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VOL. X.
LES—MEC

INDOEI DISCANT, ET AMEN ME MINER PERITI.

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LESTOFF, or LESTOFF, a town of Suffolk in England, situated on the sea shore, 117 miles north-west of London. It is concerned in the fisheries of the North-sea, cod, herrings, mackerels, and sprats; has a church, and a dissenting meeting house; and for its security, six eighteen-pounders, which they can move as occasion requires; but it has no battery. The town consists of 500 houses; but the streets, though tolerably paved, are narrow. It has a market on Wednesdays, and two fairs in the year for petty chapmen. The coast is there very dangerous for strangers.

LESTRANGE (Sir Roger), a noted writer in the 17th century, was descended from an ancient family, seated at Hunstanton-hall in the county of Norfolk, where he was born in 1616, being the youngest son of Sir Edmund L'Estrange baronet, a zealous royalist. Having in 1644 obtained a commission from King Charles I. for reducing Lynn in Norfolk, then in possession of the parliament, his design was discovered, and his person seized. He was tried by a court martial at Guildhall in London, and condemned to die as a traitor; but was reprieved, and continued in Newgate for some time. He afterwards went beyond sea; and in August 1653 returned to England, where he applied himself to the protection Oliver Cromwell, and having once played before him on the bass-viol, he was by some nicknamed Oliver's Fiddler. Being a man of parts, master of an easy humorous style, but withal in narrow circumstances, he set up a newspaper, under the title of The Public Intelligence, in 1653; but which he laid down upon the publication of the first London gazette in 1665, having been allowed, however, a consideration by government. Some time after the Popish plot, when the Tories began to gain the ascendency over the Whigs, he, in a paper called the Observer, became a zealous champion for the former. He was afterwards knighted, and served in the parliament called by King James II. in 1685. But things taking a different turn in that prince's reign, in point of liberty of conscience, from what most people expected, our author's Observer were diluted as not at all suitting the times. However, he continued licensor of the press till King William's accession, in whose reign he met with some trouble as a disaffected person. However, he went to his grave in peace, after he had in a manner survived his intellectual powers. He published a great many political tracts, and translated several works from the Greek, Latin, and Spanish, viz. Josephus's works, Cicero's Offices, Seneca's Morals, Erasmus's Colloquies, Eras's Fables, and Bonas's Guide to Eternity. The character of his style has been variously represented; his language being observed by some to be easy and humorous, while Mr Gordon says, "that his productions are not fit to be read by any who have taste or good-breeding. They are full of phrases picked up in the streets, and nothing can be more low or wanton."

LESTWETHIEL, a town of Cornwall in England, about 229 miles distant from London. It is a well-built town, where are kept the common gaol, the weights and measures for the whole county, and the county courts. It stands on the river Fowey, which brought up vessels from Fowey, before it was choked up with land coming from tin-mines, and therefore once flourishing trade is decayed; but it holds the bulvelage of coals, salt, malt, and corn, in the town of Fowey, as it does the anchorage in its harbour. It was made a corporation by Richard earl of Cornwall when he was king of the Romans, and has had other charters since. It contains of seven capital burgesses (whereof one is a mayor), and 17 assistants or common council. It is part of the duchy of Cornwall, to which it pays L. 111. 10. 10 a year for its liberties. Its chief trade is the woollen manufacture. Its church has a spire, the only one except that of Helston in the county. Its market is Friday, and its fairs are three. It first returned members to parliament in the 33rd of Edward I. They are chosen by their burgesses and assistants. It was anciently the fish-town, and the knights of the shire are still chosen here.

LETCLADE, a town of Gloucestershire, 90 miles from London, on the borders of Oxfordshire and Berks, and the great road to Gloucester; had anciently a monestary, and a priory of black canons. In this parish is Clay-hill. The market is on Tuesday; and it has two fairs. It is supposed to have been a Roman town: for a plain Roman road runs from hence to Cirencester; and by digging in a meadow near it some years ago, an old building was discovered, supposed to be a Roman bath, which was 30 feet long, 40 broad, and 4 high, suppotred with 100 brick pillars, curiously inlaid with stones of divers colours of clofiferick work. The Leech, the Coln, the Churn, and Isis, which all rise in the Cotswold-hill, join here in one full stream, and become one river, called the Thames, which begins here to be navigable, and barges take in butter, cheese, and other goods, at its quay for London.

LETHARGY, in medicine (from \textit{les} oblivia, and \textit{numbrest}, \textit{lazieust}), a disease consisting of profound dreams or sleepings, from which the patient cannot be awakened; or, if awakened, he remains stupid, without sense or memory, and presently falls again into his former sleep. See \textit{Medicine-Index}.

LETHARGY, in farriery. See there, § 9.
LET

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LETHE, in the ancient mythology, one of the rivers of hell, signifying oblivion or forgetfulness, its waters having, according to poetic fiction, the peculiar quality of making those who drank them forget every thing that was past.

LETI (Gregorio), an eminent Italian writer, was defended of a family which once made a considerable figure at Bologna: Jeron, his father, was page to prince Charles de Medicis; served some time in the troops of the grand duke as captain of foot; and settling at Milan, married there in 1628. He was afterward governor of Almantea in Calabria, and died at Salerno in 1639. Our author was born at Milan in 1630, studied under the Jesuits at Cofenza, and was afterwards sent by an uncle to Rome, who would have him enter into the church; but he being averse to it, went into Geneva, where he studied the government and the religion there. Thence he went to Lausanne; and contrasting an acquaintance with John Anthony Coerlin, an eminent physician, lodged at his house, made profession of the Calvinist religion, and married his daughter. He settled at Geneva; where he spent almost twenty years, carrying on a correspondence with learned men, especially those of Italy. Some contéts obliged him to leave that city in 1679; upon which he went to France, and then into England, where he was received with great civility by Charles II., who, after his first audience, made him a present of a thousand crowns, with a promise of the place of historiographer. He wrote there the History of England; but that work not pleasing the court on account of his too great liberty in writing, he was ordered to leave the kingdom. He went to Amsterdam in 1682, and was honoured with the place of historiographer to that city. He died suddenly in 1701. He was a man of indefatigable application, as the multiplicity of his works show. The principal of these are, 1. The universal monarchy of Louis XIV. 2. The life of Pope Sixtus V. 3. The life of Philip II. King of Spain. 4. The life of the emperor Charles V. 5. The life of Elizabeth, queen of England. 6. The history of Oliver Cromwell. 7. The history of Great Britain, 5 vols 12mo. 8. The history of Geneva, &c.

LETTRUM, a county of Ireland, in the province of Connaught, 44 miles in length and 17 in breadth; bounded on the east and north-east by Cavan and Fermangh, by Sligo and Roscommon on the west and south-west, and by Longford on the east and south-east. It is a hilly country, with rank grass, which feeds a great number of cattle. The chief town is Letterm, seated not far from the river Shannon. It contains 4000 houses, 21 parishes, 5 baronies, 2 boroughs, and sends 6 members to parliament.

LETTER a character used to express one of the simple sounds of the voice; and as the different simple sounds are expressed by different letters, the, by being differently compounded, become the visible signs or characters of all the modulations and mixtures of sounds used to express our ideas in a regular language; (See Language.) Thus, is by the help of speech we render our ideas audible; by the assistance of letters we render them visible, and by their help we can wrap up our thoughts, and send them to the most distant parts of the earth, and read the transactions of different ages. As to the first letters, what they were, who first invented them, and among what people they were first in use, there is still room to doubt: Philo attributes this great and noble invention to Abraham; Jofephus, St Ireneus, and others, to Enoch; Biliander, to Adam; Eusebius, Cicero, Alexander, Cornelius Agrippa, and others, to Moses; Pomponius Mela, Herodian, Rufus Pictus, Pliny, Lucan, &c. to the Phcenicians; St Cyprin, to Satora; Tacitus, to the Egyptians; some, to the Ethiopians; and others, to the Chinese: but, with respect to these last, they can never be intitled to this honour, since all their characters are the signs of words, formed without the use of letters; which renders it impossible to read and write their language without a vast expence of time and trouble; and absolutely impossible to print it by the help of types, or any other manner but by engraving or cutting in wood. See Printing.

There have been also various conjectures about the different kinds of letters used in different languages; thus, according to Crito, Moses invented the Hebrew letters; Abraham, the Syrac and Chaldean; the Phcenicians, those of Attica, brought into Greece by Cadmus, and from thence into Italy by the Pelagians; Nicostrata, the Roman; Isis, the Egyptian; and Vulfilas, those of the Goths.

It is probable, that the Egyptian hieroglyphics were the first manner of writing; but whether Cadmus and the Phcenicians learned the use of letters from the Egyptians, or from their neighbours of Judea or Samaria, is a question; for since some of the books of the Old Testament were then written, they are more likely to have given them the hint, than the hieroglyphics of Egypt. But whereforever the Phcenicians learned this art, it is generally agreed, that Cadmus the son of Agenor first brought letters into Greece; whence, in following ages, they spread over the rest of Europe. See alphabet and Writing.

Letters make the first part or elements of grammar; an assemblage of these compose syllables and words, and these compose sentences. The alphabet of every language consists of a number of letters, which ought each to have a different sound, figure, and use. As the difference of articulate sounds was intended to express the different ideas of the mind, so one letter was originally intended to signify only one sound, and not, as at present, to express sometimes one sound and sometimes another; which practice has brought a great deal of confusion into the languages, and rendered the learning of the modern tongues much more difficult than it would otherwise have been. This consideration, together with the deficiency of all the known alphabets, from their wanting some letters to express certain sounds, has occasioned several attempts towards an universal alphabet, to contain an enumeration of all such single sounds or letters as are used in any language. See Alphabet.

Grammarians distinguish letters into vowels, consonants, mutes, liquids, diphthongs, and characters. They are likewise divided into capital and small letters. They are also denominated from the shape and turn of the letters; and in writing are distinguished into different hands, as round-text, German-text, round hand, Italian, &c. and in printing, into Roman, Italic, and black letter.

The term Letter, or Type, among printers, noto-

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Accordingly Cicero says; "In writing letters, we use make of common words and expressions." And
Seneca more fully, "I would have my letters to be like my discourses, when we either sit or walk togeth
er, unquoted and easy." And what prudent man, in his common discourse, aims at bright and
strong figures, beautiful turns of language, or lab
oured periods? Nor is it always requisite to attend
to exact order and method. He that is master of
what he writes, will naturally enough express his
thought without perplexity and confusion; and more
than this is seldom necessary, especially in familar
letters.

Indeed, as the subjects of epistles are exceedingly
various, they will necessarily require some variety in
the manner of expression. If the subject be something
weighty and momentous, the language should be
strong and solemn: in things of a lower nature, more
free and easy; and upon lighter matters, jocose and
pleasent. In exhorations, it ought to be lively and
vigorous: in congratulations, kind and compassionate;
and in advising, grave and serious. Its style should be
clear and distinct: in requests, modest: in commendations, friendly; in prosperity cheerful, and
mournful in adversity. In a word, the style ought to
be accommodated to the particular nature of the thing
about which it is conversant.

Besides, the different character of the person, to
whom the letter is written, requires a like difference
in the modes of expression. We do not use the fame
language to private persons, and those in a public sta
tion; to superiors, inferiors, and equals. Nor do we
express ourselves alike to old men and young, to the
great and illustrious, to courtiers and philosophers,
to our friends and strangers. Superiors are to be ad
ressed with respect, inferiors with courtesy, and
equals with civility; and every one's character, sta
tion, and circumstances of life, with the relation we
stand to him, occasions some variety in this respect.

But when friends and acquaintances correspond by
letters, it carries them into all the freedom and good
humour of conversation; and the nearer it resembles
that, the better, since it is designed to supply the room
of it. For when friends cannot enjoy each others
company, the next satisfaction is to converse with
each other by letters. Indeed, sometimes greater
freedom is used in epistles, than the same persons
would have taken in discourse together; because,
as Cicero says, "A letter does not blush." But still
nothing ought to be said in a letter, which, considered
in itself, would not have been fit to say in discourse;
though modesty perhaps, or some other particular
reason, might have prevented it. And thus it fre
quently happens in requests, reproofs, and other cir
cumstances of life. A man can ask that by writing,
which he could not do by words, if present; or blame
what he thinks amiss in his friend with greater liberty
when absent, than if they were together. From hence
it is easy to judge of the fineness of any expression to
stand in an epistle, only by considering, whether the
same way of speaking would be proper in talking with
the same person. Indeed, this difference may be al
lowed, that as persons have more time to think, when
they write, than when they speak; a greater accura
cy of language may sometimes be expected in one,

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than the other. However, this makes no odds as to the kind of style; for every one would choose to speak as correctly as he writes, if he could. And therefore all such words and expressions, as are unbecoming in conversation, should be avoided in letters; and a many simplicity free of all affectation, plain, but decent and agreeable, should run through the whole. This is the usual style of Cicero’s epistles, in which the plainness and simplicity of his dictation is accompanied with something so pleasant and engaging, that he keeps up the attention of his reader, without frustrating him to tire. On the other hand, Pliny’s style is frequently witty; but generally so full of turns and quibbles upon the sound of words, as apparently to render it more flift and affected than agrees with conversation, or than a man of sense would choose to diflince, were it in his power. You may in some measure judge of Pliny’s manner, by one short letter to his friend, which runs thus: "How fare you? As I do in the country? pleasantly? that is, at leisure? For which reason I do not care to write long letters but to read them; the one as the effect of niceness, and the other of idleness. For nothing is more idle than your nice folks, or curious than your idle ones. Farewell." Every sentence here consists of an antithesis, and a jingle of words, very different from the style of conversation, and plainly the effect of study. But this was owing to the age in which he lived, at which time the Roman eloquence was sunk into puns and an affectation of wit; for he was otherwise a man of fine sense and great learning.

**Letter of Attorney**, in law, is a writing by which one person authorizes another to do some lawful act in his stead; as to give seisin of lands, to receive debts, bail a third person, &c.

The nature of this instrument is to transfer to the person to whom it is given, the whole power of the maker, to enable him to accomplish the act intended to be performed. It is either general or special: and sometimes it is made revocable, which is when a bare authority is only given; and sometimes it is irrevocable, as where debts, &c. are assigned from one person to another. It is generally held, that the power granted to the attorney must be strictly pursued; and that where it is made to three persons, two cannot execute it. In most cases, the power given by a letter of attorney determines upon the death of the person who gave it. No letter of attorney made by any feamen, &c. in any ship of war, or having letters of marque, or by their executors, &c. in order to empower any person to receive any share of prizes or bounty-money, shall be valid, unless the same be made revocable, and for the use of such seamen, and be signed and executed before, and attested by, the captain and one other of the signing officers of the ship, or the mayor or chief magistrate of some corporation.

**Letter of Free or Over**, are writings sealed with the great seal of England, whereby a man is authorized to do, or enjoy any thing, which, of himself, he could not do. See Patent. They are so called by reason of their form; as being open, with the seal affixed, ready to be flown for the confirmation of the authority given by them.

**Lettuce**, in botany. See Lactuca.
LEUCOMA, in surgery, a disorder of the eye, otherwise called **albug**, See **Albug**, and **Surgery**.

**LEUCOPETRA**, (anc. geog.) so called from its white colour (Strabo); a promontory of the Bruttii, in the territory of Rhegium: the termination of the Apennine. The outmost extremity of the Bruttii, or the modern **Calabria Ultra**; as the Japygium is of the ancient Calabria, or the modern **Calabria Cura**.

**LEUCOPETRIANS**, in ecclesiastical history, the name of a fanatical sect which sprang up in the Greek and Eastern churches towards the close of the 12th century; the fanatics of this denomination professed to believe in a double trinity, rejected wedlock, abstained from fleshly indulgences, considered the sacraments of Baptism and the Lord's Supper, and all the various branches of external worship; placed the essence of religion in internal prayer alone, and maintained, as it is said, that an evil being, or genius, dwelt in the breast of every mortal, and could be expelled thence by no other method than by perpetual supplication to the Supreme Being. The founder of this enthusiastic sect is said to have been a person called **Leucopetra**, and his chief disciple Typhon, who corrupted by fanatical interpretations, several books of Scripture, and particularly St. Matthew's Gospel.

**LEUCOPHELMATIA**, in medicine, a kind of dropsy, otherwise called **anaforcaea**, See **Jades subjoined to** **Medicine**.

**LEUCOTHOE** or **LEUCO THEA** (fáb. hist.), the wife of Athamas, changed into a sea deity; see **io**. She was called **Mataia** by the Roman. She had a temple at Rome, where all the people, particularly women, offered vows for their brother's children. They did not in treat the deity to protect their own children, because Io had been unfortunate in hers.

No female slaves were permitted to enter the temple; or if their curiosity tempted them to transgress this rule, they were beaten with the greatest severity. To this supplicating for other people's children, Ovid adds in these lines:

*Quam non tanum lancea pro filio sua pia mater adduxit, / Ipse parum fuisse parum paren.***

**LEUCTRA** (anc. geog.), a town of Boeotia, to the west of Thebes, or between Platea and Iphigia, where the Lacedemonians had a great defeat given them by Epaminondas and Pelopidas the Thewan generals. The Theban army consisted of 6000 men, where as that of the enemy was at least thrice that number; but Epaminondas trusted most in his horse, wherein he had much the advantage, both in their quality and good management; the rest he endeavoured to supply by the disposition of his men, and the vigour of the attack. He even refused to suffer any to serve under him in the engagement, but such as he knew to be fully resolved to conquer or die. He put himself at the head of the left wing, opposite to Cleombrotus king of Sparta, and placed the main forces of the battle there; rightly concluding, that if he could break the body of the Spartans, which was but 12 men deep, whereas his own was so, the rest would be soon put to flight. He closed his own with the fiercest band, which was commanded by Pelopidas; and placed his horse in front. His right, from which he had drawn so many men, he ordered to fall back,
LEV [6] LEV

Lev, in a flating line, as if they declined to fight, that they might not be too much exposed to the enemy, and might serve him for a corps of reserve in case of need. This was the wise disposition which the two Theban generals made of their few but resolute forces; and which succeeded in every part, according to their will. Epaminondas advanced with his left wing, extending it obliquely, in order to draw the enemy's right from the main body; and Pelopidas charged them with such desperate force and fury, at the head of his battalion, before they could reunite, that their horse, not being able to stand the shock, were forced back upon their infantry, which threw the whole into the greatest confusion: so that though the Spartans were of all the Greeks the most expert in recovering from any surprise, yet their skill on this occasion either failed them or proved of no effect; for the Thebans, observing the dreadful impression they had made on them with their horse, pulled furiously upon the Spartan king, and opened their way to him with a great slaughter.

Upon the death of Cleombrotus, and several officers of note, the Spartans, according to custom, renewed the fight with double vigour and fury, not so much to revenge his death as to recover his body, which was such a established point of honour as they could not give up without the greatest disgrace. But here the Theban general wisely chose rather to gratify them in that point, than to hazard the success of a second onset; and left them in possession of their king, whilst he marched straight against their other wing, commanded by Archidamus, and consisted chiefly of such auxiliaries and allies as had not heartily engaged in the Spartan interest: these were so discouraged by the death of the king and the defeat of that wing, that they betook themselves to flight, and were presently after followed by the rest of the army. The Thebans, however, pursued them so closely, that they made a second dreadful slaughter among them; which completed Epaminondas's victory, whereupon master of the field, and erected a trophy in memory of it. This was the conclusion of the famed battle of Leuctra, in which the Lacedemonians lost 4000 men, and the Thebans but 300.

LEV. An instrument wherewith to draw a line parallel to the horizon, by means of which the true level, or the difference of ascent or descent between several places, may be found, for conveying water, draining fields, &c.

There are several instruments of different contrivance and matter, invented for the perfection of levelling; all of which, for the practice, may be reduced to the following.

Air-Level, that which shows the line of level by means of a bubble of air inclosed with some liquor in a glass-tube of an indeterminate length and thickness, whose two ends are hermetically sealed. When the bubble fixes itself at a certain mark, made exactly in the middle of the tube, the plane or ruler wherein it is fixed is level. When it is not level, the bubble will rise to one end. This glass-tube may be set in another of brasses, having an aperture in the middle, whence the bubble of air may be observed. The liquor wherewith the tube is filled is oil of tartr, or aqua seconda; these not being liable to freeze as common water, nor to rarefaction and condenation, as spirit of wine is. This application of a bubble of air was the invention of Dr Hooke.

There is one of these instruments made with sights, being an improvement upon that last described, which, by the addition of more apparatus, becomes more commodious and exact. It consists of an air-level, fig. 1. about eight inches long, and seven or eight lines in diameter, set in a brass-tube, 2, with an aperture in the middle, C. The tubes are carried in a strong brass-tuber, a foot long; at whose ends are fixed two sights, 3, 3, exactly perpendicular to the tube, and of an equal height, having a square hole formed by two fillets of brass crossing each other at right angles, in the middle whereof is drilled a very little hole, through which a point on a level with the instrument is depressed. The brass tube is fastened on the ruler by means of two screws; one whereof, marked 4, serves to raise or depress the tube at pleasure, for bringing it towards a level. The top of the ball and socket is riveted to a little ruler that springs one end whereof is fastened with a fret to the great ruler, and at the other end has a screw, 5, serving to raise and depress the instrument when nearly level.

The instrument just described however, is yet less commodious than the following one; because though the holes be ever so small, yet they will still take in too great a space to determine the point of level precisely.

The instrument alluded to consists of an air-level, with telescope sights. This level (fig. 2.) is like the last; with this difference, that instead of plain sights, it carries a telescope to determine exactly a point of level at a good distance. The telescope is a little brass-tube about 15 inches long, fastened on the same ruler as the level. At the end of the tube of the telescope, marked 1, enters the little tube 1, carrying the eye-glas and an hair horizontally placed in the focus of the object-glas, 2; which little tube may be drawn out, or pulled into the great one, for adjusting the telescope to different sights; at the other end of the telescope is placed the object-glas. The screw 3, is for raising or lowering the little fork, for carrying the hair, and making it agree with the bubble of air when the instrument is level; and the screw 4, is for making the bubble of air; D or E, agree with the telescope: the whole is fitted to a ball and socket. M. Hayagens is said to be the first inventor of this level which has this advantage, that it may be inverted by turning the ruler and telescope half round; and if then the hair cut the same point that it did before, the operation is just.

It may be observed, that one may add a telescope to any kind of level, by applying it upon, or parallel to, the base or ruler, when there is occasion to take the level of remote objects.

Dr Delaguiers contrived an instrument by which the difference of level of two places, which could not be taken in less than four or five days with the best telescope-levels, may be taken in a few hours. The instrument is as follows. To the ball C (fig. 3.) is joined a recurve tube BA, with a very fine bore, and a small bubble at top A, whose upper part is open. It is evident from the make of this instrument, that if it be inclined in carrying, no prejudice will be done to the liquor, which will always be right both in the ball and tube when the instrument is set upright. If the air at C be so expanded with heat, as to drive the liquor
liquor to the top of the tube, the cavity A will receive the liquor, which will come down again and settle at D, or near it, according to the level of the place where the instrument is, as soon as the air at C returns to the same temper as to heat and cold.

To prove the same degree of heat, when the different observations are made, the machine is fixed in a tin vessel, EF, filled with water up to g h, above the ball, and a very sensitive thermometer has also its ball under water, that one may observe the liquor at D, in each experiment, when the thermometer stands at the same height as before. The water is poured out when the instrument is carried; which one may do conveniently by means of the wooden frame, which is set upright by the three screws S, S, S, fig. 4. and a line and plummet P P, fig. 5. At the back part of the wooden frame, from the piece at top K, hangs the plummet P, over a brass point at N; M m are brackets to make the upright board K N continue at right angles with the horizontal one at N. Fig. 6. represents a front view of the machine, supposing the fore part of the tin vessel transparent; and here the brass socket of the recurve-tube, into which the ball is ferewed, has two wings at 11, fixed to the bottom, that the ball may not break the tube by its endeavour to emerge when the water is poured in, as high as g h.

After the Doctor had contrived this machine, he considered, that as the tube is of a very small bore, if the liquor should rise into the ball at A (fig. 5.) in carrying the instrument from one place to another, some of it would adhere to the sides or the ball A, and upon its descent in making the experiment, so much might be left behind, that the liquor would not be blank, screw, to shut up the hole at A, as soon as one experiment is made, that, in carrying the machine, the air in A may balance that in C, so that the liquor shall not run up and down the tube, whatever degree of heat and cold may act upon the instrument, in going from one place to another. Now, because one experiment may be made in the morning, the water may be so cold, that when a second experiment is made at noon the water cannot be brought to the same degree of cold it had in the morning; therefore, in making the first experiment, warm water must be mixed with the cold, and when the water has stood some time, before it comes to be as cold as it is likely to be at the warmest part of that day, observe and set down the degree of the thermometer at which the spirit stands, and likewise the degree of the water in the barometer at D; then ferew on the cape at A, pour out the water, and carry the instrument to the place whose level you would know; then pour in your water, and when the thermometer is come to the same degree as before, open the screw at v m, and observe the liquor in the barometer.

The Doctor's scale for the barometer is ten inches long, and divided into tenths; so that such an instrument will serve for any heights not exceeding ten feet, each tenth of an inch answering to a foot in height. The doctor made no allowance for the decrease of density in the air, because he did not propose this machine for measuring mountains (though, with a proper allowance for the decreasing density of the air, it will do very well), but for heights that want to be known in gardens, plantations, and the conveyance of water, where an experiment that answers two or three feet in the distance of 20 miles, will render this a very useful instrument.

Artillery Foot—Level, is in form of a square, having its two legs or branches of an equal length; at a junction whereof is a little hole, whence hangs a thread and plummet playing on a perpendicular line in the middle of a quadrant. It is divided into twice 45 degrees from the middle. Fig. 7.

This instrument may be used on other occasions, by placing the ends of its two branches on a plane, for when the thread plays perpendicularly over the middle division of the quadrant, that plane is assuredly level. To use it in gunnery, place the two ends on the piece of artillery, which you may raise to any proposed height, by means of the plummet, whose thread will give the degree above the level.

Carpenter's and Mason's LEVEL, consists of a long ruler, in the middle whereof is flattened, at right angles, another somewhat bigger, at the top of which is fastened a line, which, when it hangs over a fiducial line at right angles with the base, shows that the said base is horizontal. Sometimes this level is all of one board. Fig. 8.

Gunner's Level, for levelling cannons and mortars, consists of a triangular brass plate, about four inches high, fig. 9. at the bottom of which is a portion of a circle, divided into 45 degrees; which number is sufficient for the highest elevation of cannons and mortars, and for giving shot the greatest range: on the centre of this segment of a circle is ferewed a piece of brass, by means of which it may be fixed or ferewed at pleasure; the end of this piece of brass is made fo as to serve for a plummet and index, in order to show the different degrees of elevation of pieces of artillery. This instrument has also a brass foot, to set upon cannons or mortars, so as, when those pieces are horizontal, the instrument will be perpendicular. The foot of this instrument is to be placed on the piece to be elevated, in such a manner, as that the point of the plummet may fall on the proper degree: this is what they call levelling the piece.

Mason's Level, is composed of three rules, so joined as to form an oblong-rectangle, somewhat like a Roman A; at the vertex whereof is a levelled thread, from which hangs a plummet, that plusses over a fiducial line, marked in the middle of the base, when the thing to which the level is applied is horizontal; but declines from the mark, when the thing is lower on the one side than on the other.

Plumb or Pendulum Level, which shows the horizontal lines by means of another line perpendicular to that described by a plummet or pendulum. This instrument, fig. 10. consists of two legs or branches, joined together at right angles, whereof that which carries the thread and plummet is about a foot and a half long: the thread is hung towards the top of the branch, at the point 2. The middle of the branch where the thread plusses is hollow, so that it may hang free every where; but towards the bottom, where there is a little blade of silver, whereon is drawn a line perpendicular to the telescope, the said cavity is covered by two pieces of brass, making as it were a kind of cafe, left the wind should agitate the thread; for which reason the silver blade is covered with a glass G, to the
end that it may be seen when the thread and plummet play upon the perpendicular: the telescope is fastened to the other branch of the instrument, and is about two feet long; having an hair placed horizontally across the focus of the object-glass, which determines the point of the level. The telescope must be fitted at right angles to the perpendicular. It has a ball and socket, by which it is fastened to the foot, and was invented by M. Piccard.

Reflecting Level, that made by means of a pretty long surface of water representing the same object inverted which we see erected by the eye, so that the point where these two objects appear to meet is on a level with the place where the surface of the water is found. This is the invention of M. Mariotte.

There is another reflecting level consisting of a mirror of steel, or the like, well polished, and placed a little before the object-glass of a telescope, suspended perpendicularly. This mirror must make an angle of 45° with the telescope, in which case the perpendicular line of the said telescope is converted into a horizontal line, which is the same line of level. This is the invention of M. Caffini.

Water Level, that which shows the horizontal line by means of a surface of water or other liquor; founded on this principle, that water always places itself level.

The most simple is made of a long wooden trough or canal, whose sides are parallel to the base; so that being equally filled with water, its surface shows the line of level. This is the chorobates of the ancients.

Chorobata.-

See also made with two cups fitted to the two ends of a pipe, three or four feet long, about an inch in diameter, by means of which the water communicates from the one to the other cup; and this pipe being moveable on its stand by means of a ball and socket, when the two cups become equally full of water, their two surfaces mark the line of level.

This instrument, instead of cups, may also be made with two short cylinders of glass three or four inches long, fastened to each extreme of the pipe with wax or mastic. Into the pipe is poured some common or coloured water which flows itself through the cylinders by means whereof the line of level is determined; the height of the water, with respect to the centre of the earth being always the same in both cylinders; this level, though very simple, is yet very commodious for levelling small distances.

Level of Mr. Huygens's invention, consists of a telescope a, fig. 11, in form of a cylinder, going through a ferrill, in which it is fastened by the middle. This ferrill has two flat branches b, one above, and the other below: at the ends whereof are fastened little moving pieces, which carry two rings, by one of which the telescope is suspended to an hook at the end of the screw 3, and by the other a pretty heavy weight is suspended, in order to keep the telescope in \textit{equilibrio}. This weight hangs in the box 5, which is almost filled with linseed oil, oil of walnuts, or other matter that will not easily coagulate, for more aptly settling the balance of the weight and telescope. The instrument caries two telescopes close and very parallel to each other, the eye-glasses of the one being against the object-glass of the other, that one may see each way without turning the level. In the focus of the object-glasses of each telescope must a little hair be strained horizontally, to be raised and lowered as occasion requires by a little screw. If the tube of the telescope be not found level when suspended, a ferrill or ring, \textit{f}, is put on it, and is to be slid along till it fixes to a level. The hook on which the instrument is hung is fixed to a flat wooden cross; at the ends of each arm whereof there is a hook serving to keep the telescope from too much agitation in using or carriage.

To the said flat cross is applied another hollow one, that serves as a case for the instrument; but the two ends are left open, that the telescope may be secured from the weather and in a condition always to be used. The foot of this instrument is a round brass plate, to which are fastened three brass ferrills, moveable by means of joints wherein are put staves, and on this foot is placed the box.

Fig. 12. marked \textit{I}, is a balance-level; which being suspended by the ring, the two sights, when in \textit{equilibrio}, will be horizontal, or in a level.

Spirit Level. The most accurate levelling instrument, and that possessed of the greatest essential advantages in use, is the spirit-level; which was at first contrived by the late Mr. Sifon, and to which the small additions and improvements have been since made. The following is a description of one of the best of these levels, as made by the principal mathematical instrument makers.

Fig. 13, is a representation of the instrument mounted on its complete staves, copied (except the letters) from Mr. Adams's Graphical Essays, Plate xviii. fig. 3. The telescope (ABC) is made from 15 inches to 2 feet in length, as may be required. It is achromatic, of the best kind, and shows the objects erect. In the focus of the eye-glases are exceedingly fine cross wires, the intersection of which is evidently shown to be perfectly in the axis of the tube; for by turning it round on its two supports DE, and looking through the telescope, the intersection of the wires will constantly cut the same part of the object viewed. By turning the screw \textit{a} at the side of the telescope, the object-glass at \textit{g} is moved; and thus the telescope is exactly adapted to the eye. If these cross wires are at any time out of their adjustment, which is discovered by their intersection not cutting the same part of the object during the revolution of the telescope on its axis, they are easily adjusted by means of the four screws bc, placed on the telescope about an inch from the end for the eye. These screws \textit{c}, in perpendicular directions to one another, by unfurring one and tightening the other opposite to the wire, so that if connected with it, it may be moved either way at pleasure; and in this manner the wire perpendicular to it may be moved, and thus the intersection of the wires brought exactly in the axis of the tube.

To the telescope is fixed, by two small screws ce, the level tube containing the spirits, with a small bubble of air: This bubble of air, when the instrument is well adjusted, will lie exactly in the same place, in or near the middle of its tube, whether the telescope be reversed or not on the supports, in which case it is kept unmoved.

It is evident that the axis of the telescope, or the intersection of the wires as before shown, must be in this case
Levels.

Plate CCLXX

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.
LEVELLING.

In this facile mode of adjustment consists the new improvement of the instrument; and it is hereby capable of being adjusted by only one station and one object, which will at the same time determine it to be in a true level. If by change of weather, accident, or otherwise, the instrument should have lost its level adjustment or face, it may thus be readily refixed and re-adjusted at the first station; which is an advantage none of the instruments formerly made have been capable of. The two supporters \( D, F \), on which the level rests and turns, are shaped like the letter \( V \). The telescope rests within the upper part of them; and the inner sides of each of these \( Y \) are tangents to the cylindrical tube of the telescope, which is turned to a true cylinder, and each touches it but at one place only.

The lower end of these supporters are inserted into a strong brass plate \( F, E, \) and fit as to stand perpendicularly on it. One is kept fast by a tightening screw \( G \), and to the other is applied a fine threaded screw \( H \), to adjust the tube when on its supporters to a true level. To the supporter \( D \) is sometimes applied a line of tangents as far as \( 12 \) degrees, in order to take an angle of depression or elevation to that extent. Between the supporters is also sometimes fixed a compass-box \( L \), divided into 360 degrees, and again into four \( 90^\circ \); having a centre pin and needle, and trigger, at \( d \), to throw off the needle from the centre when not used; so in this manner it constitutes a perfect circumferentor, connected with all the foregoing improvements. This plate is fixed on a conical brass ferrel \( K \), which is adapted to the bowl of the instrument of a cone at top of the brass head of the flaves, having a ball and socket, with three bowl-ball joints, two strong brass parallel plates \( L, L \), the four screws \( c, c \) for adjusting the horizontal motion, a regulating screw \( M \) to this motion, and a fastening screw \( N \) to tighten it on the cone when necessary. The fastening screw \( N \), and the regulating screw \( M \), by which the whole instrument is moved, with accuracy through a small space in an horizontal direction, was an addition of Mr. Ramsden's.

The manner of adjusting the spirit-level at the first station.

The whole being now placed steadily on its stand, it must be rendered parallel to the axis of the telescope before you adjust the horizontal motion. To this end the telescope must be placed in a line with two of the screws \( c, c \), and that levelled thereby till the bubble of air in the spirit-tube keeps its position in the middle, while turned about two or three points, making nearly right angles at the centre to one another.

If the horizontal motion being thus adjusted, the rims \( f, f \) of the \( Y \) is to be opened, the telescope taken off and laid the contrary way upon the supporters. If the bubble of air then rests exactly the same, the level and telescope are adjusted rightly to one another; but if the bubble does not remain the same, the end to which the air bubble goes must be noticed, and the distance of it from the telescope altered; correcting one half the error by the screws \( c, c \), and the other half by the screws \( e, e \).

Now the intersection of the wires being directed to any distant object, it may be one of the vales of the flaves hereafter described: if they continue to be against it precisely while the telescope is turned round on its \( Y \), it proves, as before mentioned, that the axis of the telescope coincides with the intersection of the wires, and that the instrument will give the true level direction.

The operation of levelling being of a very accurate and important nature, and the best instrument when out of its adjustment being of little use, it is quite necessary that every person using such an instrument should have it ready in his power to correct it; and the one above described appears to be the best adapted for that purpose of any hitherto contrived.

LEVELLING may be defined, the art which infurates us in finding how much higher or lower any given point on the surface of the earth is than another; or, in other words, the difference in their distance from the centre of the earth.

The practice of levelling therefore consists, 1. In finding one station only. or, in other words, the difference in their distance from the centre of the earth.

With regard to the theory of levelling, we must observe, that a plumb-line, hanging freely in the air, points directly towards the centre of the earth; and a line drawn at right angles, crossing the direction of the plumb-line, and touching the earth's surface, is a true level only in that particular spot; but if this line which crosses the plumb be continued for any considerable length, it will rise above the earth's surface, and the apparent level will be above the true one, because the earth is globular; and this rising will be as the square of the distance to which the said right line is produced; that is to say, however much it is raised above the earth's surface at one mile's distance, it will rise four times as much at the distance of two miles, nine times at the distance of three, &c. This is owing to the globular figure of the earth; and this rising is the difference between the true and apparent level, the real curve of the earth being the true level, and the tangent to it the apparent level. Hence it appears, that the less distance we take betwixt any two stations, the truer will be our operations in levelling; and so soon does the difference between the true and apparent levels become perceptible, that it is necessary to make an allowance for it, if the distance betwixt the two stations exceeds two chains in length. The following is an infallible rule for determining the allowance to be made:

"Multiply the number of Gunter's decimal lines that are contained in length between any two stations where the levels are to be taken by itself, and add the product arising therefrom by \( \frac{1}{100} \); which is a common multiplier for all manner of distances for this purpose on account of the earth's curvature: then divide the second product arising therefrom by \( 100,000 \); or, which is also the same, with the daff of the pen cut off five figures on the right hand side of the product, and what remains on the left side is inches, and the five figures cut off decimal parts of an inch."
Levelling. The following is A Table of the Curvature of the Earth, and shows the quantity below the apparent level at the end of every number of chains to 100.

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<th>Feet</th>
<th>Chains</th>
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<td>6</td>
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Levelling is either simple or compound. The former is when the level points are determined from one station, whether the level be fixed at one of the points or between them. Compound levelling is nothing more than a repetition of many simple operations.

An example of simple levelling is given Plate CCLXXI. fig. 1, where A B are the station points of the level; C D the two points ascertaincd. Let the height CH, HN, from whence also the number of chains and inches below the apparent level at the end of every number of chains is to be determined. The figure 12. stations are marked. Stakes ought then to be driven in at the limits of each station, as A, B, C, D, &c. They ought to be about two or three inches above the ground, and driven 18 inches into it. Stakes should also be driven in at each station of the instrument, as 1, 2, 3, 4, &c.

From A to C be - 6 0 0
From B to D be - 9 0 0

The difference - 3 0 0

If the station points of the level are above the line of sight, as in fig. 2, and the distance from A to C be six feet, and from B to D nine feet, the difference will still be three feet which B is higher than A.

As an example of compound levelling, suppose it were required to know the difference of height between the point A on the river Zame, and N on the river Belams, fig. 3. (As our author could find no factitious examples in any English author, he copied this and the following ones from M. le Febure). In this operation stakes should be driven down at A and N, exactly level with the surface of the water; and these stakes should be so fixed, that they may not be changed until the whole operation be finished; a plan of the ground between the two rivers should then be made, by which it will be discovered, that the shortest way between the rivers is by the dotted line AC, CH, HN, from whence also the number of stations necessary to be taken will be determined. The operator will also be enabled to distribute them properly according to the nature and situation of the ground.

In the figure 12 stations are marked. Stakes ought then to be driven in at the limits of each station, as A, B, C, D, &c. They ought to be about two or three inches above the ground, and driven 18 inches into it. Stakes should also be driven in at each station of the instrument, as 1, 2, 3, 4, &c.

The operation may be begun in the following manner. Let the first station be at 1, equally distant from the two points A and B, which themselves are distant 166 yards. Write down on in one column the first limit A; in another, the number of feet, inches, and tenths; with the points of sight indicated on the station-staff at A, viz. 7. 6. 0. In the third column, the second limit B; in the fourth, the height indicated at the station-staff B, viz. 6. 0. 0. Lastly, in the fifth column, the distance from one station-staff to the other; which in this case is 166 yards. Remove now the level to the point marked 2, which is in the middle between B and C, the two places where the station-staves are to be held; observing that B, which was the second limit in the former operation, is the first in this. Then write down the observed heights as before: in the first column B; in the second 4. 6. 0; in the third C; in the fourth 5. 6. 2; in the fifth 560, the distance between B and C.

It being impossible, on account of the inequality of the ground at the third station, to place the instrument in the middle between the two station-staves, find the most convenient point as at 3; then measure exactly how far this is from each station-staff, and you will find that from 3 to C is 160 yards; from three to D, 80 yards: and the remainder of the operation will be as in the preceding station.

In the fourth operation, we must endeavour to compensate for any error which might have happened in the last. Mark out, therefore, 80 yards from the station-staff D to the point 4; and 160 yards from 4 to E; and this must be carefully attended to, as by such compensations the work may be much facilitated. Proceed in the same manner with the eight remaining stations, observing to enter every thing in its proper column; and when the whole is finished, add the sums of each column together, and then subtract the lesser from the greater: the difference, which in the present case is 5. 4. 8, shows the ground at N to be thus much lower than the ground at A.

To obtain a section of this level, draw the dotted line oo, fig. 4, either above or below the plane which may be taken for the level or horizontal line. Let fall then perpendiculac upon this line from all the station-points and places where the station-staves were fixed. Beginning now at A, set off 7 feet 6 inches upon the line from A to a for the height of the level-point determined on the staff at this place, draw a line through a parallel to the dotted line oo, which will cut the third perpendicular at b, the second station-staff. Set off from this point downwards six feet to B, which shows the second limit of the first operation; and that the ground at B is one foot six inches higher than at A: place your instrument between the two lines at the height of the level line, and trace the ground according to its different heights. Now set off on the second station-staff B, four feet six inches to C, the height determined by the level at the second station; and from C draw a line parallel to oo, which will cut the fifth perpendicular at d, the third station-staff. From this point set off 3 feet 6 inches, downwards to C, which will be our second limit with respect to the preceding one and the third with respect to the fifth. Then draw your instrument in the middle between B and C, and delineate the ground with its inequalities. Proceed.
Levelling. 

Levelling, indeed, in the same manner from station to station, till you arrive at the last \( N \), and you will have the profile of the ground over which the level was taken.

This method answers very well where only a general profile of the different stations is required; but where it is necessary to have an exact detail of the ground between the limits, we must then go to work more particularly. Suppose, therefore, the level to have been taken from \( A \) to \( N \) by another route, but on a more uniform ground, in order to form a canal marked \( O, P, Q, R, S, T, U, X, Y \). Draw at pleasure a line \( Z, Y \), fig. 5, to represent the level, and regulate the rest; then let fall on this line perpendiculars to represent the flaks at the limits of each station, taking care that they be fixed accurately at their respective distances from each other. The difference between the extreme limits, in this case, ought to be the same as in the former, viz., 5 feet 4 inches. Set off this measure upon the perpendicular at the first limit; and from prolonging the perpendicular, mark off at \( a \) the height determined at the first station; then do the same with the second and third, and so on with the following, till this part of the work is finished; there remains then only to delineate in detail the ground between the stations, the distances in this example being doubled larger on account of the detail.

To obtain the section of the ground between \( O \) and \( P \), place your instrument at one of the limits, as \( P \), fixing it so that the cross hairs may answer to the point \( C \); then look towards the first limit \( a \), raising or depressing the vane till it coincides with the intersection of the cross hairs; and the line of sight from one point to the other will mark the level or horizontal line.

To set off the height of the brink of the river above the first limit, drive a stake down close to the ground at \( a \); and place your station-staff upon it, observing where the hairs intersect the vane, which will be 5 feet 10 inches; then, laying off upon the line \( ax \) the distance from the first to the last stake, let fall from thence a perpendicular, and set off thereon 14 to \( a \), which gives the height at the last stake; or, which is the fact, the height from the edge of the river above the surface of the water, as is evident from the section. Drive a second stake at \( 6 \), in a line between the limits; place the station-staff upon this stake, and observe the height 4. 6. intersected by the cross hairs; the instrument will remaining in the same situation. Set off on the level-line the distance from the first stake \( a \) to the second \( b \); and then let fall a perpendicular, and mark upon it 4. 6 to \( b \), which gives the height of the ground at this place.

The small hollow \( c \) is marked out by driving down a third stake even with the ground, in the middle of it at \( c \); but the exact distance of the second stake \( b \) from the third \( c \), must be marked upon the instrument, as \( b \) will fall a perpendicular from \( c \), and set off upon it 6. 8. \( c \), pointed out by the cross hairs on the staff, which determines the depth of the hollow, as appears from the figure. As the distances between the stakes are now very short, they can easily be marked by the operator, who can settle any little inequalities by a comparison with those already ascertained. Proceed thus with the other stations till you arrive at the last, and you will always obtain an accurate section of your work; by which it is easy to form a just estimation of levelling, the land to be dug away, in order to form the canal, by adding the depth to be given to it.

In great heights such as this, it will be necessary to proceed by small descents, as from \( A \) to \( D \). The instrument must be adjusted with all possible care; and it will even be proper, in some part of the work, to use a smaller instrument. The following is a table of the different operations used in making this level, it having been taken from M. le Febure's practice.

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<th>Feet in</th>
<th>Feet in</th>
<th>Yards</th>
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<tbody>
<tr>
<td>A 2 6</td>
<td>C 0 9</td>
<td>90</td>
</tr>
<tr>
<td>C 4 3</td>
<td>D 0 3</td>
<td>40</td>
</tr>
<tr>
<td>D 3 9</td>
<td>E 16 3</td>
<td>250</td>
</tr>
<tr>
<td>E 5 0</td>
<td>F 17 9</td>
<td>250</td>
</tr>
<tr>
<td>F 10 6</td>
<td>G 5 0</td>
<td>275</td>
</tr>
<tr>
<td>G 5 0</td>
<td>H 19 0</td>
<td>300</td>
</tr>
<tr>
<td>H 5 0</td>
<td>K 47 3</td>
<td>1000</td>
</tr>
</tbody>
</table>

In this case only two levellings are made between \( A \) and \( D \), though more would have been necessary; but they are omitted to avoid confusion. In the fourth station the height found was 16 feet 8 inches; but on account of the great length, it was requisite to reduce the apparent level to the true one, which is always necessary where the length is considerable. At the last limit we get the height from \( N \) to \( e \); then from \( e \) to \( l \); from \( f \) to \( K \), fig. 7 &c. all which added together, and the correction for the curvature, gives 47 feet 3 inches. Now, by adding each column together, and subtracting one from the other, we have 51 feet 9 inches for the height which the point \( A \) is above \( K \), the bottom of the basin, and which will cause the jet d'eau to rise about 45 feet. The general section of this operation is shown at fig. 7. 8, but an exact profile of the mountain is more difficult; as requiring many operations; though some of these might be obtained by measuring from the level line without moving the instrument.

The last example given by our author is likewise from M. le Febure, and includes a length of near five German miles (25 quarters) in a straight line, and 9 or 10 (45 or 50 English lines) including the turnings and windings. In this instance the river \( Raynor \) was measured from Lignebrook to Villebour. The first operation was to drive stakes at several parts of the river even with the water's edge; the first of which a little above the mills of Lignebrook showed the upper water-mark, and another showed the lower water-mark at the same mills. Two flaks above and below the mills of Mazurance, somewhat more than half way between Lignebrook and Villebour, pointed out...
out the difference between high and low water there, and formed likewise the third and fourth limit of the operation; while the stakes above and below the mills of Villebourg pointed out the difference between high and low water, and likewise formed the last limits of the operation.

These marks were all made at the edge of the water exactly even with its surface, and all made at the different parts of the river nearly at the same instant of time. The principal limits of the levelling (says Mr. Adams) being already fixed and determined, it remains to find the level between the limits, according to the methods already pointed out, using every advantage that may contribute to the success of the work, and in the same time avoiding all obstacles and difficulties that may retard or injure the operations. The first rule is always to take the shortest possible way from one limit to another, though this rule ought not to be followed if there are considerable obstacles in the way; as hills, woods, marshy ground, or if, by going aside, any advantage can be obtained. In the present case it was found necessary to deviate very considerably from the general rule, in order to take in several points, the surfaces of which might all be taken for a perfect level, and thus levels were frequently taken across the country for a considerable way. The difference of height between the mills of Lignebruk and Villebourg was at last found to be about 19 feet, indicating a deficient of not quite a foot in a mile.

LEVELLING-STATES, instruments used in levelling, serving to carry the marks to be observed, and at the same time to measure the heights of those marks from the ground. They usually consist of two mahogany flaves ten feet long, in two parts, that slide upon one another to about 5½ feet, for the more portable carriage. They are divided into 1000 equal parts, and numbered at every tenth division by 10, 20, 30, 40, &c. to 1000; and on one side the feet and inches are also sometimes marked.

A vane A slides up and down upon each side of these flaves, which by brafs springs will stand at any part. These vanes are about 10 inches long and 4 inches broad; the breadth is first divided into three equal parts, the two extremes painted white, the middle space divided again into three equal parts which are reds; the middle one of them is also painted white, and the two other parts black; and thus they are fitted to all the common distances. These vanes have each a brass wire across a small square hole in the centre, which serves to point out the height correctly, by coinciding with the horizontal wire of the telecope of the level.

LEVEN, a river of Lenox or Dunbartonshire in Scotland. See Lenox.

LEVER, in mechanics, is a bar of iron or wood, one part of which being supported by a prop, all other parts turn upon that prop as their centre of motion. This instrument is of two kinds. First, the common form, where the weight we desire to raise rests at one end of it, our strength is applied at the other end, and the prop is between both. When we fill up the fire with a poker, we make use of this lever; the poker is the lever, it rests upon one of the bars of the grate as a prop, the incumbent fire is the weight to be overcome, and the other end held in the hands the strength or power. In this as in all the rest, we have only to increase the distance between the strength and prop to give the man that works the instrument greater power.

The lever of the second kind, has the prop at one end, the strength is applied to the other, and the weight to be raised rests upon them. Thus in raising the water-plug in the streets, the workman puts his iron lever through the hole of the plug, till he reaches the ground, and then raising his prop, lifts the plug with his strength at the other end of the lever. In this lever also, the farther the distance of the prop from the strength, the greater is the workman's power.

These instruments, as we see, assist the strength, but sometimes a workman is obliged to act at a disadvantage, in raising either a piece of timber or a ladder upon one end. We cannot without grammatical propriety, call this a lever, since such a piece of timber in fact in no way contributes to raise the weight. In this case, the man, who is the strength or power, is in the middle, the part of the beam already raised is the weight, the part yet at the ground is the prop on which the beam turns or rests. Here the man's strength will be diminished, in proportion to the weight it supports. The weight will be greater the farther it is from the prop, therefore the man will bear the greater weight the nearer he is to the prop. See Mechanics.

LEVERET, among sportsmen, denotes a hare in the first year of its age.

LEVIGATION, in pharmacy and chemistry, the reducing hard and ponderous bodies, to an impalpable powder, by grinding them on a porphyry, or in a mill. See Chemistry, n. 399.

A new method of reducing powders to a great degree of finenesses has lately been invented by means of a fanner. This has the advantage over the other methods, in being much more expeditious, and attended with less trouble and expense; the degree of fineness to which they are reducible being thus also in a manner unlimited. The construction of the fanner employed for this purpose is different from that employed for winnowing corn; the blast not being collected into a small compass as in the latter, but diffused over a considerable space, left a violent blast should hurry off both coarse and fine together. For this purpose, the leaves of the fanner are made as long in the direction parallel to the axis as can be done conveniently. In the other direction projecting from it, they differ not from the ordinary length, nor do they in the general situation with respect to each other. Before the leaves is a wooden partition reaching half way up, to prevent the gross powder from falling in among the leaves, which reaches about half way from bottom to top; and about two feet or less from this, according to the size of the fanner, is another partition in a sloping direction, reaching from the bottom of the box to near the top. The whole is enclosed in a large box fix or seven feet long, having in the end farther off from the leaves a slit equal to the space left between the top of the box and the sloping partition already mentioned. On the top of this is another box, extending from the farthermost end of the former to the hopper which holds the coarse powder, with a hole in the end nearest to the fanner; and upon this another box,
LEV (13)

LEWDNESS. See Fornication. Lewdness is punishable by the English law by fine, imprisonment, &c. And Mich. 15 Car. II. a person was indicted for open lewdness, in throwing his naked body in a balcony, and other misdemeanors; and was fined 2000 marks, imprisoned for a week, and bound to his good behaviour for three years. 1 Sid. 168. In times past, when any man granted a lease of his house, it was usual to insert an express covenant, that the tenant should not entertain any lewd women, &c.

LEVITE, in a general sense, means all the descendants of Levi, among whom were the Jewish priests themselves, who, being descended from Aaron, were likewise of the race of Levi. In a more particular sense, Levite is used for an order of officers in that church, who were employed in performing the manual service of the temple. They were obedient to the priests in their ministration, and brought them wood, water, and other necessaries for the sacrifice. They sang and played upon instruments in the temple and in other places. They applied themselves to the study of the law, and were the ordinary judges of the country, but always subordinate to the priests. Their functions were the tythes of corn, fruit, and cattle, throughout Israel: but the priests were intitled to a tenth of the city tythes, by way of first-fruits to the Lord.

Eight and forty cities were assigned for the residence of the Levites, of which the priests claimed thirteen, six whereof were chosen for cities of refuge. They were consecrated, before they entered upon their ministry, by having their flesh washed, their clothes sprinkled with water of expiation. Imposition of hands was used in consecration, and two bullocks were offered at the door of the tabernacle. They waited weekly, and by turns, in the temple, beginning their attendance on one sabbath and ending the next. During this time they were maintained out of the offerings, &c. In the time of Solomon, the number of Levites, from the age of 20 and capable of serving, was 38,000.

LEVITICUS, a canonical book of the Old Testament, so called from its containing the laws and regulations relating to the priests, Levites, and sacrifices.

LEVITY, in physiology, the privation or want of weight in any body when compared with another that is heavier than it; in which sense it stands opposed to gravity.

LEUK, a town of Switzerland, almost in the middle of the Valais, remarkable for its natural strength, for the assembly of the flocks that often meet there, and for its baths, whose water is so hot that they will boil eggs.

LEUNCLAUVIUS (Joannes), a learned German, was descended from a noble family, and born at Amelbrun in Westphalia, 1533. He travelled through almost all the countries in Europe. While he was in Turkey, he collected very good materials for an "History of the Ottoman Empire," which he published, and also several other pieces concerning it, in Latin. He gave Latin translations also of Xenophon, Zophimus, &c. To a knowledge of the learned languages he added that of the civil law. He died at Vienna in 1593, aged 60.

LEUSDEN (John), a celebrated philologer, born in
LEWES, a large well-built town of Sussex in England, seated on an eminence on the banks of the river Ouse, 50 miles from London. It is famous for a bloody battle near it, wherein King Henry III. was defeated and taken prisoner by the barons: and is so ancient, that we read the Saxon king Athelstan appointed two mint-houses here, and that in the reign of Edward the Confessor it had 127 burgesses. It is a borough by prescription, by the style of contables and inhabitants. The contables are chosen yearly. It has handsome streets and two suburbs, with six parish churches. It carries on a good trade; and the river Ouse runs through it, which brings goods in boats and barges from a great distance. On this river are several iron-works, where cannon are cast for merchant-ships, besides other useful works. A charity-school was opened here in 1711, where 20 boys are taught, clothed, and maintained, at the expense of a private gentleman, by whom they were also furnished with books; and 8 boys more are taught here at the expense of other gentlemen. Here are horse-races almost every summer for the king’s plate of L. 100. The roads here are deep and dirty; but then it is the richest soil in this part of England. The market here runs through it, which is not more than a year, and sometimes a whole summer is not dry enough to make the roads passable. It is cheap living here; and the town not being under the direction of a corporation, but governed by gentlemen, it is reckoned an excellent retreat for half-pay officers, who cannot so well confine themselves to the rules of a corporation. It sends two members to parliament.

LEWIS, one of the largest of the Hebrides or western islands of Scotland, extending about 60 miles in length from north to south, and from 13 to 14 in breadth, consisting of a great number of isles and rocks, and parted by the sea into two divisions, called Lewis and Harris, the former lying to the westward of the other. Lewis belongs to the shire of Ross; is divided by several channels, distinguished by several names, and portioned out among different proprietors; but the Lewis, strictly so called, stretches about 36 miles in length, from the north point of Bowling-head to the southern extremity of Harris. The air is temperately cold, moist, and healthy: great part of the low ground is flooded with lakes; the soil is arable in many places, and has been counted fruitful in oats, barley, rye, flax, and hemp. The soil in these parts is a light sand, which the inhabitants manure with foot and sea-ware: but great part of the island is covered with heath. The labouring people dig the land with spades, and break the clods with small harrows, the foremost teeth of which are made of wood, and the remainder of rough heath, which smooths what the others have broken; and this harrow is drawn by one man, having a strong trace of horse-hair across his breast. Of their corn they not only make malt for ale, but likewise a strong spirit called trellareg, which is the whisky, or ukebeanagh, three times distilled. Lewis abounds with convenient bays and harbours, in which are caught, in great plenty, cod, ling, and herring: here are likewise whales of different sizes, which the natives drive into the bays, and kill with harpoons. These bays afford great plenty of shell-fish, such as clams, oysters, cockles, mussels, limpets, weals, and such a prodigious quantity of spout-fish is sometimes cast up from the sand off Loch-tua, that they infect the air, and render it unhealthy to the neighbouring inhabitants, who are not able to confume them, either by eating, or using them as manure for the fields. Some of these islands yield like wise produce small coral and coralline. The fresh water lakes are well stored with trout and eels, and the rivers yield...
The land-animals reared in this island, are cows, horses, sheep, goats, hogs, and deer; all these are of a diminutive size. The beef, mutton, and pork, are juicy and delicious; the horses are active and hardy: the deer, which are of the red kind, confine themselves to the chace of Geveraul, about 15 miles in compass, which affords tolerable pasturage; but in the winter, when the ground is covered with frost and snow, these animals are forced to feed on sea-ware, and endure all the rigour of the sea, without any shelter from wood or cope, for there is not a tree to be seen; nevertheless, the roots of very large trees, which have been cut by the axe, are found in different places. There is likewise a small grove of birch and hazel on the south-west side of Loch-Stornaway.

The inhabitants of Lewis are well-proportioned, tall, fair, sanguine, strong, and healthy. They are in general sober, circumplexed, and hospitable; dexterous in shooting, swimming, and leaping; bold and skilful mariners; and so temperate, that they will tug at the oar all day, without any other provifion than bread and water, with a fuiff of tobacco.

Along this coast we fee several natural remains or forts, called Duin; fuch as Duin royly, Dan-coradel, and Dan-eifer. There are also the remains of some old cairns, and other monuments of antiquity. At Stornaway village we fee the ruins of a fort destroyed by the English garrison sent thither by Oliver Cromwell. To the northward of Brago there is a round tower built of large stones, three stories high, tapering towards the top, with a double wall, and a circular staircase between, by which one may go quite round the building. On the heaths and summits of hills there are feveral cairns or heaps of stones, which served either for graves or beacons. In the parish of Barvas we fee a fingle stone called the thrashey, standing upright, above 20 feet high, and almost as much in breadth. Three stones, about 12 feet high each, are feen standing on the north side of antiquity; and another others standing fingle at great distances, and in remote parts of the island. But the moft remarkable monument of this kind appears by the village of Clafernife. Here we fee 39 pyramidal fones standing upright, about six or seven feet high from the furface, each about two feet in breadth. They are placed in form of an avenue, eight feet wide; the distance between every fone amounting to fix feet, and a fingle piece fands at the entrance. This avenue leads to a circle of 12 fones of the fame dimensions, with one in the centre 15 feet in length, and shaped like a rudder: on the eafh, south, and west fides of this circle, are four fones, fuch as thofe that compofe this round and avenue, forming three lines, or as it were, the body of the circle. This is fuppofed to have been a Druid temple; and tradition reports, that the chief Druid ftood by the large fone in the centre, and harangued the audience. At the distance of a quarter of a mile there is another circle of the fame nature; but without the range and avenue.

In all probability, thefe, as well as the monuments we have defcribed in our account of the Orkneys, and Stone-henge on Salisbury-plain, were places of worship erected by the Druids in the time of Pagan fuperfition. The chief town in Lewis is called Stornaway.

There is a considerable number of inferior adjacent isles and rocks, fome of which hardly deferve to be mentioned; fuch as the small islet Garve at the mouth of Lock_carly, Berniay, Padda, Bernera Minor, and Bernera Major, Kailify, Cavay, Carvay, Gremin, Pabay, Shirein, Vexay, Wuya the Larger and Lesser, and the Flannan islands, which the fearmen denominate the northerm hunters. These are visited every summer by the inhabitants of the Lewis, who go thither in quest of fowls, egges, down, quilis, and feathers, as well as to fear or kill the fheep that are kept here for fulture. As these islands are very steep and rocky, the visitors, after having landed and climbed up the rock by a ladder, uncover their heads, and, making a turn fun-ways, thank God for having escaped the danger they have undergone. In the largest islet are the ruins of a chapel dedicated to St Flannan, from whom the isles derive their name. Thither the fowlers repairing, strip themselves of their upper garments, which being laid upon a flone, they advance towards the altar, and repeat three prayers; an exercife which is performed every morning and evening. They obferve many other fuperflitious customs during their residence on these rocks; and when they have loaded their boat with their purchafe, return to the larger islands. Among the islands belonging to the Lewis, we may likewise take notice of the fmall isle of Pignies, fo called, because bones refeembling thofe of human creatures, but of very fmall dimensions, have been dug out of the ground.

The isle of Lewis is divided into the two parifhes of Barvas and Eye; and in each of these one minifter is fettled; but there is a great number of churches and chapels dedicated to different faints, in the different ifles which compofe this cloffer. All these were fancuaryes before the reformation, but now they are divifed of that privilege. The people of these ifles are Prefsbyterians, with a few Protestants of the English communion, and a fmall number of Roman Catholics. The Protestants obferve the festivals of Chriftmas, Good Friday, Easter, and Michaelmas; on the laft of which the individuals of both fexes perform an anniversary cavelcade.

LEWIS, or LOUTIS, the name of feveral kings of France. See FRANCE.

LEWIS VII. anno 1137, was the firft who had the courage to oppose the encroachments of the popes on the regal authority: Pope Innocent II. excommunicated him for appointing an archbishop of Bourges; but Lewis defended his prerogatives, and put the priests to death who had been the authors of the quarrel. In 1147, he put himself at the head of an army of 90,000 men, and marched against the Saracens, in the second crusade, but was defeated; and returning into France by sea, was taken by the Greeks, but rescued by Roger king of Sicily. His queen Eleonora accompanied him in this expedition; and being suspected of infidelity, with Saladin, a young Turk,
Lewis divorced her, and she was married six weeks after to Henry duke of Normandy, (Henry II. king of England). Lewis died in 1180, aged 60.

Lewis IX. anno 1226 (cannulized), was one of the greatest monarchs of France; equally memorable for his valour and his virtues, but unfortunately milled by the superlition of the times: he sacrificed his own repose, and the welfare of his kingdom, to the folly of crusading.

1248, leaving France to the care of his minister, he embarked for Egypt; attended by his queen, his three brothers, and the flower of the French nobility. At first his victories were rapid: he took Damietta in 1249; but the following year he was defeated and taken prisoner by the Turks, with all the nobility in his train, and the greatest part of his army. The sultan sent to him in prison, to demand an exorbitant sum for his ransom; and his answer being truly noble, deserves to be recorded: "Tell the sultan, that a king of France is not to be ransomed with money; I will give the sum required for my people, and Damietta for my self." These terms were accepted; and a peace was concluded with the sultan, on condition: 1st. that ten years elapsed before the sultan returned to France, he diminished the taxes, revoked those which the cupidity of the financiers had introduced; 2nd. fifteen million ducats; 3rd. several furlaughs estates; 4th. several churches and hospitals; and effectually overturned the ecclesiastical jurisdiction of the court of Rome, by his pragmatic sanction in 1269, which established the independency of the Gallican church. Thirteen years residence in his capital indemnified his subjects for his absence; but his pious zeal prevented the enjoyment of this happiness: he embarked for the sixth crusade in 1270; and died the same year, at the siege of Tunis, aged 55.

Lewis XI. anno 1461. His oppressions obliged his subjects to enter into a league against him, styled "Ligue de bien publique," in which his brother the duke of Berry and some of the principal nobility were concerned: they solicited succours from John duke of Calabria, who joined them with 5000 Swiss (the first introduction of Swiss soldiers into the French armies.) His reign was almost one continued scene of civil war: and it is computed that 4000 of his subjects were executed in public and privately, either for being in arms against him, or suspected by him. In his last illness, he drank the warm blood of children, in the vain hope of restoring his decayed strength. He died in 1483, aged 66. The polls for letters were established in his reign, owing to his eagerness for news; the first introduction of this nature in Europe.

Lewis XII. anno 1492, styled the Just, and the Father of his people; memorable for his valour in the field, and his wisdom in the cabinet. A great general; but unfortunate towards the end of his reign, when he did not command his troops in person: his orders transmitted from home were misunderstood, or wilfully disobeyed; and he had the mortification, before he died to see the total expulsion of the French from the possessions he had acquired for them by his personal bravery. At 53 years of age, he married the princess Mary of England, sister of Henry VIII. and being of a delicate constitution, fell a victim (according to the French historians) to an excess of abstinence; for he died in about two months after his nuptials, in 1515.

Lewis XIII. anno 1610, increased the military reputation of his country, and made considerable additions to its domains. The beginning of his reign was occupied in civil wars with his mother and his Protestant subjects; in which he was excited to continue by his famous minister cardinal Richelieu, who attended him to the siege of Rochelle, the last of the Huguenot party. This place was reduced by famine to further, in 1628, after a siege more than a year. Upon this and other occasions, the king gave proofs of great personal bravery. His attachment to his ally the duke de Nevers, who succeeded to the dukedom of Mantua, but was refuted the invincibility of Charles VI. emperor of Germany, involved him in a war with that prince, the Spaniards, and the duke of Savoy; in which Lewis was victorious; and obtained a treaty of peace, by which the duke of Mantua was guarantied in the possession of his dominions. In 1633, a new war broke out between France and Spain, and the emperor took part with the latter; 1st. against the emperor, and 25 against Spain, with various succeds; and the different armies kept on foot, in the Low Countries, and in Italy, in the course of this war, paved the way for the successes of Lewis XIV. the campaigns of these armies being a military school of discipline and experience for the French officers, besides giving them a knowledge of the countries which became the seat of war in the next reign. Lewis XIII. died 1643, aged 41.

Lewis XIV. le Grand (king at five years of age), anno 1643. He was at first styled Dieu-donne, because the French considered him as the gift of heaven, granted to their prayers after the queen had been barren 22 years. This princefs (Anne of Austria) was declared regent by Lewis XIII, and sought herself under a necessity to continue the war against Philip IV. king of Spain, her brother. The duke d'Enghien was made general of the French armies; and so signal was the success of this renowned warrior (afterwards prince of Condé, and known by the style of the Great Condé), that his victories brought on the advantageous treaties of Münster in 1648, between France, the emperor Ferdinand III. and Christina queen of Sweden; the basis of the aggressions of France in this reign; the principal events of which, and of the next, are related under the articles BRITAIN, United Provinces, &c. Lewis XIV. died in 1715, aged 77.

Lewis XV. (his great-grandson) succeeded in 1715.

He was styled, in the course of his reign, the well-beloved, which he lost some years before he died; and was detested and despised by his subjects for his shameful attachment to a young girl, under the title of his mlle-fille, who, by the ministrations of her patron the duke d'Alguillon, governed the kingdom, and invaded the ancient rights and privileges of the people. He died in 1774, in the 64th year of his age and 59th of his reign.

LEXINGTON, a town of North America and at present the capital of the state of Kentucky, is situated on Elkhorn a northern branch of Kentucky River. It was founded in 1779, and is now a flourishing town, containing upwards of 200 houses and about 1500 inhabitants. Lexington contains two printing presses, and a large number of useful mechanics and manufacturers; also upwards of 30 flores well supplied with goods of all kinds.

LEX, Law. See LAW.—The Roman laws were
of three kinds: 1st, Such as were made by their kings. 2d, The laws of the twelve tables brought by the Decemviri from Athens, &c. And 3d, Such as were proposed by the superior magistrates in the times of the republic. The laws of this last class were enacted in the following manner.

No law could be proposed but by some of the following magistrates, viz. the Praetor, the Consul, the Dictator, the Interrex, the Decemviri, the Military Tribunes, Trimarviri, and Tribunes of the people. If any of these proposed a law, it was first committed to writing, and privately examined as to its utility and probable consequences, by some persons well qualified for the task; sometimes it was referred to the whole Senate for their sentiments. It was then hung up publicly for three market-days, that all the people might have time to examine it, and consider its tendency: This was called legis promulgatio, quasii promulgatio. If the person who framed the bill did not see cause in the mean time to drop it, the people were convened in comitia, and he addressed them in an oration, being also seconded by his friends, formerly the expediency and probable utility of such a law: This was called regatio legis, because the address was always prefixed with this petitionary form of words, Velliti jubetatis, Quirites? "Will you, O Romans, consent and order this law to pass?" This being done, those that dissented motion delivered their sentiments in opposition to it. An urn was then brought to certain likely for three market-days, that all the people might if any on such as came not to the public assemblies, and also to make scrutiny among such as were present.

The lexicarch kept a register of the age, manners, and abilities of all the citizens, who were always enrolled at the age of 20.

LEXICON, the name with dictionary. The word is chiefly used in speaking of Greek Dictionaries: it is derived from the Greek λexi, word, diction; of a word I speak.

LEYDEN, in Latin Lugdunum Batavorum, one of the largest and finest cities in Holland, abounds with canals, along which are rows of lofty trees that afford very pleasant walks. An arm or small branch of the Rhine runs through it. Over the canals are 145 bridges, most of them of stone or brick. The university here is the oldest in the United Provinces: it has large privileges; a library well furnished, and particularly rich in manuscripts; a physic-garden well stocked with all sorts of plants, many of which have been brought from the Cape of Good Hope and the East Indies; an anatomy-hall, well provided with skeletons; and an observatory. The professors, who are generally very eminent, read public lectures four times a week, for which they take no money, but about three guineas are paid for a course of private lectures, which lasts a whole year. The students have no distinct habit, but all wear gowns, though they generally go to the public and private lectures in their night-gowns and slipperis. The salaries of the professors are from 100 to 200 a-year: they wear gowns only when they preside at public disputationes, read public lectures, or meet in the senate; and their lectures are always in Latin. The students do not lodge in the university, but where they please in the town. The cloth manufacture here is much decayed, which formerly flourished to such a degree, that 100000 pieces, it is said, have sometimes been made in a year. The city is famous for the long and severe siege it maintained in 1573 against the Spaniards. We cannot help mentioning the reply of that illustrious magistrate, Adrian de Ver, when the citizens represented to him the havoc made by the famine during the siege, and inquired upon his surrendering: "Friends (said he), here is my body, divide it among you to satisfy your hunger, but banish all thoughts of surrendering to the cruel and pernicious Spaniards." They took his advice, in regard to their not surrendering, and never would listen to any alterations; but told the Spaniards, they would hold out as long as they had one arm to eat and another to fight. There are some fine churches here, and many long, broad, handfome, streets; but the Papists, as at Haerlem, are more numerous than the Protestants.

LEEDEN Phial, a phial coated on the inside and outside with tinfoil, or other proper conducting substance, and
and furnished with a brass wire and knob, for giving the electrical shock. See Electricity-Index.

Lucas van Leyden. See Lucas.

LEYSERA, in botany: A genus of the polygama superflua order, belonging to the syngenia class of plants; and in the natural method ranking under the 49th order, Compositae. The receptacle is naked; the pappus paleaceous; that of the disc plumy; the calyx scarious.

LEYTE, one of the Philippine islands in the East Indies, situated in E. Long. 118°. N. Lat. 11°. Its greatest length is about 40 leagues, and its circumference about 90 or 100. Its soil on the east side is very fruitful; but there are very high mountains which cut it almost through the middle, and occasion so great an alteration in the air, that when it is winter on the north side, it is summer on the southern part of the island. Thus when the inhabitants of one half of the island reap, the others sow; and they have two plentiful harvests in a year, to which the rivers running down from the abovementioned mountains contribute not a little. The island contains about 9000 inhabitants, who pay tribute to the Spaniards in rice, wax, and quilts.

Lhuyd, or Lloyd (Humphrey), a learned antiquary of the 17th century, born at Denbigh, who applied himself to the study of physic; and living mostly within the walls of Denbigh castle, professed there as a physician; and died in 1570, with the character of a wellbred gentleman. He wrote and translated several pieces relative to history and antiquities; in particular, The history of Cambria, now called Wales, from Caradoc of Langcarvan, &c. but died before it was finisht: however, Sir Henry Sidney, lord president of Wales, employed Dr David Powel to finisht it, who published it in 1584. A new and improved edition of this work was published in 1774.

Lhuyd (Edward), keeper of the Museum at Oxford, was a native of South Wales, the son of Charles Lhuyd, Esq.; of Llanvorde. He was educated at Jesus College, Oxford, where he was created M. A. July 21. 1701. He was bred under Dr Plot, whom he succeeded as keeper of the Ashmolean museum, and had the use of all Vaughan's collections. With incessant labour and great exactness he employed a considerable part of his life in searching into the Welsh antiquities: he perused or collected a great deal of ancient and valuable matter from their MSS. transferred all the old charters of their monasteries that he could meet with; travelled several times over Wales, Cornwall, Scotland, Ireland, Armorie Bretagne, countries inhabited by the same people, compared their antiquities, and made observations on the whole; but died in July 1709, before he had digested them into the form of a discourse, as he intended, on the ancient inhabitants of that island. The untimely death of this excellent antiquary prevented the completing of many admirable designs. For want of proper encouragement, he did very little towards understanding the British bards, having seen but one of those of the sixth century, and not being able to procure access to two of the principal libraries in the country. He communicated many observations to Bishop Gibson, whose edition of the Britannia he revised; and published "Archæologia Britannica," giving some accounts additional to what has been hitherto published of the languages, histories, and customs of the original inhabitants of Great Britain, from collections and observations in travels through Wales, Cornwall, Bas Bretagne, Ireland, and Scotland, Vol. I. Glophography, Oxford 1707," fol. He left in MS. a Scottifh or Irish-English Dictionary, proposed to be published in 1733 by subscription, by Mr David Malcolme, a minister of the church of Scotland, with additions; as also the Elements of the said language, with necessary and useful informations for propagating more effectually the English language, and for promoting the knowledge of the ancient Scottifh or Irish, and very many branches of useful and curious learning. Lhuyd, at the end of his preface to the Archæologia, promises an historical dictionary of British persons and places mentioned in ancient records. It seems to have been ready for press, though he could not see the time of publication. His collections for a second volume, which was to give an account of the antiquities, monuments, &c. in the principality of Wales, were numerous and well chosen; but, on account of a quarrel between him and Dr Wyne, then fellow, afterwards principal of the college, and bishop of St Asaph, he refused to buy them, and they were purchased by Sir Thomas Seabright, of Beachwood in Hertfordshire, in whose library the greatest part still remain, but so indigested, and written with so many abbreviations, that nobody can undertake to publish them. They consist of about 40 volumes in folio, to in quarto, and above 100 smaller, and all relate to Irish or Welsh antiquities, and chiefly in those languages. Carte made extracts from them about or before 1736; but these were chiefly historical. Sir John Seabright has given Mr Penman 23 of Lhuyd's MSS. Latin and English. Many of his letters to Fothergill, and other learned contemporaries, were given by Dr Fothergill to the university of Oxford, and are now in the Ashmolean museum. Lhuyd undertook more for illustrating this part of the kingdom than any one man besides ever did, or than any one man can be equal to.

LIBANIUS, a famous Greek rhetorician and sophist in the 4th century, was born at Antioch, and had a great share in the friendship of Julian the Apostate. That prince offered him the dignity of Prefettus Pratorio; but Libanius refused it, thinking the name of sophist, or professor of eloquence, much more honourable. There are still extant several of his letters and Greek orations, by which he acquired great reputation; but his style is somewhat affected and obscure. He was a pagan. Basil and Chrysostom were his disciples about the year 360. His letters were published at Amsterdam in 1739; his orations at Venice, 1755.

LIBANOMANTIA, in antiquity, a species of divination performed with frankincense; which, if it presently caught fire, and sent forth a grateful odour, was esteemed a happy omen, and vice versa.

LIBANUS, the name of a chain of mountains of Turkey in Asia, which lie between Proper Syria and Palestine, extending, from west to east, from the Mediterranean sea as far as Arabia. The summits of these mountains are so high, that they are always covered with snow; but below are very pleasant; and fruitful.
Libation fruitful valleys. They were formerly famous for the great number of cedar-trees growing thereon; but now there are very few remaining. Geographers dividing this chain into Libanus and Anti-libanus; the latter of which lies on the south-side of the valley, rising near the ruins of Sidon, and terminates at others in Arabia, in N. Lat. 54. They are separated from each other at an equal distance throughout; and form a baion, or country, called by the ancients Cælo Syria.

Libation, amongst the Greeks and Romans, was an essential part of solemn sacrifices. It was also performed alone, as a drink offering, by way of procuring the protection and favour of the gods, in the ordinary affairs of life. Libations, according to the different natures of the gods in honour of whom they were made, consisted of different liquids, but wine was the most usual. The wine offered to the gods was always unmixed with water. We meet with libations of water, libations of honey, libations of milk, and libations of oil; these are called ἐπαρχεῖς ἱερὰς. The libation was made with a serious deportment and solemn prayer. At sacrifices, the libation, after it had been taunted by the priest, and handed to the bystanders, was poured upon the victim. At entertainments, a little wine was generally poured out of the cup, before the liquor began to circulate, to show their gratitude to the gods for the blessings they enjoyed.

Libations were also in use among the Hebrews, who poured an hun of wine on the victim after it was killed, and the several pieces of the sacrifice were laid on the altar, ready to be consumed in the flames. Libaw, a sea-port town of Courland, lying on the Baltic sea, consisting entirely of wooden houses. It belongs to the duke of Courland, and is situated in E. Long. 21. 27. N. Lat. 56. 27.

Libel, (libellus famosus), taken in its largest and most extensive sense, signifies any writing, picture, or the like, of an immoral or illegal tendency; but, in a peculiar sense, is used to denote a malicious defamation of any person, and especially a magistrate, made public by either printing, writing, signs, or pictures, in order to provoke him to wrath, or expose him to public hatred, contempt, and ridicule. The direct tendency of these libels is the breach of the public peace, by stirring up the obnoxious of the two parties, and perhaps to bloodshed. The communication of a libel to any one person is a publication in the eye of the law: and therefore the sending an abusive private letter to a man is as much a libel as if it were openly printed, for it equally tends to a breach of the peace.

With regard to libels in general, there are, as in many other cases, two remedies; one by indictment and another by action. The former for the public offence; for every libel has a tendency to break the peace, or provoke others to break it: which offence is the same whether the matter contained be true or false; and therefore the defendant, on an indictment for publishing a libel, is not allowed to allege the truth of it by way of justification of the offence, but by action on the case, which is to repair the party in damages for the injury done him, the defendant may, as for words spoken, justify the truth of the facts, and show that the plaintiff has received no injury at all. What was said with regard to words spoken, will also hold in every particular with regard to libels by writing or printing, and the civil action consequent thereupon: but as to signs or pictures, it seems necessary always to show, by proper inuendos and averments of the defendant's meaning, the import and application of the scandal, and that some special damage has followed; otherwise it cannot appear, that such libel by picture was underfoot to belevelled at the plaintiff, or that it was attended with any actionable consequences.

In a civil action, then, a libel must appear to be false, as well as scandalous; for, if the charge be true, the plaintiff has received no private injury, and has no ground to demand a compensation for himself, whatever offence it may be against the public peace: and therefore, upon a civil action, the truth of the accusation may be pleaded in bar of the suit. But, in a criminal prosecution; the tendency which all libels have to create animosities, and to disturb the public peace, is the sole consideration of the law. And therefore, in such prosecutions, the only points to be considered are, first, the making or publishing of the book or writing; and, secondly, whether the matter be criminal: and, if both these points are against the defendant, the offence against the public is complete. The punishment of such libellers, for either making, repeating, printing, or publishing the libel, is a fine, and such corporal punishment as the court in its discretion shall inflict; regarding the quantity of the offence, and the quality of the offender. By the law of the twelve tables at Rome, libels, which affected the reputation of another, were made a capital offence: but, before the reign of Augustus, the punishment became corporal only. Under the emperor Valentinian it was again made capital, not only to write, but to publish, or even to omit destroying them. Our law, in this and many other respects, corresponds rather with the middle age of Roman jurisprudence, when liberty, learning and humanity, were in their full vigour, than with the cruel edicts that were established in the dark and tyrannical ages of the ancient deceiviri, or the latter emperors.

In this, and other instances, where blasphemous, immoral, treasonable, felonious, or scandalous libels are punished by the English law, some with a greater, others with a lesser, regard of service; the liberty of the press, properly understood, is by no means infringed or violated. See Liberty of the Press.

Libella, a piece of money amongst the Romans, being the tenth part of the denarius, and equal in value to the as. It was called libella, as being a little pound, because equal to a pound of brays. Its value in our money is 1 ob. 1 qr. or a half-penny farthing. See Money.

Libella, or Libellula, in zoology, a genus of four-winged flies, called by the English dragon-flies, or adder flies; the characters of which are these: The mouth is furnished with jaws; the feelers are shorter than the head; and the tail of the male terminates in a kind of hooked forcuses. There are many species, chiefly distinguished by their colour. They have all the very large and reticulated eyes, covering the whole surface of the head. They fly very swiftly, and prey upon the wing, clearing the air of numerous
able little flies. They are found in August and September in the fields and gardens, especially near places where there are waters, as they have their origin from worms living in that element. The great ones usually live all their time about waters; but the smaller are common among hedges, and the smallest of all frequent gardens. The smaller kind often settle upon baobbs, or upon the ground; but the large ones are almost always upon the wing, so that it is very difficult to take them. Their eyes are beautiful objects for the microscope. The largest species is produced from a water-worm that has six feet, which, yet young and very small, is transformed into a chrysalis, that has its dwelling in the water. People have thought they discovered them to have gills like fishes. It wears a mask as perfectly formed as those that are worn at a masquerade; and this mask, fastened to the insect's neck, and while it moves at will, serves to hold its prey while it devours it. The period of transformation being come, the chrysalis makes to the water-side, undertakes a voyage in search of a convenient place; fixes on a plant, or flicks fast to a bit of dry wood. Its skin, grown patched, splits at the upper part of the thorax. The winged insect flies forth gradually, throws off its teachers, expands its wings, flutters, and then flies off with graceful ease and cafe. The elegance of its slender shape, the richness of its colours, the delicacy and resplendent texture of its wings, afford infinite delight to the beholder. The female deposits her eggs in the water, and the males: those of the females are known by

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Libertines, and that men could not, properly speaking, commit
sin; that religion consisted in the union of the spirit or
rational soul with the Supreme Being; that all those
who had attained this happy union, by sublime con-
templation and elevation of mind, were then allowed
to indulge, without exception or restraint, their ap-
petites or passions; that all their actions and pursuits
were then perfectly innocent; and that, after the
death of the body, they were to be united to the Deity.
They likewise said that Jesus Christ was nothing but a
mere je ne sais quoi, composed of the spirit of God,
and of the opinion of men.

Thee maxims occasioned their being called Lib-
ertins; and the word has been used in an ill sense ever
since.

The Libertini spread principally in Holland and
Brabant. Their leaders were one Quintin, a Picard;
Pocketius, Ruffus, and another called Chopin, who
joined with Quintin, and became his disciple.

This sect obtained a certain footing in France thro'
the favour and protection of Margaret, queen of Na-
varre, and sister to Francis I. and found patrons in fe-
veral of the reformed churches. This sect was fe-
emblably a remnant of the more ancient Begaards or
Brethren of the Free Spirit.

Libertines of Genoa, were a cabal of rakes rather
than of fanatics; for they made no pretences to any
religious system, but pleaded only for the liberty of
leading voluptuous and immoral lives. This cabal was
composed of a certain number of licentious citizens,
who could not bear the severe discipline of Calvin, who
punished with rigour not only dissolute manners, but
also whatever bore the aspect of irreligion and impiety.
In this turbulent cabal there were several persons who
were not only notorious for their dissolute and scandi-
ulous manner of living, but also for their atheistical im-
piety, and contempt of all religion. To this odious
class belonged one Gruet, who denied the divinity of
Christ and the immortality of the soul; the difference
between moral good and evil, and rejected with disdain the doctrines that are held most sacred among
Christians; for which impertinency he was at last
brought before the civil tribunal, in the year 1550, and
condemned to death. The Genevan spirit of refor-
mation, improperly directed by the violence and zeal
of Calvin, did at this time operate to a degree which has
marked the character of this great reformer with re-
proach. For in 1544, Sebastian Caflalio, master of the
public school at Geneva, who was a man of probity,
and distin guished by his learning and virtue, was, never-
theless, deposed from his office and dismissed the city,
because he disapproved some of the measures that were
pursued, and some of the opinions entertained by Calvin
and his colleagues, and particularly that of absolute
and unconditional predetermination. Jerome Bolice also
was a man of genius and learning, who became a convert
to the Protestant religion and fled to Geneva for pro-
tection, was cast into prison, and soon after sent into
banishment, because, in 1551, he imprudently and in-
decently declaimed, in full congregation and at the
election of public worship, against the doctrine of abso-
late decrees.

Libertus, or libertinus, among the Romans,
a freedman, or a person set free from a legal servi-
tude.
Liberty. ever ridiculous the fashion then in use might appear, the restraining it by pecuniary penalties could serve no purpose of common utility. But the statute of king Charles II. which prescribes a thing seemingly as indifferent, viz. a dred for the dead, who were all ordered to be buried in woollen, is a law consistent with public liberty; for it encourages the staple trade, on which in a great measure depends the universal good of the nation. So that laws when prudently framed, are by no means subversive, but rather coddled, of liberty; for (as Mr Locke has well observed) where there is no law there is no freedom. But then, on the other hand, that constitution or frame of government, that system of laws, is alone calculated to maintain civil liberty, which leaves the owner. The legislature and of course the laws of other states on the continent of Europe, and from the genius of the imperial law; which in general are calculated to ve the arbitrary and despotic power, of controlling the actions of the subject, in the prince, or in a few grandees. And this spirit of liberty is so deeply implanted in their constitution, and rooted even in their human jurisprudence, as it is being still human. At some times we have seen them despised by overbearing and tyrannical princes, and others, so luxuriant as to come to a state of anarchy, a worse state than tyranny itself, as any government is better than none at all.

The benefit of their free constitution has always delivered the nation from these embarrassments: and, as soon as the convulsions consequent on the struggle have been over, the balance of their rights and liberties has settled to its proper level; and their fundamental articles have been from time to time ascertained in parliament, as often as they were thought to be in danger:"

First, by the great charter of liberties, which was obtained, I word in hand, from king John, and afterwards, with some alterations, confirmed in parliament by king Henry III. his son. Which charter contain ed very few new franchises; but, as Sir Edward Coke observes, was for the most part declaratory of the principal grounds of the fundamental laws of England. Afterwards, by the statute called confirmatio cartarum, whereby the great charter is directed to be allowed as the common law; all judgments contrary to it are declared void; copies of it are ordered to be sent to all cathedral churches, and read twice a year to the people; and sentence of excommunication is directed to be as constantly denounced against all those that by word, deed, or counsel, act contrary thereto, or in any degree infringe it. Next by a multitude of subsequent corroborating statutes (Sir Edward Coke reckons 32), from the first Edward to Henry IV. Then, after a long interval, by the petition of right; which was a parliamentary declaration of the liberties of the people, assented to by king Charles I. in the beginning of his reign: Which was closely followed by the still more ample concessions made by that unhappy prince to his parliament, before the fatal rupture between them; and by the many salutary laws, particularly the habeas corpus act, passed under Charles II. To these succeeded the bill of rights, or declaration delivered by the lords and commons to the prince and princes of Orange, 5th February 1688; and afterwards enacted in parliament, when they became king and queen: which declaration concludes in these remarkable words; "and they do claim, demand, and insist upon, all and singular the premises, as their undisputed rights and liberties." And the act of parliament itself recognizes "all and singular the rights and liberties asserted and claimed in the said declaration to be the true, ancient, and indubitable rights of the people of this kingdom." Lastly, these liberties were again asserted at the commencement of the present century, in the act of settlement, whereby the crown was limited to his present majesty's illustrious house; and some new provisions were added at the same fortunate era, for better securing their religion, laws, and liberties; which the statute declares to be "the birthright of the people of England," according to the ancient doctrine of the common law.

Thus much for the declaration of their rights and liberties. The rights themselves, thus defined by these several statutes, consist in a number of private immunities, which will appear, from what has been premised, to be indeed no other, than either that refiduum of natural liberty, which is not required by the laws of society to be sacrificed to public convenience; or else those civil privileges, which society hath engaged to provide, in lieu of the natural liberties so given up.

The rights which were formerly, either by inheritance or purchase, the rights of all mankind; but in most other countries of the world, being now more or less debated and destroyed, they at present may be said to remain, in a peculiar and emphatical manner, the rights of the people of Britain. And these may be reduced to three principal or primary articles; the right of personal security, the right of personal liberty, and the right of private property, because, as there is no other known method of compulsion, or of abridging man's natural free will, but by an infringement or diminution of one or other of these important rights, the preservation of these inviolate may justly be said to include the preservation of their civil immunities in this largest and most extensive sense. See the article Rights.
L I B

mary rights, of personal security, personal liberty, and private property. These are,
1. The constitution, powers, and privileges of parliament; for which see PARLIAMENT.

2. The limitation of the king's prerogative, by bounds so certain and notorious, that it is impossible he should exceed them without the consent of the people; as to which, see PREROGATIVE. The former of these keeps the legislative power in due health and vigour, so as to make it improbable that laws should be enacted defradive of general liberty; the latter is a guard upon the executive power, by restraining it from acting either beyond or in contradiction to the laws that are framed and established by the other.

3. A third subordinate right of every Briton is that of applying to the courts of justice for redress of injuries. Since the law is, in this realm, the supreme arbiter of every man's life, liberty, and property, courts of justice must at all times be open to the subject, and the law be duly administered therein. The emphatical words of magna carta, spoken in the person of the king, who in judgment of law (says Sir Edward Coke) is ever present and repeating them in all his courts, are these: Nulli vendemus, nulli negabimus, nulli praebimus vel refuemus ut jus sit illium; and therefore every subject (continues the same learned author), for injury done to him in bonis, in terris, vel persona, by any other subject, be he ecclesiastical or temporal, without any exception, may take his remedy by the course of the law, and have justice and right for the injury done to him, freely without sale, fully without any denial, and speedily without delay. It was endliis to enumerate all the affirmative acts of parliament, wherein justice is directed to be done according to the law of the land: and what that law is, every subject knows; or may know if he pleases: for it depends not upon the arbitrary will of any judge; but is permanent, fixed, and unchangeable, unless by authority of parliament. We shall however just mention a few negative statutes, whereby abuses, perverfions, or delays of justice, especially by the prerogative, are restrained. It is ordained by magna carta, that no freeman shall be outlawed, that is, put out of the protection and benefit of the laws, but according to the law of the land. By 2 Edw. III. c. 8. and 11 Ric. II. c. 10. it is enacted, that no commands or letters shall be sent under the great seal, or the little seal, the signet or privy seal, in disturbance of the law; or to disturb or delay common right: and, though such commandments should come, the judges shall not cease to do right: which is also made a part of their oath by statute 18 Edw. III. f. 4. And by first W. & M. ft. 2. c. 2. it is declared, that the pretended power of suspending or dispensing with laws, or the execution of laws, by regal authority without consent of parliament, is illegal.

Not only the substantial part, or judicial decisions, of the law, but also the formal part, or method of proceeding, cannot be altered but by parliament: for, if once those outworks were demolished, there would be an inlet to all manner of innovation in the body of the law itself. The king, it is true, may erect new courts of justice; but then they must proceed according to the old established forms of the common law. For which reason it is declared in the statute 16 Car. I. c. 10. upon the dissolution of the court of star-chamber, that neither his majesty, nor his privy-council, have any jurisdiction, power, or authority, by English bill, petition, articles, libel (which were the course of proceeding in the star-chamber, borrowed from the civil law), or by any other arbitrary way whatsoever, to examine, or draw into question, determine, or dispose of the lands or goods of any subjects of this kingdom; but that the same ought to be tried and determined in the ordinary courts of justice, and by course of law.

4. If there should happen any uncommon injury, or infringement of the rights before mentioned, which the ordinary course of law is too defective to reach, there still remains a fourth subordinate right, appertaining to every individual, namely, the right of petitioning the king, or either house of parliament, for the redress of grievances. In Russia we are told, that the Czar Peter established a law, that no subject might petition the throne till he had first petitioned two different ministers of state. In case he obtained justice from neither, he might then present a third petition to the prince; but upon pain of death, if found to be in the wrong. The consequence of which was, that no one dared to use such third petition; and grievances seldom falling under the notice of the sovereign, he had little opportunity to redress them. The restrictions, for some there are, which are laid upon petitioning in Britain, are of a nature extremely different; and while they promote the spirit of peace, they are no check upon that of liberty. Care only must be taken, left, under the pretence of petitioning, the subject be guilty of any riot or tumult; as happened in the opening of the memorable parliament in 1640: and, to prevent this, it is provided by the statute 13 Car. II. ft. 1. c. 5. that no petition to the king, or either house of parliament, for any alteration in church or state, shall be signed by above 20 persons, unless the matter thereof be approved by three justices of the peace, or the major part of the grand jury, in the county; and in London, by the lord mayor, alder­men, and common-council: nor shall any petition be presented by more than 10 persons at a time. But, under these regulations, it is declared by the statute 1 W. & M. ft. 2. c. 2. that the subject hath a right to petition; and that all commitments and prosecutions for such petitioning are illegal.

5. The fifth and last auxiliary right of the subject, that we shall at present mention, is that of having arms for their defence, suitable to their condition and degree, and such as are allowed by law. Which is also declared by the same statute 1 W. & M. f. 2. c. 2. and is indeed a public allowance, under due restrictions, of the natural right of self-defense and self-preservation, when the sanctions of society and laws are found insufficient to restrain the violence of oppression.

In these several articles confind the rights, or, as they are frequently termed, the liberties of Britons: liberties more generally talked of, than thoroughly understood; and yet highly necessary to be perfectly known and considered by every man of rank or property, lest his ignorance of the points whereon they are founded should hurry him into faction and licentiousness on the one hand, or puillanimous indiffe-
Liberty. Licence and criminal submission on the other. And we have seen that these rights, consist, primarily, in the free enjoyment of personal security, of personal liberty, and of private property. So long as these remain inviolate, the subject is perfectly free; for every species of compulsory tyranny and oppression must act in opposition to one or other of these rights, having no other object upon which it can possibly be employed. To preserve these from violation, it is necessary that the constitution of parliaments be supported in its full vigour; and limits, certainly known, be fixed to the royal prerogative. And, lastly, to vindicate these rights, when actually violated or attacked, the subjects of Britain are entitled, in the first place, to the regular administration and free course of justice in the courts of law; next, to the right of petitioning the king and parliament for redress of grievances; and, lastly, to the right of having and using arms for self preservation and defence. And all these rights and liberties it is our birthright to enjoy entire; unless where the laws of our country have laid them under necessary restraints. Restraints in themselves so gentle and moderate, as will appear upon further inquiry, that no man of sense or probity would wish to see them slackened. For all of us have it in our choice to do every thing that a good man would desire to do; and are restrained from nothing, but what would be pernicious either to ourselves or our fellow-citizens. So that this review of our situation may fully justify the observance of a learned French author, who indeed generally both thought and wrote in the spirit of genuine freedom; and who had not scrupled to proceed, even in the very bosom of his native country, that the Britih is the only nation in the world, where political or civil liberty is the direct end of its constitution. Recommending therefore to the student in our laws a farther and more accurate search into this extensive and important title, we shall close our remarks upon it with the expiring wish of the famous Father Paul to his country, "Esto perpetua!"

Liberty and necessity. See Metaphysics.

Liberty of the Press. The art of printing, soon after its invention, was lost, as well abroad, as in other countries, as merely a matter of state, and subject to the coercion of the crown. It was therefore regulated by the king's proclamations, prohibitions, charters of privilege and licence, and finally by the decrees of the court of star-chamber, which limited the number of printers, and of presses which each should employ, and prohibited new publications unless previously approved by proper licencers. On the demolition of this odious jurisdiction in 1647, the long parliament of Charles I. after their rupture with that prince, assumed the same powers as the star-chamber had exercised with respect to the licensing of books; and in 1643, 1647, 1649, and 1652 (Soc. Hill. i. 44, 133. ii. 88, 230.) they issued their ordinances for that purpose, founded principally on the star-chamber decree of 1627. In 1652, was passed the statute 13 & 14 Car. II. c. 32, which, with some few alterations, was copied from the parliamentary ordinances. This act expired in 1679; but was revived by statute 1 Jac. II. c. 17. and continued till 1692. It was then continued for two years longer by statute 4 W. & M. c. 24. but though frequent attempts were made by the government to revive it, in the subseqent part of that reign (Com. Journ. 17 Feb. 1694. 26 Nov. 1695. 22 Oct. 1696. 9 Feb. 1697. 31 Jan. 1698.) yet the parliament resisted it so strongly, that it finally expired, and the presses became properly free in 1694, and has continued so ever since.

The liberty of the presses, however, so essential to the nature of a free state, consists not in freedom from censure for any criminal matter that may be published, but in laying no previous restraints upon publications. Every free man has undoubtedly a right to lay what sentiments he pleases before the public; to forbid this, is to destroy the freedom of the presses; but if he publishes what is improper, mischievous, or illegal, he must take the consequence of his own temerity. To subject the presses to the restrictive power of a licencier in the manner abovementioned, is to subject all freedom of sentiment to the prejudices of one man, and make him the arbitrary and infallible judge of all controverted points in learning, religion, and government. But to punish (as the law does at present) any dangerous or offensive writings which, when published, shall, on a fair and impartial trial, be adjudged of a pernicious tendency, is necessary for the preservation of peace and good order, of government and religion, the only solid foundations of civil liberty. Thus the will of individuals is still left free; the abuse only of that free-will is the object of legal punishment. Neither is any restraint hereby laid upon freedom of thought or inquiry; liberty of private sentiment is still left; the discriminating or making public of bad sentiments, destructive of the ends of society, is the crime which society corrects. A man (says a wise writer) may be allowed to keep poisons in his closet, but not publicly to vend them as cordials. And to this we may add, that the only plausible argument heretofore used for restraining the just freedom of the presses, "that it was necessary to prevent the daily abuse of it," will entirely lose its force, when it is shown (by a saevous exercise of the laws) that the presses cannot be abused to any bad purpose without incurring a suitable punishment; whereas, it can never be used to any good one which is not under the control of an inspector. So true will it be found, that to confine the licencious, is to maintain the liberty of the presses.

Liberty, in mythology, was a goddess both among the Greeks and Romans. Among the former she was invoked under the title Eleutheria; and by the latter she was called Libertas, and held in singular veneration; temples, altars, and statues, were erected in honour of this deity. A very magnificent temple was consecrated to her on mount Aventin, by Tiberius Gracchus, before which was a spacious court, called arium libertatis. The Romans also erected a new temple in honour of Liberty, when Julius Cæsar established his empire over them, as if their liberty had been secured by an event which proved fatal to it. In a medal of Brutus, Liberty is exhibited under the figure of a woman, holding in one hand a cap, the symbol of Liberty, and two poinards in the other, with the inscription IANVS MARTIS. Libethræ (anc. geo.), the fountain of long, was situated in Magnesia, a district of Macedonia annexed to Thessaly; distant from the town of Libethra, which stood on the mount Olympus, where it verges
Libethrius verges toward Macedonia: hence the Muses are called Libethrides, (Virgil). Strabo places on Helicon, not only Hippocrates, and the temple of the Muses, but also the cape of the nymphs Libethrides.

LIBETHRIUS NUNS (anc. geog.), a mountain of Beotia, distant from Corinth 40 stad. where stood the statues of the muses, and of the nymphs, surname Libethride. A mountain probably conjoined with, or at least very near to, Helicon.

LIBITINA, in the Roman mythology, a goddess which preceded over funerals. This goddess was the same with the Venus inferna or Ephjmis of the Greeks. She had a temple at Rome, where was lodged a certain piece of money for every person who died, whose name was recorded in a register called Libitina ratio. This practice was established by Servius Tullius, in order to obtain an account of the number of annual deaths in the city of Rome, and consequently the rate of increase or decrease of its inhabitants.

LIBITINARII, were undertakers whose office was to take care of funerals, prepare all things necessary upon the solemn occasion, and furnish every article required. — They got their livelihood by this gloomy business, and kept a number of servants to perform the working part of the profession, such as the pellinlores, nelephai, &c. The name Libitinarius is derived from Libitina, the goddess of funerals, in whose temple were told all things relating to funerals. See FUNERAL.

LIBNA (anc. geog.), a sacerdotal city in the tribe of Judah, a place of strength, as appears from Sennacherib's laying siege to it, 2 Kings xix. Isaiah xxxvii. In Jerome's time, a village, called Libna, in the territory of Eleutheropolis.

LIBOURNE, a town of France, in Guienne, and in Bourdelais. It is a populous trading town, and is seated on the rive Dordogne. W. Long. 0. 10. N. Lat. 44. 55.

LIBRA, or BALANCE, one of the mechanical powers. See BALANCE.

LIBRA, in astronomy, one of the 12 signs of the zodiac, and exactly opposite to Aries; so called because when the sun is in this sign at the autumnal equinox, the days and nights are equal as if weighed in a balance. — The stars in this constellation according to Ptolemy are 17, Tycho 10, Hevelius 20, and Flamstead 51.

LIBRA also denotes the ancient Roman pound, borrowed from the Sicilians, who called it Libra.

The libra was divided into 12 untia or ounces, and the ounce into 26 grumes.

The divisions of the libra were, the uncia, one twelfth; the sextans, one sixth; the quadrans, one fourth; the triens, one third; the guinceans, five ounces; the semis, six; the septuans, seven; the sextans, eight; the dodrans, nine; the sextans, ten; the denarius, eleven, lastly, the as weighed twelve ounces or one libra.

The Roman libra was used in France for the proportions of their coin till the time of Charlemagne, or perhaps till that of Philip I. in 1093, their folls being so proportioned, as that 20 of them were equal to the libra. By degrees it became a term of account; and every thing of the value of twenty folls was called a livre.

Libra penna, in our law books, denotes a pound of money in weight. It was usual in former days not only to tell the money but to weigh it; because many cities, lords, and bishops, having their mints, coined money, and often very bad too; for which reason, though the pound consisted of 20 shillings, they always weighed it.

LIBRARI, among the ancients, were a sort of copyists who transcribed in beautiful or at least legible characters, what had been written by the notaries in notes and abbreviations.

LIBRARY, an edifice or apartment designed for holding a considerable number of books placed regularly on shelves; or the books themselves lodged in it. Some authors refer the origin of libraries to the Hebrews; and observe, that the care these took for the preservation of their sacred books, and the memory of what concerned the actions of their ancestors, became an example to other nations, particularly to the Egyptians. Osmandus, king of Egypt, is said to have taken the hint first; who, according to Diodorus, had a library built in his palace, with this inscription over the door, P|x|xe| IAPPEION. Nor were the Ptolemies, who reigned in the same country, less curious and magnificent in books.

The scripture also speaks of a library of the kings of Persia, Ezra v. 17. vi. 1. which some imagine to have consisted of the historians of that nation, and of memoirs of the affairs of state; but, in effect, it appears rather to have been a depository of laws, charters, and ordinances of the kings. The Hebrew text calls it the house of treasuries, and afterwards the house of the rolls, where the treasures were laid up. We may, with more justice, call that a library, mentioned in the second of Esdras to have been built by Nehemiah, and in which were preserved the books of the prophets, and of David, and the letters of their kings.

The first who erected a library at Athens, was the tyrant Pihistratus: and yet Strabo refers the honour of it to Aristotle. That of Pihistratus was transported by Xenox into Persia, and was afterwards brought back by Seleucus Nicanor to Athens. Long after, it was plundered by Sylla, and re-established by Hadrian. Plutarch says, that under Eumenes there was a library at Pergamus, containing 200,000 books. Tyrranian, a celebrated grammarian, contemporary with Pompey, had a library of 30,000 volumes. That of Ptolemy Philadelphus, according to A. Gellius, contained 700,000, all in rolls, burnt by Caesar's soldiers.

Constantine, and his successors, erected a magnificent one at Constantinople; which in the eighth century contained 500,000 volumes, all burnt by order of Leo Isaurus; and, among the rest, one wherein the Iliad and Odyssey were written in letters of gold, on the guts of a serpent.

The most celebrated libraries of ancient Rome, were the Ulpian, and the Palatine. They also boast much of the libraries of Paulus Memilius, who conquered Peræus; of Lucullus Lucullus, of Attianus Pollio, Attianus, Julius Severus, Domitian, Serenus, Pamphilus Martyr, and the emperors Gordian and Trajan.

Anciently every large church had its library; as appears by the writings of St Jerome, Anastasius, and others. Pope Nicholas laid the first foundation of
Library. [26]

that of the Vatican, in 1450. It was destroyed by the confi­
bable Bourbon, in the facking of Rome, and re­
foved by Pope Sixtus V. and has been consider­ably en­
riched with the reams of that of Heidelberg, plun­
dered by Count Tilly in 1622. One of the most com­
plete libraries in Europe, was faid to be that erected at Florence by Cosimo de Medicis, over the gate where­of is written, labor absque labore; though it is now exceeded by that of the French king, be­
gun by Francis I. augmented by Cardinal Richelieu, and completed by M. Colbert.

The emperor’s library at Vienna, according to Lam­
bechius, consists of 80,000 volumes, and 15,940 curious medals.

The Bodleian library at Oxford, built on the foun­
dation of that of Duke Humphrey, exceeds that of any univer­ity in Europe, and even tho’ of all the sove­reigns of Europe, except the emperor’s and French king’s, which are each of them older by 100 years. It was firft opened in 1602, and has since found a great number of benefactors: particularly Sir Robert Cotton, Sir H. Savil, Archibishop Laud, Sir Kenelm Digby, Mr Allen, Dr Pococke, Mr Selden, and others. The Vatican, the Mediccin, that of Bel­
lication at Venice, and thofe juft mentioned, exceed the Bodleian in Greek manuscripts; which yet outs­­
de them all in Oriental manuscripts.

As to printed books, the Ambrofian at Milan, and that of Wolfenbuttle, are two of the most famous, and yet both inferior to the Bodleian.

King’s Library, at St James’s, was founded by Henry, eldeft fon of James I. and made up partly of books, and partly of manuscripts with many other curiosities, for the advancement of learning. It has received many additions from the libraries of Isaac Cafaubon and others.

Cottonian Library, originally confifted of 958 vol­
umes of original charters, grants, instruments, letters, of sovereign princes, transactions between Britain and other kingdoms and states, genealogies, histories, re­
gisters of monafteries, remains of Saxen laws, the book of Genesis, thought to be the moft ancient Greek copy extant, and faid to have been written by Origen in the second century, and the curious Alexandrian copy or manuscript in Greek capitals. This library is kept in the British Mu­
efum, with the large and valuable library of Sir Hans Sloane, amounting to upwards of 42,000 volumes, &c. There are many pu­

cial libraries belonging to the feveral colleges at Ox­
ford and Cambridge, and the universities in North Britain. The principal public libraries in London, be­
side that of the Mu­

eum, are tho’ of the college of her­
alds, of the college of physicians, of Doctors Com­
mons, to which every bishop, at the time of his con­
fe­r­
cation, gives at least 201. sometimes of 50 l. for the purchase of books; tho’ of the Gray’s Inn, Lincoln’s Inn, Inner Temple, and Middle Temple; that of Lambeth, founded by Archibishop Bancroft in 1610, for the use of succeeding archbishops of Canterbury, and increafed by the benefactions of Archbishops Ab­
bart, Sheldon, and Tennyson, and faid to confift of at least 15,000 printed books, and 617 volumes in manuscript; that of Red-Crofs freet, founded by Dr Daniel Williams, a prebifterian divine, and fince en­
riched by many private benefactions; that of the Royal

Society, called the Arundelian or Norfolk library, be­
cause the principal part of the collection formerly be­
longed to the family of Arundel, and was given to the fociety by Henry Howard, afterwards duke of Norfolk, in 1666, which library has been increafed by the valuable collection of Francis Afton, Esq; in 1715, and is continually increafed by the numerous benefactions of the works of its learned members, and others: that of St Paul’s, of Sion college; the queen’s library, erected by queen Caroline in 1737; and the furgeon’s library kept in their hall in the Old Bailey, &c.

In Edinburgh there is a good library belonging to the univer­ity, well furnished with books; which are kept in good order. There is also a noble library of books and manuscripts belonging to the faculty of ad­
 vocates. See Advo­cate.

LIBRATION, in aeronautics, an apparent irregular­
arity of the moon’s motions whereby the夫人 is lib­
rate about her axis, fometimes from the east to the weft, and now and then from the weft to the eaf­
See Astronomy, no 420.

LIBURNIA (anc. geog.), a diffirict of Illiricum, ex­
­ending towards the Adriatic between Iltria on the weft, Dalmatia on the eaf­
, and mount Albius on the north. Liburni, the people. The apparitors, who at the command of the magistrate fummoned the people from the country, were called Liburni, because generally men of Liburnia—Liburnia or Libur­
nia, (Horace), denoted a kind of light and swift ski­f, used by the Liburnians in their fee-roving or piracies, for which they were noted. Liburnum (Juvenal) was a species of litter made in form of Liburnian ski­f, wherein the noblemen of Rome were carried, and where they fat at their cafe, either reading or writing. LIBURNUS (anc. geog.), a mountain of Campania. Also a port of Tus­­
cany. Now Livorno, or Leghorn.

E. Long. 1. N. Lat. 43. 50.

LIBYA, in general, according to the Greeks, denoted Africa. An appellation derived from libe “thrift,” being a dry and thirfty country. See Af­
rica.

LIBYA, in a more reftained fense, was the middle part of Africa, extending north and weft, (Pliny); between the Mediterranean to the north, and Ethiopia to the eaf­
and was two-fold, the Hither or Exterior Lib­
ys; and the Farther or Interior. The former lay be­
­tween the Mediterranean on the north, and the Farther Libya and Ethiopia beyond Egypt on the south, (Ptolemy). The Farther or Interior Libya, was a vaft country, lying between the Hither Libya on the north, the Atlantic ocean on the weft, the Ethiopic on the south, and Ethiopia beyond Egypt on the eaf­
(Ptolemy).

LIBYA, in a fill more reftained fense, called, for di­
­inition’s fake, Libya Propria, was a northern dif­
trict of Africa, and a part of the Hith. r Libya; situ­
­ated between Egypt to the eaf­, the Mediterranean to the north, the Syrtis Major and the Regio Tripoli­
tana to the weft, the Garamantes and Ethiopia be­
yond Egypt to the South, Now the kingdom and defart of Barca. This Libya was again divided into Libya taken in the strictefe fense of all, and into Marmarica and Cyrenaica. Libya in the strictefe fense, otherwise the Ex­
terior, was the moft eaf­ten part of Libya Pro­
prica, next to Egypt, with Marmarica on the weft, the
Licence

Licence, in law, an authority given to a person to do some lawful act.

Licensor of the Prefi. See Liberty of the Prefi. Licentiate, one who has obtained the degree of a licence. — The greatest number of the officers of justice in Spain are distinguished by no other title than that of licentiate. In order to pass licentiate in common law, civil law, and phyfic, they must have studied seven years, and in divinity ten. Among us a licentiate usually means a physician who has a licence to practice, granted by the college of physicians.

LICETUS, a celebrated physician of Italy, was born at Rappolo, in the state of Genoa, 1577. He came, it seems, into the world, before his mother had completed the seventh month of her pregnancy; but his father being an ingenious physician, wrapped him up in cotton, and nurtured him for that he lived to be 77 years of age. He was trained with great care, and became a very distinguished man in his profession; and was the author of a great number of works: his book De Monstris every body must have heard of. He was professor of philosophy and physic at Padua, where he died in 1655.

LICEN, liver wort, in botany; a genus of the natural order of alge, belonging to the criprogama class of plants. The male receptacle is roundish somewhat plain and fihing. In the female the leaves have a fenza or nearly furface, scattered over them. There are about 120 species, all found in Britain. Among the most remarkable are the following:

1. The geophytes; it is frequent in rocks, and may be readily distinguished at a distance. The crust or ground is of a bright greenish-yellow colour, sprinkled over with numerous plain black tubercles; which frequently run into one another, and form lines resembling the rivers in a map, from which last circumstance it takes its name.

2. The calcareous, or black nobbed dyer's lichen, is frequent on calcareous rocks; and hath a hard, smooth, white, fpony, or tartareous crust cracked or fetulated on the surface, with black tubercles. Dillenius relates, that this species is used in dyeing, in the same manner as the tartarius after mentioned.

3. The venetus, or red fangled tartareous lichen, hath a hard tartareous crust, cracked and fetulated on the surface, of pale a yellow colour when freh, and a light olive when dry. The tubercles are of a blood-red colour at top, their margin and base of the fame colour as the crust. The texture and appearance of this (according to Mr Lightfoot), indicate that it would answer the purpofe of dyeing as well as some others of this tribe, if proper experiments were made.

4. The calenderius, or yellow farinaeous lichen, is common upon walls, rocks, boards, and old pales. There are two varieties. The first has a farinaeous crust of no regular figure, covered with numerous, small greenish yellow, or olive fhields, and grows commonly upon old boards. The other has a smooth, hard circular crust, wrinkled and lobed at the circumference which adheres closely to rocks and stones. In the centre are numerous fhields of a deeper yellow or orange colour, which as they grow old, dwell in the middle, and assume the figure of tubercles. The inhabitants of Småland in Sweden scrape this lichen from the rocks, and mix it with their tallow, to make golden candles to burn on feftival days.

5. The tartarius, or large yellow-faucer'd dyer's lichen, is frequent on rocks; both in the Highlands and lowlands of Scotland. The crust is thick and tough, either white or greenish-white, and has a rough warted furface. The shields are yellow or buff-coloured, of various sizes from that of a pins head to the diameter of a silver penny. Their margins are of the fame colour as the crust. This lichen is much used by the Highlanders for dyeing a fine claret or pomepadour colour. For this purpofe, after fraping it from the rocks, and cleaning it, they steep it in urine for a quarter of a year. Then taking it out they make it into cakes, and hang them up in bags to dry. These cakes are afterwards pulverized, and the powder is used to impart the colour with an addition of alum.

6. The pellarus, or crawfish-eye lichen, grows upon walls and rocks, but is not very common. The crust spread closely upon the place where they grow; and cover them to a considerable extent. They are rough tartareous, and ash-coloured, of a tough courious substance. The shields are numerous and crowded, having white or ash coloured, shallow, plain dyes, with obtufe margins. This is used by the French for dyeing a red colour.

7. The faxatifius, or grey-blue pitted lichen, is very common upon trunks of trees, rocks, tile, and old wood. It forms a circle two or three inches diameter. The upper surface is of a blue grey and sometimes of a whitish ash-colour, uneven, and full of numerous small pits or cavities; the under side is flat, and covered all over, even to the edges, with short fimple hairs or radicles. A variety sometimes occurs with leaves tinged of a red or purple colour. This is used by fichers and other fmall birds in constructing the outside of their curiously formed nests.

8. The omphaloides, or dark coloured dyers lichen, is frequent upon rocks. It forms a thick widely expanded crust of no regular figure, composed of numerous imbricated leaves of a brown or dark purple colour divided into small segments. The margins of the shields are little crisp and turned inwards, and their outside ash-coloured. The lichen is much used by the Highlanders in dyeing a reddish brown colour. They steep it in urine for a considerable time, till it becomes soft and like a fapie; then, forming the paste into cakes, they dry them in the sun, and preserve them for use in the manner already related of the tartarius.

9. The paticius, or common yellow wall-lichen, is very common upon walls, rocks, tiles of houfes, and trunks of trees. It generally spreads itself in circles of two or three inches diameter, and is said to dye a good yellow or orange colour with alum.

10. The ilandicus, or table lichen, grows on many mountains both of the Highlands and Lowlands of Scotland. It consists of nearly creft leaves about two inches high, of a fliiff substance when dry, but soft and pliant when moist, variously divided without order into broad faniform segments, bifid or trifid at the extremities. The upper or interior surface of the leaves is concave, chequif-colour, smooth and fhining, but red at the base; the under or exterior surface is smooth and whitif, a little pitted and sprinkled with very minute black waris. The margins of the leaves and all the segments from bottom to top are ciliated with fmall,
Lichen. (28)

short, stiff, hair-like spines, of a dark chestnut colour, turning towards the upper side. The shields are very rarely produced. For the uses of this as an excellent herb, see Iceland, next. Made into broth or gruel, it is said to be very nutritious in coughs and consumptions; and in gruel, made by Haller and Scopoli, is much used in these complaints in Vienna.

11. The pulmonarius, or lung-wort lichen grows in shady woods upon the trunks of old trees. The leaves are as broad as a man's hand, of a kind of leather-like substance, hanging loose from the trunk on which it grows, and laminated into wide angular segments. Their natural colour, when fresh, is green; but in drying, they turn first to a glaucous and afterwards to a fuscous colour. It has an astringent, bitter taste; and, according to Gmelin, is boiled in ale in Siberia, instead of hops. The ancients used it in coughs and afflams, &c., but it is not used in modern practice.

12. The calicarius, or beaked lichen, grows sometimes upon trees, but more frequently upon rocks, especially on the sea-coasts, but is not very common. It is smooth, glossy, and whitish, producing flat or convex shields, of the same colour as the leaves, very near the summit of the segments, which are acute and rigid, and, being often reflected from the perpendicular by the growth of the shields, appear from under their limbs like a hooked beak. This will dye a red colour; and promises, in that intention, to rival the famous Lichen Rosella or Argyl, which is brought from the Canary Islands and sometimes sold at the price of 80 l. per ton. It was formerly used instead of starch to make hair-power.

13. The prunifoli, or common ragged hoary lichen, grows upon all sorts of trees; but it is generally most white and hoary on the floc and old palm trees, or upon old pales. This is the most variable of the whole tribe of lichens, appearing different in figure, magnitude and colour, according to its age, place of growth, and sex. The young plants are of a glaucous colour, slightly divided into small acute cleft segments. As they grow older, they are divided like a flag's horn, into more and deeper segments, somewhat broad, flat, soft, and pitted on both sides, the upper surface of a glaucous colour the under one white and hoary.—The male plants, as Linnaeus terms them, are short, seldom more than an inch high, not hoary on the under side; and have pale glaucous shields situated at the extremities of the segments, standing on short peduncles, which are only small stiff portions of the leaf produced. The female specimens have numerous farinaceous tubercles both on the edges of their leaves, and the wrinkles of their foliage. The pulverized leaves have been used as a powder for the hair, and also in dyeing yarn of a red colour.

14. The juniperinus, or common yellow tree-lichen, is common upon the trunks and branches of clumps and many other trees. Linnaeus says it is very common upon the juniper. The Gothland Swedes dye their yarn of a yellow colour with it, and give it as a specific in the jaundice.

15. The cocciferus, or scarlet-tipped cup lichen, is frequent in moors and heaths. It has in the first state a granulated crust for its ground, which is afterwards turned into small laminated leaves, green above, and hoary underneath. The plant assumes a very different aspect, according to the age, situation, and other accidents of its growth; but may be in general readily distinguished by its fructifications, which are fungous tubercles of a fine scarlet colour, placed on the rim of the cup, or on the top of the flake. These tubercles, steeped in an alkaline lixivium, are said to dye a fine durable red colour.

16. The aphotheca, or green ground liverwort with black warts, grows upon the ground at the roots of trees in woods, and other stony and mossy places. It differs very little from the foregoing, and according to some is only a variety of it. Linnaeus informs us, that the country people of Upland in Sweden give an infusion of this lichen in milk to children that are troubled with the disorder called the therub or apho, which induced that ingenious naturalist to bestow upon it the trivial name of aphotheca. The same writer also tells us that a decoction of it in water purges upwards and downwards, and will destroy worms.

17. The cocciferus, or scarlet-tipped cup lichen, is frequent in moors and heaths. It has in the first state a granulated crust for its ground, which is afterwards turned into small laminated leaves, green above, and hoary underneath. The plant assumes a very different aspect, according to the age, situation, and other accidents of its growth; but may be in general readily distinguished by its fructifications, which are fungous tubercles of a fine scarlet colour, placed on the rim of the cup, or on the top of the flake. These tubercles, steeped in an alkaline lixivium, are said to dye a fine durable red colour.

18. The rauhferinus, or rein-deer lichen, is frequent in woods, heaths, and mountainous places. Its general height, when full grown, is about two inches. The flake is hollow, and very much branched from bottom to top; the branches are divided and subdivided, and at last terminated by two, three, four, or five very fine, short, nodding horns. The axillae of the branches are often perforated. The whole plant is of a hoary white or grey colour, covered with white farinaceous particles, light and brittle when dry, soft and elastic when moist. The fructifications are very minute, round, fuscous, or reddish brown tubercles, which grow on the very extremities of the finest branches: but thec

Lichen.
Lichen
tuberces are very seldom found. The plant seems to have no foliaceous ground for the base, nor scarcely any visible roots. Linnaeus tells us, that in Lapland this moss grows so luxuriant that it is sometimes found a foot high. There are many varieties of this species, of which the principal is the Sylvaticus, or brown-tinted rein-deer lichen. The most remarkable difference between them is, that the Sylvaticus turns tawny by age, while the other always continues white. For the uses of these species, see Lapland.

19. The plicatus, or official stringy lichen, grows on the branches of old trees, but is not very common. The flanks are a foot or more in length, cylindrical, rigid, and string-shaped, very irregularly branched, the branches entangled together, of a cinerous or ash-colour, brittle and stringy if doubled short, otherwise tough and pliant, and hang pendent from the trees on which they grow. The fields grow generally at the extremities of the branches, are nearly flat, or slightly concave, thin, dull coloured above, pale-brown underneath, and radiated with fine rigid fibres. As the plant grows old, the branches become covered with a white, rough, warty crust; but the young ones are destitute of it. It was formerly used in the shops as an astringent to stop haemorrhages, and to cure ruptures; but is out of the modern practice. Linnaeus informs us, that the Laplanders apply it to their feet to relieve the excoriations occasioned by much walking.

20. The barbatus, or bearded lichen, grows upon the branches of old trees in thick woods and pine-forests. The flanks or flaring are slightly branched and pendulous, from half a foot to two feet in length, little bigger than a Taylor's common sewing thread; cylindrically jointed towards the base; but surrounded every where with numerous, horizontal, capillary fibres, either simple or slightly branched. Their colour is a whitish green. This has an astringent quality like the preceding. When steeped in water, it acquires an orange colour; and according to Dillenius, was used in Pennsylvania for dyeing that colour.

21. The vulpinus, or gold-wiry lichen, grows upon the trunks of old trees, but is not very common. It is produced in erect tusfs, from half an inch to two inches in height, of a fine yellow or lemon-colour, which readily discovers it. The filaments which compose it are not cylindrical, but a little compressed and uneven in the surface, variously branched, the angles obtuse, and the branchesragglng and entangled one with another. Linnaeus informs us, that the inhabitants of Sweden dye their yarn of a yellow colour with this lichen; and the Norwegians destroy wolves by stuffing dead carcasses with this moss reduced to powder, and mixed with pounded glafs, and so exposing them in the winter-forests to be devoured by those animals.

LICHFIELD. See Litchfield.

LICHTENBERG, a cاطle of France, in Lower Alsace, and the chief place of a county of the same name; feated on a rock, near the mountains Volpes, and is looked upon as impregnable. E. Long. 7° 35'. N. Lat. 48° 55'.

LICHTENBURG, a town of Germany, in the circle of Franconia, and margravate of Culmbach. E. Long. 12° 0'. N. Lat. 50° 26'.

LICHTENFELD, a town of Germany, in the circle of Ffrrnconia, and bishopric of Bamberg, feated on the river Mayne, in E. Long. 11° 10'. N. Lat. 50° 20'.

LICHTENSTEIN, a town of Swisserland, in Tock-erberg, feated on the river Thour. E. Long. 2° 15'. N. Lat. 47° 25'.

LICHTSTATT, an hand some town of Swisserland, in the county of Balde; feated on the river Erzget. In E. Long. 7° 57'. N. Lat. 47° 40'.

LICINIIUS STOLO, a famous Roman tribune, flyed Sto0no on account of a law he made, while tribune, that no Roman citizen should polluce more than 500 acres of land; alleging that when they occupied more, they could not cultivate it with care, nor pull up the useless shoots (foliounes) that grow from the roots of trees. He is memorable also for enacting, that one of the confuls should always be of a Plebian family. He lived about 362 B. C.

LICONON, in the Dionysian solemnities, the myr­stitial van of Baceus; a thing so essential to all the solemnities of this god, that they could not be duly celebrated without it. See DIONYSIA.

LICNOPHORI, in the Dionysian solemnity, those who carried the licenon.

LICOLA, or LAGO-DI-LICOLA, a lake in the king­dom of Naples, formerly famous for plenty of excellent fif; but in the year 1538 an explosion of a volcano changed one part of it into a mountain of ashes, and the other into a morass. It was anciently known by the name of the Loricine-lake.

LICONIA, in Italy: A genus of the digynia order, belonging to the pentandra class of plants. There are five petals included in the pit of the nectarium at its base; the capsule is bilocular and seed-bearing.

LICTORS, among the Romans, were officers esta­blished by Romulus, who always attended the chief magistrates when they appeared in public.

The duty of their office consisted in the three follow­ing particulars: 1. Substitutio, or clearing the way for the magistrate they attended: this they did by word of mouth; or, if there was occasion, by using the rods they always carried along with them. 2. Antinocati, or causing the people to pay the ufual respect to the magistrate, as to slight, if on horseback or in a chariot; to ride up, uncover, make way, and the like. 3. Pretatio, or walking before the magistrates: this they did not confinedly, or altogether, nor by two or three abreast, but singly following one another in a straight line. They also preceded the triumphal car in public triumphs; and it was also part of their office to arrest criminals, and to be public executioners in behal­ling, &c. Their ensigns were the fasces and scurcis. As to the number of lictors allowed each magistrate, a dictator had twenty-four, a master of the horse fix, a conful twelve, a praetor six; and each vefcal virgin, when she appeared abroad, had one.

LID. See Lydd.

LIDDEL (Dr Duncan), professor of mathematics and of medicine in the university of Helmflato, was born in the year 1567 at Aberdeen, where he received the first part of his education in languages and philosophy. About the age of eighteen he repaired to the university of Franche­fort, where he spent three years in a diligent application to mathematics and philosophy. From Frankfort he proceeded to Wittenfaw, or Breflaw in Sicilia, where
he is said to have made uncommon progress in his favourite study of mathematics under the direction of a very eminent professor, Paulus Wittichus. Having lived at Brelaw for the space of one year, he returned to Francfort, and remained there three years, paying the most intense application to the study of physic. A contagious distemper having broke out at that place, the students were dispersed; and Liddel retired to the university of Roftock. Here he renewed his studies, rather as a companion than a pupil of the celebrated Brucæus, who, though an excellent mathematician, did not scruple to confess that he was instructed by Liddel in the more perfect knowledge of the Copernican system, and other astronomical questions. In 1590 he returned once more to Francfort. But having there heard of the increasing reputation of the Academia Julia, established at Helmstadt by Henry duke of Brunswick, Mr Liddel removed thither; and soon after his arrival was appointed to the first or lower professorship of mathematics. From thence he was promoted to the second and more dignified mathematical chair, which he occupied for nine years, with much credit to himself and to the Julia Academy. In 1596 he obtained the degree of M. D. was admitted a member of that faculty, and began publicly to teach physick. By his teaching and his writings he was the chief support of the medical school at Helmstadt; was employed as first physician at the court of Brunswick, and had much practice among the principal inhabitants of that country. Having been several times elected dean of the faculties both of philosophy and physick, he had in the year 1604 the honour of being chosen pro-rector of the university. But neither academical honours, nor the profits of an extensive practice abroad, could make Dr Liddel forget his native country. In the year 1600 he took a final leave of the Academia Julia; and after travelling for some time through Germany and Italy, he at length settled in Scotland. He died in 1613, in the fifty-second year of his age. By his last will he bequeathed certain lands purchased by him near Aberdeen upon the university there, in all time coming, for the education and support of six poor scholars. Among a variety of regulations and injunctions for the management of this charity, he appoints the magistrates of Aberdeen his trustees, and solemnly denounced the curse of God on any person who should abuse or misapply it. His works include:

1. *Disputationes Medicinales*, Helmstadt, 1603, 4to. 2. *Artes Medicinae et peritia explicantia*, Hamburgi, 1607, 8vo. This performance is dedicated to King James VI. and is divided into five books, viz. *Introductio in totam Medicinam*, *De Physiologia*, *De Pathologia*, *Signorum delirina*, *De Therapeutica*. 3. *De febribus Libri tres*, Hamburgi, 1610, 12mo. 4. *Tractatus de dente aureo*, Hamburgi, 1628, 12mo. This last performance Dr Liddel published in order to refute a ridiculous story then current of a poor boy in Silida, who, at seven years of age, having lost some of his teeth, brought thither, to the astonishment of his parents, a new tooth of pure gold. Jacobus Horlins, doctor and professor of medicine in the Academia Julia, at the same time with our author, had published a book which he dedicated to the emperor Rudolphus II. to prove that this wonderful tooth was a prodigy sent from heaven to encourage the Germans then at war with the Turks, and foretelling, from this golden tooth, the future victories of the Christians, with the final destruction of the Turkish empire and Mahometan faith, and a return of the golden age in 1700, preparatory to the end of the world. The imposture was soon after discovered to be a thin plate of gold, skilfully drawn over the natural tooth by an artist of that country, with a view to excite the public admiration and charity. 5. *Artis conservandi Sanitatem*, *libri dui*, *Abdoniensis*, 1611, 12mo; a pithomous work. The merit of these works of Dr Liddel, it is not necessary to callify with precision. They appear, however, to contain the most fashionable opinions and practice, in the medical art, of the age in which he lived; nor is there among any differente or medical subject then known of which he has not treated in one or other of his writings. Of his language it may be sufficient to observe, that the Latin is at least as pure as is generally found among medical writers, and that his style is plain and perspicuous, and sometimes even elegant.

**Lidford**, a village of Devonshire in England, situated on the river Lid, two or three miles east of Brent Tor, was formerly a famous town, with a caffle, which was always committed to men of quality, and twice spent by the Danes in 997; and though now a contemptible village, the parish may for lands and liberties encourage the Germans then at war with the Turks, and so forth. A companion than a pupil of the celebrated Brucæus, who, though an excellent mathematician, did not scruple to confess that he was instructed by Liddel in the more perfect knowledge of the Copernican system, and other astronomical questions. In 1590 he returned once more to Francfort. But having there heard of the increasing reputation of the Academia Julia, established at Helmstadt by Henry duke of Brunswick, Mr Liddel removed thither; and soon after his arrival was appointed to the first or lower professorship of mathematics. From thence he was promoted to the second and more dignified mathematical chair, which he occupied for nine years, with much credit to himself and to the Julia Academy. In 1596 he obtained the degree of M. D. was admitted a member of that faculty, and began publicly to teach physiology. By his teaching and his writings he was the chief support of the medical school at Helmstadt; was employed as first physician at the court of Brunswick, and had much practice among the principal inhabitants of that country. Having been several times elected dean of the faculties both of philosophy and physiology, he had in the year 1604 the honour of being chosen pro-rector of the university. But neither academical honours, nor the profits of an extensive practice abroad, could make Dr Liddel forget his native country. In the year 1600 he took a final leave of the Academia Julia; and after travelling for some time through Germany and Italy, he at length settled in Scotland. He died in 1613, in the fifty-second year of his age. By his last will he bequeathed certain lands purchased by him near Aberdeen upon the university there, in all time coming, for the education and support of six poor scholars. Among a variety of regulations and injunctions for the management of this charity, he appoints the magistrates of Aberdeen his trustees, and solemnly denounced the curse of God on any person who should abuse or misapply it. His works include:

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**Lidney**, a town of Gloucestershire in England, 71 miles from London, is seated on the west bank of the river Severn, and has a market on Wednesdays, with two fairs in the year. In the neighbourhood are the remains of a large Roman encampment, with foundations of many ancient buildings, among which are the ruins of a Roman hypocaust of an oval form, and Roman antiquities and coins are often found here in great number. Mr Bathurst has a fine seat here called Sydney-Park, with very extensive woods adjoining.

**LIE**, in morals, denotes a criminal breach of veracity. — Archdeacon Paley, in treating of this subject, observes, that there are falsehoods which are not lies; that is, which are not criminal; and there are lies which are not literally and directly false.

1. Cales of the first class are those which
2. Where no one is deceived: as for instance in parables, fables, novels, jefts, tales to create mirth, or ludicrous embellishments of a story, in which the declared design of the speaker is not to inform, but to divert; compliments in the subcription of a letter; a prisoner's pleading not guilty; an advocate affecting the justice, or his belief of the justice, of his client's cause. In such instances no confidence is destroyed, because none was repose; no promise to speak the truth is violated, because none was given or understood to be given.
ties to continue, the
and the difference is, lhat the former
lies, falfe
to veracity, fpeech and
and we wilfully deceive,
fiction
a fentence is different from the
meaning. It is the
nary things which they have feen or heard; aud fo
fer obligation to
fal, who holds a kind offee, that binds him in a
fenfes of all words
huts, to induce his creditors
his finger in
rion,
any fenfe of
frauds,
slperuitious
lie, that it is inoffeniive; or to
"to bind;" or his hand in that of the lord, to
word
he was
the fame {ource with
fouth by Champaigne and Lnxemberg,
the former being in
any
for the ftrvice of the province, or
he had
omnibus victis Francis & Anglis, faltentum.
Scattis me dedifle terram Ufse, in depedene (bodus deped­
dale) huic Basfolien, & usori ejus Afjite—ea condition
ed inspirations, forged books, counterfeit miracles, are
they are improperly enough called,
pretenfi<;ifls
of all
they should be perpetual, which is hardly possible; and
the detection of the fraud is sure to disparage the credit
by pointing his finger in a wrong direction, when a traveller
inquires of him his road; or when a tradesman shuts up his
windows, to induce his creditors to believe that he
is abroad: for to all moral purpofes, and therefore as
to veracity, fpeech and action are the fame; fpeech being
only a mode of action.
LIECHTENAU, a town of Germany, in the cir-
cle of Franconia and margravate of Anfpach, fubjeft
to Nurenbeg. E. Long. 9. 5. N. Lat. 48. 43.
LIEGE (Ligia,) in law, properly signifies a vaf-
fal, who holds a kind of fee, that binds him in a clo-
fer obligation to his lord than other people.
The term seems to be derived from the French fer
"to bind;" on account of a ceremony used in rendering
fait or homage: which was by locking the vaflal's
thumb or his hand in that of the lord, to show that
he was fast bound by his oath of fidelity. Cujus,
Vigence, and Bignon, choose rather to derive the
word from the fame fource with levis or loadi, "loy-
al, faithful." But Du Cange falls in with the opin-
ioin of thofe who derive it from lri, a kind of vaflals,
so firmly attached to their lord, on account of lands or
feftial of him, that they were obliged to do him all
manner of service, as if they were his domestics. He
adds, this was formerly called ligiumferotinum, and
the perion Itige. In this fene, the word is ufed, Leg.
Edw. cap. 29. fada fub tutela regis liges debent effe; this,
wholly under his protection.
By liege homage, the vaflal was obliged to ferve his
lord towards all, and againft all, excepting his father.
In which fene, the word was ufed in opposition
to fimple homage; which laft only obliged the vaflal to pay
the rights and accustomed dues to his lord; and not to
bear arms againft the emperor, prince, or other superior
lord: fo that a liege man was a perfon wholly devoted
to his lord, and entirely under his command. Omnibus.

LIEGE, a biphopic of Germany, in the circle of
Weffphalia; bounded to the north by Brabant, to the
south by Champaigne and Luxemburg, to the eait by
Limburg and Juliers, and to the west by Brabant,
Namur, and Hainault. It is very unequal both in
length and breadth; the former being in some places
above 93 miles, in others not half so much; and the
latter in some places 45, in others hardly 25. The
air here is very temperate; and the foil fruitful in
corn, wine, wood, and pasture. Here also are mines of
lead and iron, pits of coal, quarries of marble and
done, and some celebrated mineral waters, as thofe
of Spa and Chau-fountain. The principal rivers are,
the Maes and Sambre. The manufacturers and com-
modities of the country are chiefly hemp, raps, nails,
ferge, leather, with the products we have just men-
tioned. The fates of the biphopic are composed of
three bodies: the first is the chapter of Lige; the
second, the nobility of the country; and the third, the
deputies of the capital and the other towns. The
three fates are seldom called together, except to
raife taxes for the service of the province, or upon
some particular emergency; but there is a committee of
the fates, who meet thrice a-week, and in time of
war daily. They are always about the prince-bishop,
to make remontrances, and demand the redrefs of
grievances. The bishop is spiritual and temporal
Liege, the capital of the bishopric of the same name, stands upon the Meuse, in a fine valley, surrounded with woods and hills, being a free imperial city, and one of the largest and most eminent in Europe. Though it is 100 miles from the sea by water, the Meuse is navigable up to it. The city has 16 gates; 17 bridges, some of them very handsome; 154 streets, many of them straight and broad; a fine episcopal palace; a very large flately cathedral, in which, besides five great silver cofiers full of reliques, are several silver statues of saints, and a St. George on horseback of maffy gold, presented to the cathedral by Charles the Bold, by way of aatonement for the inhabi-
tants cruelly in the year 1468. Of the other churches, that of St. Paul is the most remarkable, both for its structure and fine ornaments in painting and marble. The city is well fortified, and there are also two castles on the mountain of the Holy Walburg for its defence. Besides a great number of other convents of both sexes, here is a college of English Jesuits, founded in the year 1616, and a fine munery of English ladies. Indeed, churches, convents, and other religious foundations, take up the greater part of it. The reader, therefore, no doubt, will take it for granted, that it is a most blest, holy, and happy city. But however it may fare with the profane, unhallowed laity, it is certainly the paradise of priests, as it is expressively called, by way of eminence. It is divided into the old and new, or the upper and lower; and the latter again into the iland, and the quarter beyond the Maes. The houses are high, and built of bluish marble. In the town and suburbs are 12 public places or squares, 10 hospitals, a beguin-house, and two fine keys, planted with several rows of trees, for the burghers to take the air; but a great part of that within the walls is taken up with orchards and vineyards. The manufactures of this city are arms, nails leather, l fee, and beer. In St. William's convent, without the city, is the tomb of the famous

English traveller Sir John Mandeville, with an in-
scription in barbarous French, requesting those who
read it to pray for his soul. Near it are kept the saddle, spurs, and knife, that he made use of in his travels. After having been most of the cities of any note in the world, he made choice of this to spend the eve of his life in. A little way from the city, on the other side the Meas, stands the episcopal palace of Ste-
ning, in which the bishops generally reside during the summer. The latitude of this city is 50. 36. N. and the longitude 5. 40. E.

Some disturbances took place here in the year 1789, in consequence of certain disputes that had arisen between the prince-bishop and the inhabitants. The latter having demanded certain privileges, which he did not think proper to grant, they took up arms, and compelled him and his chapter to comply with their request. The prince, together with many of the clergy, nobility, and citizens, alarmed by this commotion, and dreading the consequences of popular fury, which when once roused, inroads on some famous universities. The bishopric is very populous and extensive, containing 1500 parishes, in which are 24 walled towns, besides others, 52 baronies, besides counties and seigniories 17 abbeys for men, who must be all gentlemen, and 11 for ladies, exclusive of others.
LIEGE was now full time to put a period to that madness to which the people had abandoned themselves; and to accomplish this in an effectual manner, the imperial chamber at Wetzlar requested the emperor, as a member of the ancient circle of Burgundy, to execute its orders respecting this object. In consequence of this measure, Baron Alvinzi, who commanded a body of Austrian troops cantoned in Limburg and the confines of Brabant, notified, by order or Martial Bender, to the states and municipality of Liege, that the emperor intended to send troops into their city and territories, for the purpose of restoring tranquillity and good order. The states had already been informed of this resolution by their agent at Wetzlar. They therefore wrote to Martial Bender, to assure him of the respectful confidence which they placed in the justice and magnanimity of the emperor, and to request that the Austrian troops might enter alone, without those of the electors; and that they might be confined to occupying the gates and the suburbs only. To this letter, which was carried to Brussels by a deputation of the states, Martial Bender returned a very satisfactory answer, relating to the disposition of the electoral troops; but Baron Alvinzi, in a note which he wrote to the states, infufed among other articles, that all the citizens should throw down their arms: that proper accommodations should be prepared for the officers and men; that the warlike stores, collected for making resistance, should be removed; and that cockades, and every other distinctive mark of the like kind, should be laid aside before the arrival of the Imperial troops. However humiliating these preliminaries might be, especially that of a general disarming, the states and municipalities acquiesced without the least reserve; and their submission, as sudden as complete, was communicated to the people, with an exhortation to follow their example.

Notwithstanding this pacific appearance, two days before the entrance of the Imperial troops, the municipal council of Liege, flattering themselves, perhaps, with the hopes of succour from Prussia, assured the inhabitants that they would remain unshaken in their post, and that they had sworn never to desert the cause in which they were engaged. This, however, did not prevent the Austrian troops from entering without opposition, into the heart of the city; where they occupied every post; made the citizens lay aside their arms, uniforms, and cockades; and, in a single hour, deposed so many false-reigns of a year. The greater part of the municipal officers, who, two days before, had solemnly promised such great things; betook themselves to flight, and retired either to France or Wefel; while the ancient magistracy, which had been expelled in the month of August 1789, was provisionally reinstated by the directorial commissioners. —The decrees of the imperial chamber at Wetzlar have since been executed in their utmost extent. The ancient magistracy and the privy-council of the prince bishop have been restored; and the prince himself having returned, peace and good order have been re-established.

 LIENERY, a flux of the belly, in which the aliments are discharged as they are swallowed, or very little altered either in colour or substance. See (Index subjoined to) Medicine.

LIEVENS (John or Jan), a celebrated painter, was born at Leyden in 1607. He discovered an early inclination for the arts, and was the disciple first of juris van Schooten, and afterwards of Peter Laftman. He excelled principally in painting portraits; but he also executed several historical subjects with great success. He came over into England, where he resided three years, and painted the portraits of Charles I. the queen, the prince of Wales, and several of the nobility; after which he returned to Antwerp, where he met with full employment for his pencil. He has several etchings by this matter, which are performed in a flight, but masterly manner. His style of etching bears some resemblance to that of Rembrandt; but it is coarser in general, and less finished.

LIEOU-KIEOU, the name of certain islands of Asia, subject to China; but hitherto little known to geographers, who have been satisfied with marking their existence and latitude in their charts. They, however, form a powerful and extensive empire, the inhabitants of which are civilized, and ought not to be confounded with other savage nations dispersed throughout the islands of Asia. Father Gabel, a Jesuit, has furnished us with some interesting particulars respecting these islanders, which he extracted from a Chinese relation, published in 1721, at the end of a voyage that was undertaken on the following account. The emperor Kang-hi having resolved, in 1719, to send an ambassadour to the king of Lieou-kieou, chose for this purpose one of the great doctors of the empire, named Sopao-Koang. This learned man departed from China in 1719, and returned to Peking in 1720, where, in the year following, he related a relation of his voyage to be published in two volumes. It is in the first of these that he gives an accurate and particular description of the isles of Lieou-kieou; and what he relates appears to be worthy of the greater credit, because, being on the spot, he examined, as he himself says, according to the orders of the emperor, whatever he found curious or interesting, respecting the number, situation, and productions of these isles; also the history, religion, manners, and customs of the people who inhabit them.

These isles, situated between Corea, Formosa, and Japan, are in number 36. The principal and largest is called Lieou-kieou; the rest have each a particular denomination. The largest island extends from north to south almost 440 1ys, and 120 or 140 from east to west; but on the south side, the extent from east to west is not 100 1ys. The south-east part of the island where the court resides, is called Cheouli; and it is there that Kint-ching, the capital city, is situated. The king's palace, which is reckoned to be four leagues in circumference, is built on a neighbouring mountain. It has four gates, which correspond to the four cardinal points; and that which fronts the west forms the grand entrance. The view which this palace commands is most extensive and delightful; it reaches as far as the port of Napakiang, at the distance of ten lys, to the city of Kint-ching, and to a great number of other cities, towns, villages, palaces, temples, monasteries, gardens, and pleasure houses. It stands in longitude 146° 26' east, and in latitude 26° 2' north.

If we believe these islanders, the origin of their empire
Lieou-Kicou.

Pirate is lost in the remotest antiquity. They reckon up 25 succeasive dynasties, the duration of which forms a period of more than 18,000 years. It would be useless to employ a single moment in pointing out the absurdity of these pretensions. It is however certain, that the existence of the country called Lieou-kicou was not known in China before the year 605 of the Christian era. It was in the course of that year, that one of the emperors of the dynasty of Soui, having heard of these isles, was desirous of knowing their situation. This prince at first sent some Chinese thers; but their expedition proved fruitless, as the want of interpreters prevented them from acquiring that knowledge which was the object of their voyage. They only brought some of the islanders with them to Sigan-fou, the capital of the province of Chen-fi, which was the usual residence of the emperors of the dynasty of Soui. It fortunately happened, that an ambassador of the king of Japan was then at court. This ambassador and his attendants immediately knew the strangers to be natives of Lieou-kicou; but they spoke of these isles as of a miserable and wretched country, the inhabitants of which had never been civilized. The emperor of China afterwards learned, that the principal island lay to the east of a city called at present Fau-teheou-fou, which is the capital of the province of Fo-kien; and that, in a passage of five days, one might reach the large island where the king kept his court.

On this information, the emperor Yang-ti sent skilful men, accompanied by interpreters, to summon the prince to do homage to the emperor of China, and to pay him tribute. This proposal was very ill received. The king of Lieou-kicou sent back the Chinese, telling them, firmly, that he acknowledged no prince to be his superior. This answer irritated the emperor, who, to obtain revenge, caused a fleet to be immediately equipped in Fo-kien, in which he embarked 10,000 men. This fleet set sail, and arrived in safety at the port of Napa-kiang. The army, in spite of every effort made by the natives, landed on the island; and the king, who had put himself at the head of his troops to oppose the enemy, having fallen in battle, the Chinese pillaged, sacked, and burnt the royal city, made more than 5000 slaves, and returned to China.

The emperors of the dynasty of Tang, those of the first dynasties that followed, and those of the dynasty of Song, although they were fully informed of every thing respecting the Lieou-kicou isles, made no attempts to render them tributary. In 1291, Chi tio-emperor of the dynasty of Yen, was desirous of reviving the pretensions of his predecessors. He fitted out a fleet to subdue these islands; but schemes of conquest had become disagreeable to the Chinese, since the disaster that befell their army in an expedition against Japan. The fleet of Chi tio-fou went no farther than the isles of Pong-hou, and the western coast of Formosa, from whence, under divers pretences, they returned to the ports of Fo-kien.

It was only in 1372, under the reign of Hong-you, founder of the dynasty of Ming, that these islands submitted voluntarily to the Chinese government. Hong-you had sent one of the grandees of his court to Tsay-tou, who was then reigning at Lieou-kicou, to inform him of his accession to the throne. The Chinese nobleman had received particular instructions respecting this commission, and he acquited himself of it with all the prudence and address of an able minister. In a private audience which he had with Tsay-tou, he exhorted this prince to declare himself a tributary of the empire, and laid before him the advantages he would derive from this step. His reasoning, supported by the power of his natural eloquence, made so much impression on the mind of Tsay-tou, that he embraced the proposal made him, and sent immediately to the emperor to demand the investiture of his states.

Hong-you received his envoys in a magnificent manner, and loaded them with presents. He solemnly declared Tsay-tou a vassal of the empire; and, after having received his first tribute (which consisted in valuable horses, aromatic wood, sulphur, copper, tin, &c.), he sent to this prince, a golden seal, and confirmed the choice he had made of one of his sons to succeed him. The emperor afterwards sent 36 families, almost all from the province of Fo-kien to Lieou-kicou. Tsay-tou received them, assigned them lands near the port of Napa-kiang, and appointed certain revenues for their use, at the same time that Hong-you made them considerable remittances. These families first introduced into Lieou-kicou the learned language of the Chinese, the use of their characters, and the ceremonies prescribed in China in honour of Confucius. On the other hand, the sons of several of the grandees of the court of Tsay-tou were sent to Nan-king, to study Chinese in the imperial college, where they were treated with distinction, and maintained at the emperors' expense.

The isles of Lieou-kicou had neither iron nor porcelain. Hong-you supplied this want; he cauted a great number of utensils of iron and instruments to be made, which he sent thither, together with a quantity of porcelain vessels. Commerce, navigation, and the arts soon began to flourish. These islanders learned to cast bells for their temples, to manufacture paper and the finest stuffs, and to make porcelain, with which they had been supplied before from Japan.

The celebrated revolution which placed the Tartars on the imperial throne of China, produced no change in the conduct of the kings of Lieou-kicou. Chang-tché, who was then reigning, sent ambassadors to acknowledge Chunch-tchi, and received a seal from him, on which were engraved some Tartar characters. It was then settled, that the king of Lieou-kicou should pay his tribute only every two years, and that the number of persons in the train of his envoys should not exceed 150.

The emperor Kang-hi seemed to pay more attention to these isles than any of his predecessors. He cauded a superb palace to be erected in honour of Confucius, and a college where he maintained masters to teach the sciences and the Chinese characters. He also instituted examinations for the different degrees of literati. He ordained, that the king of Lieou-kicou should never send in tribute rose-wood, cloves, or any other production which was not really of the growth of the country; but that he should send a fixed quantity of sulphur, copper, tin, shells, and mother of pearl, which is remarkably pretty in these islands. He permitted, that, besides the usual tribute, he might present him horse furniture, pitil-cafes, and other things of the same kind, which these islanders are said to manufacture with great taste and neatness.
It is more than 900 years since the bronze of China introduced at Lieou-kieon the worship of Po, and the principal beasts belonging to their feet. This worship is at present the established religion both of the grandees and of the people. There is still to be seen in the royal city a magnificent temple, erected in honour of another idol borrowed from the Chinese, named Tien-fey, which signifies celestial queen or lady.

These illidours do not make promises or swear before their idols. When they have occasion to do this, they burn perfumes, present fruits, and stand respectfully before some stone, which they call to witness the solemnity of their engagements. Numbers of stones are to be seen in the courts of their temples, in most public places, and upon their mountains, which are entirely appropriated to this purpose. They have also among them women consecrated for the worship of spirits, who are supposed to have great influence over these beings. They visit the sick, distribute medicines, and recite prayers for their recovery.

They respect the dead as much as the Chinese, and they are no less ceremonious in wearing mourning; but their funerals are neither so pompous, nor attended with so much expense. Their coffins, which are of an hexagonal or octagonal figure, are three or four feet high. They burn the flesh of the bodies of their dead, and preserve only the bones. They never offer provisions to them; they are contented with placing lamps round them, and burning perfumes.

Different families are distinguished in Lieou-kieou by surnames, as in China; but a man and a woman of the same surname cannot be united in marriage. The king is not permitted to marry but in the three grand families, which always enjoy the highest offices. There is a fourth, of equal distinction as the three former; but neither the king nor the princes contract any alliances with this family; for it is doubtful, whether it be not sprung from the same item as the royal line.

A plurality of wives is allowed in these isles. Young men and young women enjoy the liberty of falling one another, and of contracting together; and their union is always in conformity of their own choice. The women are very reserved; they never use paint, and wear no pendants in their ears; they collect their hair on the top of their heads in the form of a curl, and fix it in that manner by means of long pins made of gold or silver.

Besides the vast domains which the king possesses, he receives the produce of all the sulphur, copper, and tin-mines, and of the salt-pits, together with what arises from taxes. From these revenues he pays the salaries of the mandarins and officers of his court. These salaries are estimated at a certain number of facks of rice; but under this name is comprehended what ever the king gives in grain, rice, silk, cloth, &c. The whole is valued according to the price of the facks of rice.

There are here, as in China, nine orders of mandarins, who are distinguished by the colour of their caps, or by their girdles and cushions. The greater part of the titles of these mandarins are hereditary in their families; but there are some which are only bestowed upon merit. In the royal city there are tribunals established for managing the revenue and affairs of the principal island, and of all the others which are dependent on it. The latter have agents, who reside at court.

There are also particular tribunals for civil and criminal matters; for whatever concerns the families of the grandees and princes of the affairs of religion; for inspecting the public granaries, king's revenues, duties; for commerce, manufactures, civil ceremonies, and for navigation, public edifices, literature, and war.

The vessels that are built in this country are greatly valued by the people of China and Japan. In thelfe the natives go not only from one island to another, but also to China, Tong-kung, Cochinchina, Corea, Nangazaki, Satsuma, the neighbouring isles, and so on, where they dispose of their different commodities. Besides these articles of commerce which their manufactures of silk, cotton, paper, arms, copper utensils, &c. furnish them, they also export mother of pearl, tortoise and other shells, coral and whale-fishes, which are in great request both in China and Japan.

LIEUTAUD (Dr Joseph), councillor of state and first physician at the court of France, was born at Aix in Provence, and resided principally there till he took the degree of doctor of medicine. After this he prosecuted his studies for some years at Montpellier. He returned to Aix, where he soon acquired extensive practice, and became eminent for literary abilities. He resided there till the year 1750, when he was invited to act as physician to the royal infirmary at Versailles. There he practised with such reputation and success, that he soon arrived at the head of his profession; and in the year 1774, upon the death of M. Senac, he was appointed architect. His extensive engagements in practice did not prevent him from cultivating the science of medicine in all its branches, and from freely communicating to others the result of his own studies. He published many valuable works; amongst which the following may be accounted the most remarkable. 1. Elementa Philologic. 2. Precis de la Medicina. 3. Pratique des Prisons de la Materie Medica. 4. Essais Anatomique. 5. Synopsis Universelle des Medecins. 6. Historia Anatomica-Medica. He died at Versailles in 1780, aged 78 years.

LIEUTENANT, an officer who supplies the place and discharges the office of a superior in his absence. Of these, some are civil, as the lords lieutenants of counties, and the lords-lieutenants of counties; and others are military, as the lieutenant-general, lieutenant-colonel, &c.

Lord Lieutenant of Ireland, is properly a viceregal; and has all the state and grandeur of a king or of England, except being served upon the knee. He has the power of making war and peace, of besieving all the offices under the government, of dubbing knights, and of pardoning all crimes except high treason; he also calls and prorogues the parliament, but no bill can pass without the royal assent. He is assisted in his government by a privy-council; and, on his leaving the kingdom, he appoints the lords of the regency, who govern in his absence.

Lord Lieutenant of Counties, are officers, who, upon any invasion or rebellion, have power to raise the militia, and to give commissions to colonels and other officers, to arm and form them into regiments, troops, and companies. Under the lord-lieutenants, are deputy-lieutenants, who have the same power;


**Lieutenant**

These are chosen by the lords-lieutenants, out of the principal gentlemen of each county, and preferred to the king for his approbation.

**Lieutenant-Colonel.** See Colonel.

**Lieutenant-General.** See General.

Lieutenant, in the land-service, is the second commissioned officer in every company of both foot and horse, and next to the captain, and who takes the command upon the death or absence of the captain.

**Lieutenant of Artillery.** Each company of artillery hath four: first and second lieutenants. The first lieutenant hath the same duty with the captain; because in his absence he commands the company: he is to see that the soldiers are clean and neat; that their clothes, arms, and accoutrements, are in good and serviceable order; and to watch over every thing else which may contribute to their health. He must give attention to their being taught the exercise, see them punctually paid, their messes regularly kept, and to visit them in the hospitals when sick. He must assist at all parades, &c. He ought to understand the doctrine of projectiles and the science of artillery, with the various effects of gun-powder, however managed or directed; to enable him to construct and dispose his batteries to the best advantage; to plant his cannon, mortars, and howitzers, so as to produce the greatest annoyance to an enemy. He is to be well skilled in the attack and defence of fortified places; and to be conversant in arithmetic, mathematics, mechanics, &c.

Second **Lieutenant in the Artillery,** is the same as an ensign in an infantry regiment, being the younger commissioned officer in the company, and must assist the first lieutenant in the detail of the company's duty. His other qualifications should be equal with those of the first lieutenant.

**Lieutenant of a ship of War,** the officer next in rank and power to the captain, in whose absence he is accordingly charged with the command of the ship, as also the execution of whatever orders he may have received from the commander relating to the king's service.

The lieutenant who commands the watch at sea, keeps the life of all the officers and men thereto belonging, in order to prevent them when he judges it expedient, and report to the captain the names of those who are absent from their duty. During the night-watch, he occasionally visits the lower decks, or sends thither a careful officer, to see that the proper sentinels are at their duty, and that there is no disorder amongst the men; no tobacco smoked between decks, nor any fire or candle burning there, except the lights which are in lanterns, under the care of a proper watch, on particular occasions. He is expected to be always upon deck in his watch, as well to give the necessary orders with regard to trimming the sails and superintending the navigation, as to prevent any noise or confusion; but he is never to change the ship's course without the captain's directions, unless to avoid an immediate danger.

The lieutenant, in time of battle, is particularly to see that all the men are present at their quarters, where they have been previously stationed according to the regulations made by the captain. He orders and exhibits them every where to perform their duty; and acquaints the captain at all other times of the misbehaviour of any person in the ship, and of whatever else concerns the service or discipline.

The youngest lieutenant in the ship, who is also styled lieutenant at arms, besides his common duty, is particularly ordered, by his instructions, to train the seamen to the use of small arms, and frequently to exercise and discipline them therein. Accordingly his office, in time of battle, is chiefly to direct and attend them; and at all other times to have a due regard to the preservation of the small arms, that they be not lost or embezzeled, and that they are kept clean and in good condition for service.

**Lieutenant-Reformer,** he whose company or troop is broke or disbanded, but continued in whole or half-pay, and still preserves his right of seniority and rank in the army.

**Life,** is peculiarly used to denote the animated state of living creatures, in the time that the union of their soul and body lasts.

The Prolongation of Life is made by Lord Bacon one of the three branches of medicine; the other two relating to the preservation of health, and the cure of diseases. See Medicine.

The theory of prolonging life he numbers among the depredata. Some means or indications that seem to lead to it, he lays down as follow.

Things are preferred in two manners; either in their identity, or by reparation. In their identity; as a fly or ant in amber; a flower, or fruit, or wood, in a conservatory of snow; a dead carcase in balams. By reparation; as a flame, or a mechanical engine, &c. To attain to the prolongation of life, both these methods must be used. And hence, according to him, arise three intentions for the prolongation of life: Retardation of consumption, proper reparation, and renovation of what begins to grow old.

Consumption is occasioned by two kinds of depredation; a depredation of the innate spirit, and a depredation of the ambient air. These may be each prevented two ways; either by rendering those agents less predatory, or by rendering the passive parts (viz. the juices of the body) less liable to be preyed on. The spirit will be rendered less predatory, if either its substance be congealed, as by the use of opiates, grief, &c.; or its quantity diminished, as in spare and monastic diets; or its motion calmed, as in idleness and tranquillity. The ambient air becomes less annoying to an enemy, if it be either less heated by the rays of the sun, as in cold climates, in caves, mountains, and anchorits cells; or be kept off from the body, as by a dense skin, the feathers of birds, and the use of oils and ungualts without aromatics. The juices of the body are rendered less liable to be preyed on, either by making them harder or more moist and oily; harder, as by a coarse sharp diet, living in the cold, robust exercises, and some mineral baths; moister, as by the use of sweet foods, &c. abstaining from fats and acids; and especially by such a mixture of drink as consists wholly of fine subtle particles without any acrimony or acidity.

Reparation is performed by means of aliment; and allmentation is promoted four ways; by the concoction of the visceras, fo as to extrude the aliment; by exciting the exterior parts to the attraction of the aliment; as in proper exercises and frications, and someunctions and
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Life, Ligature.

Ligature. It may more easily infinate itself, and in some measure anticipate the digestion; as in various ways of dressing meats, mixing drinks, fermenting breads, and reducing the virtues of these three into one: By promoting the act of alimentation itself, as in seafonable sleep, some external application, &c.

The renovation of what begins to grow old, is performed two ways: By the intertension of the habit of the body; as in the use of emollients, emplasters, undilutes, &c. of such a nature, as do not extract but impress: Or by purging off the old juices, and substituting fresh ones; as in seafonable evacuations, attenuating diats, &c.

The same author adds these three axioms: That the prolongation of life is to be expected, rather from some flated diets, than either from any ordinary regimen or any extraordinary medicines; more from operating on the spirits and mollifying the parts, than from the manner of feeding; and this mollifying of the parts without it is to be performed by substials, imprints, and accidents. See LONGEVITY.

Vegetable Life. See PLANTS.

LIFE-Rent, in Scots law. When the use and enjoyment of a subject is given to a person during his life, it is said to belong to himself in life-rent.

LIGAMENT, in its general sense, denotes any thing that ties or binds one part to another.

Ligament, in anatomy, a strong compact substance, serving to join two bones together. See Anatomy, p. 7.

LIGARIUS (Quintius), a Roman proconsul in Africa, 49 B.C. Taking part with Pompey, he was forbidden by Julius Caesar to return to Rome; to obtain his pardon, Cicero made that admired oration in his defence which has immortalized the memory of the client with that of his celebrated advocate.

Ligature, in surgery, is a cord, band, or string; or the binding any part of the body with a cord, band, fillet, &c. whether of leather, linen, or any other matter.

Ligatures are used to extend or replace bones that are broken or dislocated; to tie the patient down in lithotomy and amputations; to tie upon the veins in phlebotomy, or the arteries in amputations, or in large wounds; to secure the splints that are applied to fractures; to tie up the processes of the peritoneum with the peritoneal veins in cataract; and lastly, in taking off warts, or other excrescences by ligature.

Ligature, is also used to signify a kind of bandage or fillet, tied round the arm, neck, leg, or other part of the bodies of men or beasts, to divers or drive off some disease, accident, &c.

Ligature, is also used for a state of impotency, in respect to venery, pretended to be caused by some charm or witchcraft.

Kämpfer tells of an uncommon kind of ligature or knotting, in use among the people of Malaçar, Java, Malaya, Siam, &c. By this charm or spell, a man binds up a woman, and a woman a man, so as to put it out of their power to have to do with any other person; the man being thereby rendered impotent to any other woman, and all other men impotent with the woman.

Some of their philosophers pretend, that this ligature may be effected by the shutting of a lock, the drawing of a knot, or the sticking of a knife in the wall, at the point of time wherein the priest is joining a couple together; and that a ligature, thus effected, may be dissolved, by the spouse's urining through a ring. This piece of superstition is said to obtain also among the Christians of the East.

The same author tells us, that during the ceremony of marriage in Kudish, he observed an old fellow lurking behind the church-door, and mumbling生意 are made by a firing of words; and, at the same time, cutting a long rod, which he held under his arm, into pieces; which, it seems, is a common practice at the marriages of great persons, and done with a design to elude and counterwork any other person that might possibly be inducing the ligature.

The secret of inducing a ligature is delivered by the same author, as he was taught it on the spot by one of their adepts: but it is too absurd and obscene to deserve being transcribed.

M. Marshall mentions a ridiculous form of ligature, which he received from a bramint at Indostan; "If (says he) the little worm in the wood Viktorara kara be cut into two, and the one part flies and the other not, if the string part be bruised, and given with half a beetle to a woman, and the other half to a woman, the charm will keep each from ever having to do with any other person." Phil. Trans. No. 268.

Ligature, in the Italian music, signifies a tying or binding together of notes. Hence syncoques are often called ligatures, because they are made by the ligature of many notes. There is another sort of ligatures for breves, when there are many of these on different lines, or on different spaces, to be sung to one syllable.

Ligatures, among printers, are types consisting of two letters or characters joined together; as A, O, S, F, S, &c. The editions of Greek authors are extremely full of ligatures; the ligatures of Stephens are by much the most beautiful. Some editions have been lately printed without any ligatures at all; and there was a design to explode them quite out of printing. Had this succeeded, the finest ancient editions would in time have grown useless: and the reading of old manuscripts would have been rendered almost impracticable to the learned themselves.

Light, in the most common acceptance of the word, signifies that invisible external matter which makes objects perceptible to our sense of seeing. Figuratively, it is also used for whatever conveys instruction to our minds, and likewise for that instruction itself.

The nature of light hath been a subject of speculation from the earliest ages of philosophy. Some of the first of those first distinguished by the appellation of philo-philosophers even doubted whether objects became visible by phers concerning means of any thing proceeding from them, or from the eye of the spectator. The fallacy of this notion must very soon have been apparent, because in that case, we ought to have seen as well in the night as in the day. The opinion was therefore qualified by Epicene, and Plato; who maintained, that vision was occasioned by particles continually flying off from the surfaces of bodies, which met with others proceeding from
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Light.

Light from the eye; but Pythagoras ascribed it solely to the particles proceeding from the external objects and entering the pupil of the eye.

Of Descartes.

Among the modern philosophers there have been two celebrated opinions, viz. the Cartesian and Newtonian. According to the former, light is an invisible fluid present at all times and in all places, but which requires to be set in motion by an ingenuously or otherwise properly qualified body in order to make the objects visible to us. The Newtonians maintain, that light is not a fluid per se, but consists of a vast number of exceedingly small particles shaken off in all directions from the luminous body with inconceivable velocity by a repulsive power, and which most probably never return again to the body from which they were emitted. These particles are also said to be emitted in right lines by the body from whence they proceed; and this rectilinear direction they preserve until they are turned out of their original path by the attraction of some other body near which they pass, and which is called interference; by falling through a medium of different density, which is called refraction, or by being thrown obliquely or indirectly forward by some body which opposes their passage, and which is called reflection; or, lastly, till they are totally stopped by the substance of any body into which they penetrate, and which is called their extinction. A succession of these particles following one another in an exactly straight line is called a ray of light; and this ray, in whatever manner it hath its direction changed, whether by refraction, reflection, or interference, always preserves its rectilinear course; neither is it possible by any art whatever to make it pass on in the segment of a circle, ellipse, or other curve.—From some observations on the eclipse of Jupiter's satellites, and also on the aberration of the fixed stars, it appears that the particles of light move at the rate of little less than 200,000 miles in a second of time. See Astronomy-Index.

Objections to the Newtonian doctrine.

To this doctrine concerning the nature of light several objections have been made; the most considerable of which is, That in this case, the rays of light are continually falling in different directions from every visible point, they must necessarily interfere with and destroy each other in such a manner as entirely to confound all distinct perception of objects, if not to destroy the sense of feeling altogether; not to mention the continual waste of substance which a constant emission of particles must occasion in the luminous body, and which since the creation ought to have greatly diminished the sun and stars, as well as increased the bulk of the earth and planets by the vast quantity of particles of light absorbed by them in such a long period of time.

In answer to this objection, Mr. Melville gives some ingenious illustrations concerning the extreme facility of light, or the smallness of the particles of which it consists, and of which few persons, even of those who admit the hypothesis, have any idea. He observes, that there is probably no physical point in the visible horizon that does not send rays to every other point, unless where opaque bodies interpose. Light, in its passage from one system to another, often passes thro' torrents of light issuing from other suns and systems, without ever interfering or being diverted in its course, either by it, or by the particles of that clastic medium which some phenomena give us reason to suppose are diffused through all the mundane space. To account for this fact and others similar to it, he concludes, that the particles of which light consists, must be incomparably rare, even when they are most dense; that is, that the semidiameters of the two nearest particles, in the same or in different beams, soon after their emission, are incomparably less than their distance from one another. This difficulty concerning the non-interference of the particles of light is not solved, as he observes, by supposing with Mr. Boscovich and others, that each particle is ended with an imperceptible impulsive force; because, in that case, their spheres of impulsion would even be more liable to interfere, and they would on that account be more likely to disturb one another.

The difficulty, according to Mr. Canton, will nearly vanish, if a very small portion of time be allowed between the emission of every particle and the next that follows in the same direction. Suppose, for instance, that one luminous point of the sun's surface emits 50 particles in a second, which are made to give constant light to the eye without the least appearance of intermission; yet still the particles of which it consists, will on account of their great velocity be more than 1000 miles behind each other, and thereby leave room enough for others to pass in all directions.

In order to determine whether light really consists of particles emitted from the luminous body, or only moves in the vibrations of a subtile fluid, it has been attempted to find out its momentum, or the force with which it moves. The first who said anything in this matter was M. Mairan. Others indeed, particularly Hallock and by Mr. Homberg, had pretended, that in certain cases this momentum was very perceptible; but M. Mairan proved, that the effects mentioned by them were owing to currents of heated air produced by the burning-glass used in their experiments, or to some other causes overlooked by these philosophers. To decide the matter therefore, it is possible, he began with trying the effects of rays collected by lenses of four and six inches diameter, and thrown upon the needle of a compass; but the report was nothing more than some tremulous motion from whence he could draw no conclusion. After this, he and Mr du Pay constructed a machine of paper, and moved with an exceedingly light impulse; but though they threw upon it the focus of a lens of seven or eight inches diameter, they were still unable to draw any conclusions from the result.

M. Mairan afterwards procured a horizontal wheel of iron three inches in diameter, having fix radii, at the extremity of each of which was a small wing fixed obliquely. The axis of the wheel which was also of iron was suspended by a magnet. The wheel and the axis together did not weigh more than 30 grains; but though a motion was given to this wheel when the focus of the burning glass was thrown upon the extremities of the radii, yet it was so irregular, that he could not but conclude that it was occasioned by the motion of the heated air. He then intended to have made his experiment in vacuo, but he concluded that it was unnecessary. For, besides the difficulty of making a vacuum, he was persuaded that there was in our atmosphere...
sphera a thinner medium which freely penetrates even glass itself, the existence of which he imagined that he had sufficiently proved in his transactions on the aurora borealis. See Annual Register, No. 8.

Mr. Michell some years ago endeavoured to ascertain the momentum of light in a manner still more accurate. The instrument he made use of for this purpose consisted of a very thin plate of copper, a little more than an inch square, which was fastened to one end of a slender harp-chord wire about ten inches long. To the middle of this was fixed an agate cap, such as is commonly used for small mariner's-compasses, after the manner of which it was intended to turn; and at the other end of the wire, was a middling fixed short corn, as a counterpoise to the copperplate. The instrument had also fixed to it in the middle, at right angles to the length of the wire, and in the horizontal direction, a small bit of a very slender sewing-needle, about one-third or perhaps half an inch long, which was made magnetic. In this state the whole instrument might weigh about 10 grains. It was placed on a very sharp-pointed needle on which the agate cap turned extremely freely; and to prevent its being disturbed by any motion of the air, it was enclosed in a box, the lid and front of which were of glass. This box was about 12 inches long, six or seven inches deep, and about as much in width; the needle standing upright in the middle. At the time of making the experiment, the box was placed in such a manner that a line drawn from the sun, passed at right angles to the length of it; and the instrument was brought to range in the same direction with the box, by means of the magnetic bit of needle above-mentioned, and a magnet properly placed on the outside, which would retain it, though with extremely little force, in any situation. The rays of the sun were now thrown upon the copperplate above-mentioned from a concave mirror of about two feet diameter, which, passing through the front-glass of the box, were collected into the focus of the mirror upon the copperplate. In consequence of this the plate began to move, with a flow motion of about an inch in a second of time, till it had moved through a space of about two inches and a half, when it struck against the back of the box. The mirror being removed, the instrument returned to its former situation by means of the little needle and magnet; and the rays of the sun being then again thrown upon it, it again began to move, and struck against the back of the box as before, and this was repeated three or four times with the same success. The instrument was then placed the contrary way in the box so that in which it had been placed before, so that the end to which the copperplate was affixed, and which had lain, in the former experiment, towards the right hand, now lay towards the left; and the rays of the sun being again thrown upon it, it began to move with a flow motion, and struck against the back of the box as before; and this was repeated once or twice with the same success. But by this time the copperplate began to be so much altered in its form, by the extreme heat which it underwent in each experiment, and which brought it nearly into a state of fusion, that it became very much bent, and the more so as it had been unwarily supported by the middle, half of it lying above and half below the wire to which it was fastened. By this means it now varied so much from the vertical position, that it began to lie in the same manner as the tail of a windmill, being impelled by the stream of heated air which moved upwards, with a force sufficient to drive it in opposition to the impulse of the rays of light.

"If we impute (says Dr. Priestley) the motion produced in the above experiment to the impulse of the rays of light, and suppose that the instrument weighed ten grains, and acquired a velocity of one inch in a second, we shall find that the quantity of matter contained in the rays falling upon the instrument in that time amounted to no more than one hundred-thousand-millionth part of a grain, the velocity of light exceeding the velocity of one inch in a second in the proportion of about 12,000,000,000 to 1. Now the light in the above experiment was collected from a surface of about three square feet, which reflecting only about half what falls upon it, the quantity of matter contained in the rays of the sun incident upon a square foot and an half of surface in one second of time, ought to be no more than the twelve-hundred-millionth part of a grain, or upon one square foot only, the eighteen-hundred-millionth part of a grain. But the density of the rays of light at the surface of the sun is greater than at the earth in the proportion of 45,000 to 1: there ought, therefore, to issue from one square foot of the sun's surface in one second of time, in order to supply the waste by light, one forty-thousandth part of a grain; that is, a little more than two grains in a day, or about 4,752,000 grains, or 670 pounds avoirdupois nearly, in 6000 years; a quantity which would have shortened the sun's semidiameter no more than about ten feet, if it was formed of the densest matter.

The Newtonians, besides the answer just now given to the most formidable objections of their opponents, against the hypothesis of light being a vibration in any fluid, Sir Isaac, in his Principia, demonstrates, that no rectilinear motion can be propagated among the particles of any fluid unless these particles lie in right lines; and he hath also shown, that all motion propagated through a fluid diverges from a rectilinear progress into the unmoved spaces. Hence he concludes, "a preface on a fluid medium (i.e. a motion propagated by such a medium beyond any obstacle, which impedes any part of its motion), cannot be propagated in right lines, but will be always inflected and diffusing itself every way, to the quiescent medium beyond that obstacle. The power of gravity tends downwards; but the preface of water rising from it tends every way with an equable force, and is propagated with equal ease, and equal strength, in curves, as in straight lines. Waves, on the surface of the water, gliding by the extremes of any very large obstacle, inflect and dilate themselves, still diffusing gradually, into the quiescent water beyond that obstacle. The waves, pulses, or vibrations of the air, wherein sound consists, are manifestly inflected, though not so considerably as the waves of water; and sounds are propagated with equal ease, through crooked tubes and through straight lines; but light was never known to move in any curve, nor to inflect itself in any way." To this Mr. Rowning adds another proof. "The By Mr. Cartesian notion of light (says he), was not that it Rowning is propagated from luminous bodies by the emission of small
small particles, and that it was communicated to the
small of light by their presence upon the materia sub-
stitute, with which they supposèd the universe to be filled.
But, according to this hypothesis, it could never be dark
because, when a fluid sustains any pressure, if that
fluid fills all the space it takes up, absolutely,
without leaving any pores, which is the case of the
supposed materia substitute, then that pressure must ne-
cessarily be communicated equally and instantaneously
to every part. And therefore, whether the fun were
above or below the horizon, the pressure communicat-
ed, and consequently the light, would be the same.
And farther, as the pressure would be instantaneous, so
would the light, which is contrary to what is collected
from the eclipses of Jupiter's satellites."

It is obvious, however, that whatever side we take
concerning the nature of light, many, indeed almost
all the circumstances concerning it, are incomprehensi-
ble, and beyond the reach of human understanding.

Most of the dicky flowers, by some power unknown
to us, follow the fun in its course. They extend
him to his evening retreat, and meet his rising luftre in
the morning with the fame unerring law. If a plant alfo
be by produced the inflammation itself, independent of ignition.

Dr Priestley concerning the production of pure de-
phlogisticated air from pum- water, by means of the
air light. If light either were the phlogiston itself,
or contained in its very considerable quantity, it
imposible the air produced by its means could be pure and
dephlogisticated.—For the properties of light act-
ing as the medium of our perceptions by the fene of
light, fee the article Optics.

In the Philosophical Transactions for 1776, Dr
For- dycy gives an account of some experiments up-
upon the light produced by Inflammation. They were made
to determine, whether there was any light produced by
the inflammation itself, independent of ignition.

Substan-
ces, he observes, begin to be luminous in the dark
when heated to between 6 and 700 degrees of Fahren-
heit's thermometer. If the substances be colourless,
they first emit a red light; then a red mixed with
yellow; and lastly, with a great degree of heat, a pure
white. This whiteness, however, seems to depend
greatly upon the density of the body; for the vapour
at the end of the flame urged by a blow-pipe is not
visibly luminous, though its heat be sufficiently great to
give a white heat to glass. The colour of the ignited
matter, according to our author, has an effect upon
the colour of the light emitted. Thus, during the
calcination of zinc, the calc of which is white, a light
is produced scarce inferior in beauty to that of the fun
himself. A beautiful green is communicated by the
green calx of copper to the flame of a fire into which
it is thrown; and the yellow eempaneous oil into
which tallow or any common oil is converted in burning,
communicates a part of its own colour to the flame.
which very much alters the appearance of bodies seen
by candle-light from what it is by day-light. It does
not, however, appear that this always holds good; for
the flame of burning iron is intensely white; and yet
neither the metal itself nor any of its calces are of
that colour.

Light produced by the decomposition of bodies by
inflammation without ignition is always blue, and
produced in some cases very little heat. Thus phosphorus of urine is de-
composed by mere exposure to the air, and gives but
very little heat, though a considerable light is emitted.
The following proof is adduced by our author that this
emission of light is a true inflammation. "Take a re-
cipient of white glasses, capable of holding six or eight
gallons; put into it a drachm of phosphorus finely
powdered, and half an ounce of water; cork the mouth
of the recipient, and tie it over with a bladder, so as
to exclude the external air; incline the receiver to all
sides gently, and afterwards set it to rest; the powder
will adhere to the sides, and the water will drain from
it. As soon as the water is sufficiently drained off,
the particles of the phosphorus will become luminous,
and emit a thick smoke: this will continue for some
days; but at last no more light or vapour will appear.
Open the receiver, and you will find that the air will
have contracted, as it does from the inflammation of a
candle in Van Helmont's experiment; that is, about a
twentieth part. It is become unfit for inflammation;
for if a lighted candle be immerced in it, it will be ex-
tinguished as well as the phosphorus, and an animal will
be suffocated by it. The air then has suffered the same
change as that which has served for the inflammation of
other bodies; and the phosphorus is partly decomposed,
the water in the receiver being impregnated with its
acid, and the air saturated with its phlogiston. Blow
fresh air into the receiver, and the light and smoke will
immediately re-appear. In like manner it is known that
sulphur will burn and give light without heat sufficient
for ignition. Take a piece of iron heated nearly red
hot, and throw a little gunpowder upon it. If the
heat be of a proper degree, the sulphur will burn off
with a blue flame, without heat sufficient for ignition;
for if such heat had been produced, the gun-powder
would certainly have taken fire. It is the inflammation
and decomposition of the sulphur, and not its evapo-
ration, which produces the light; for if we sublime sul-
phur in vessels of the most transparent glasses, no light
will be visible except at the very beginning, when a
small portion of it burns till the air in the vessel be
saturated, and rendered unfit for inflammation."

Our author is of opinion, that the light produced by
inflammation is of a blue colour, from whatever body it
is derived. This he endeavours to prove from an ob-
observation sappo-
theory and the colour of the flame, the lower part of which, where the inflammation is, always appears of
always blue.
Observe that the flame be large, is scarcely red-hot; as the flame burns, the point which is in the centre will be heated white hot, whereas, if the flame be large, the point which is in the centre will be fully and a blue colour. Or (says he) take a candle which has burned for sometime; extinguish it by applying tallow to the wick, and let it stand to cool; afterwards put it on fire by the flame of another candle; at first no more vapour will arise than can be acted upon by the air at once; inflammation, therefore, will go on in the whole small flame, and it will be blue. When a candle burns, the following may be observed. That the tallow boils in the wick; and is converted into empyreumatic oil, rising from it in the form of vapour. As it rises from every part of the wick, the volume is increased till it comes to the top, and gives to the lower part of the flame the form of the frustum of an inverted cone. The air is applied to the outer surface of the column of vapour; and there decomposing the empyreumatic oil, produces heat and blue light; the frustum of vapour, within the outer burning surface, is heated white-hot; the heat diminishes towards the centre, which, if the flame be large, is farceely red-hot; as the column rises, decomposition taking place constantly on its surface, it necessarily diminishes, and the upper part of the flame is conical. That the tallow boils in the wick, or decomposes, is that it is converted into empyreumatic oil, is proved by drawing the vapour, rising in the middle of the flame, where it does not burn, into a glass-tube: the empyreumatic oil condenfes; this also shows that the flame does not burn in the middle. That the heat is produced on the outer surface, appears, if we take a small rod of glass, and put the end of it in the blue flame on the surface; it will be heated white hot, and melt. Immerse the rod into the flame, so that the point shall be in the centre; it will melt and bend where it is in the blue flame on the surface; whereas, if the flame be large, the point which is in the centre will hardly be heated red-hot. That the empyreumatic oil is decomposed, is proved by burning a candle with a very small wick in distilling vessels; no condensation of empyreumatic oil takes place.

In the 75th volume of the Transactions, Mr. Morgan treats of light of some length. As a foundation for his reasoning he alludes the following data. 1. That light is a body, and, like all others, subject to the laws of attrac- tion. 2. That light is an inhomogeneous body; and that the flame attractive power operates with different degrees of force on its different parts. 2. That the light which escapes from combustibles when decomposed by heat, or by any other means, was, previous to its escape, a component part of these substances. Hence he concludes, that when the attractive force by which the several rays are attached to a body is weakened, some of those rays will escape sooner than others; it being evident that those which are detained by the smallest power will sooner go off when the general attractive force is weakened. This he illustrates by the example of a mixture of spirit of wine, water, and other more fixed substances. The application of a gentle heat will carry off the spirit of wine only; a heat not much greater will evaporate the spirits and water mixed together; and a still greater degree will carry off a mixture of all the particles together. "In like manner (says he), when the surface of a combustible is in a state of decomposition, those parts of the flame, which are the least fixed, or that empyreumatic oil, will be separated first. Amongst these the indigo rays of light will make the earliest appearance. By increasing the heat, we shall mix the violet with the indigo; by increasing it still more, we shall add the blue and the green to the mixture, till at length we reach that intensity of heat which will cause all the rays to escape from the flame instant, and make the flame of a combustible perfectly white. By examining the flame of a common candle, we may observe, that its boundaries are not in the same place in which the black colour of the wick terminates, discharges the least heat; flame of a candle, and that, as the vertex of the flame is approached, a succession of orders of parts is passed through, in which the lower is continually adding to the heat of that which is just above it, till we come to the top of the flame, near which all the heat is collected into a focus. At the lowest extremity, however, where the heat is inconsiderable, a blue colour may always be observed; and from this appearance, amongst others, I think it may be concluded, that the blue rays are some of those which escape from combustibles in an early period of their decomposition; and that if the decomposition could be examined in a period still more early, the colour of the flame would be violet. By an a priori deduction of this kind, I was led to the belief, that the indigo, the blue, and the violet rays are all decomposed in the atmosphere of the flame of a common candle is annexed a filament of light; which if proper care be taken to prevent the escape of too much smoke, will appear most beautifully coloured with the violet and indigo rays. If sulphur or other be burned, or any other combustible whose vapour is kindled in a small degree of heat, a blue flame will appear, which, if examined by the prism, will be found to consist of the violet, the indigo, the blue, and sometimes a small quantity of the green rays. The belief, however, of showing the escape of some rays by that degree of heat which will not separate others till increased, is the following. Give a piece of brown paper a spherical form, by pressing it upon any hard globular substance. Gradually bring the paper thus formed to that distance from the candle at which it will begin to take fire. In this case a beautiful blue flame may be seen hanging, as it were, by the paper till a hole is made in it; when the flame, owing to the increased action of the air upon all parts of it, becomes white, though the edges still continue of a blue or violet colour. As a confirmation of this, it may be observed, that the very flame, which when exposed to a certain degree of heat emits only the most refrangible rays, will, if exposed to one considerably greater, emit also those which are left to. The flames of sulphur and spirit of wine, if suddenly exposed to the heat of a reverberatory, will change their blue colour for one that is perfectly white."

To obtain a more perfect knowledge of this matter, our author examined the light proceeding from combustible bodies by Mr. Melville's method. Having darkened the room, he introduced between the eye and combustible a sheet of pasteboard, in which was a very small hole for transmitting the light. Viewing the light which passed through this hole with a prism, he observed, that the blue and violet rays were in greater abundance than any of the rest, though all the different kinds passed through it when spirit of wine only was used. Of when the combustion of the spirit was made exterior in that part in which the black colour disappeared, but made their appearance again as soon as the salt became heated to such a degree as to increase
increase rather than diminish the combustion of the spirits. On examining the different parts of the flame separately, it was always found that the colours varied according to the degree of heat. At the base of the flame, or where the heat was least, the indigo, violet, and blue always appeared in greatest quantity; but as the vertex was approached, the other rays appeared, and at the very top they were all visible through a prism.

From these facts Mr Morgan concludes, 1. That light, as an heterogeneous body, is gradually decomposed during combustion; that the indigo rays escape with the least heat, and the red with the greatest; and from this again he explains the reason why flames assume different colours. "If a piece of paper (says he), impregnated with a solution of copper in nitrous acid, be set on fire, the bottom and sides of the flame are always tinged green. Now this flame is evidently in that weak state of decomposition in which the most refrangible rays escape in the greatest abundance; but of these the green rays escape most plentifully through the unignited vapour and that portion of the atmosphere which is intercepted between the eye and the flame. This peculiarity may be observed in greatest perfection in brass foundries. Here the heat, though very strong, is scarcely sufficient to decompose the metallic vapour which escapes from the melted brass; whence the flame has a very singular appearance, the edges being green, and the body of such an appearance, as to give substances viewed by it a pallid and ghastly appearance, owing to the want of a sufficient quantity of red rays to make a perfect white."

2. Mr Morgan explains the red appearance of bodies in their last state of ignition, from the previous escape of the more refrangible rays, so that only the red ones remain. "Again (says he), we may consider the external surface of the combustible body as annexed to an inner surface, which may be partly, but not perfectly decomposed as itself; for the violence of the heat will be found to leasen in its effects the nearer it approaches to the centre of the substance which is exposed to it. Hence we are to consider the parts which are just covered by the external surface as having lost less of their component light than the external surface itself; or the former may retain the green rays when the latter has lost both indigo, violet, blue, and green.

3. "Those parts which are nearer to the centre of the body than any of the preceding must, as they are farther from the greatest violence of the heat, have lost proportionally fewer of their rays; or while the external parts may have lost all but the red, these may have lost only the indigo and violet.

4. "The most central parts may be unaffected by the heat; and whenever the fire does reach these parts, they will immediately discharge their indigo rays, and be decomposed in the gradual manner already mentioned. A piece of rotten wood, while burning, will exemplify and confirm the preceding illustration. When influenced by the external air only, if examined through a prism, no rays will be found to escape but the orange and the red. By blowing upon the burning wood with a pair of bellows, the combustion being increased, will affect those internal parts of the body which were not acted upon before. These parts therefore will begin to lose their light, and a prism will show the green, blue, violet, and indigo, all appearing in succession. Appearances similar to the preceding may be observed in a common kitchen fire. When it is faintest, its colour is most red, the other rays having been emitted, and the combustion at a stand; but by blowing upon it in this state, its brightness will be increased, and more and more of the rays which are yielded by the internal parts of the body will come to the eye, till at length, by continuing to blow, the combustion will be made complete as to yield all the rays, or to make it appear perfectly white."

Our author concludes the subject with a criticism upon Sir Isaac Newton's definition of flame, viz. that it is a vapour heated red hot. In his opinion, flame is an influence of combustion whose whole colour will be determined by the degree of decomposition which takes place. When very imperfect, only the most refrangible rays will appear. If it be very perfect, all the rays will appear, and its flame will be brilliant in proportion. But there are flames which consist of burning particles, the rays of which have partly escaped before they ascended in form of vapour. "Such (says he) would be the flame of a red coal, if exposed to a heat as would gradually convert it into vapour. When here is very low under the furnace of an iron foundry, at the upper orifice of the chimney a red flame of this kind may be seen, which is different from the flame that appears immediately after fresh coals have been thrown upon the fire; for in consequence of adding such a supply to the burning fuel, a vast column of smoke ascends, and forms a medium so thick as to absorb most of the rays excepting the red."

Thus we have a most elaborate theory for the solving of phenomena which seem not easily to admit of gain's theories any solution. It is obvious, however, that the data upon which he builds his system are altogether unfounded and hypothetical. That light is subject to the laws of attraction, cannot be proved unless we could examine it independent of any other substance whatever; that is to say, in a perfect vacuum; and even in the most perfect vacuum that can be formed, we are far from being certain that no other matter is present. Light is inflected and turned out of its course in many different ways when acting in the common atmosphere, but we have no reason to suppose that it would be the flame in a perfect vacuum; at least we have not a right to lay it down as a principle to argue from, unless it were verified by experience. Even the heterogeneous nature of light seems far from being absolutely established. The refraction into different colours by the prism seems insufficient to do so; for, though, by a quick revolution of these colours when painted upon any substance, we may produce a kind of white colour, it is by no means perfect, but looks as if some black had got amongst it. The opinion of those who maintain that the prismatic colours are no other than different mixtures of light and shade, seems therefore equally probable with the other. His third position, that the light emitted by combustible bodies formed part of their substance before combustion, seems still worse founded; for instead of being fixed in solid substances, all the light and proceeding from combustion seem entirely to come from the air. By means of heat originally applied, the substance, or part of it, is rarified into vapour; and this vapour, we have every reason to suppose, consists of elementary fire united with the solid substance. It is this fire, heat, or light, which..."
is afterwards thrown out from the vapour in combustion; and new fapphires of it perpetually come from the atmosphere, as is abundantly shown under the articles 

COMBUSTION, FIRE, FLAME, and many others throughout this work. We cannot therefore think it either inconstant, or very improbable, that in the beginning of combustion, when the white light is clouded with a great quantity of vapour, it should appear of a blue or violet colour; and that in proportion as this vapour is dissipated, it should appear green, yellow, red, or perfectly white. For it is observable, that in dephalogliculated air, even those flames which in the common atmosphere always appear blue, such as sulphur and spirit of wine, are then changed to a dazzling white. The pure light of the sun also seen through smoke, or even through a great quantity of aqueous vapour, appears red; and there is not the least doubt, that if we were to view the sun while he thus appears red through any blue medium, he would appear purple; and in like manner, were we to view a blue flame through a yellow medium, it would appear of a green colour.

In the same paper Mr Morgan has some curious observations upon the electric light. There is neither fire nor light from which the electric fluid in its passage will not appear luminous, if we do not make the quantity, through which it has to pass, too great. In his experiments on fluids, he puts them into a tube about three quarters of an inch diameter and four inches long. The orifices are then stopped up with two corks, through which two pointed wires are thrust, so that the points may approach within one eighth part of an inch of each other; and in this case the electric matter which passes through the fluid is always luminous, provided a sufficient force be used. The experiment, however, is dangerous, unless great care be taken; and the tube, unless it be very strong, will be broken by a very slight discharge. With acids the experiment succeeds more difficulty; they must be put into capillary tubes, and the wires placed very near to each other. A strip of gold leaf one eighth of an inch diameter, and a yard long, becomes quite luminous by discharging a battery over it; and our author cannot ascertain the length to which it might be made luminous. The experiment will also succeed with Dutch metal or silver leaf. If the gold or silver leaf be put upon a glass, and that laid in water, the whole will appear most beautifully luminous on discharging a battery through it.

The better a conductor that any substance is, the greater is the difficulty of making the electric spark visible in it. Hence it requires a much greater power of electricity to make a spark visible in boiling than in cold water; the former being a much better conductor than the latter. In like manner, the mineral acids are much better conductors than common water; and, of consequence, the spark is made to appear in them with much more difficulty than in water. This appears from what has been already mentioned; and our author likewise observes, that if a few drops of acid be poured into the tube containing the water employed for this purpose, it will faintly be possible to make the spark luminous in it by any force.

The rarity of any body greatly increases the case with which the electric spark is made visible in it; as appears from discharging a vial through rarefied air, the vapour of ether, spirit of wine, or water.

In the prosecution of his experiments upon this subject, our author cemented a ball of iron into the oriace of a tube 43 inches long, and two thirds of an inch diameter, so that it could bear the weight of the quicksilver with which the tube was filled all to a small space at the open end, which contained a few drops of water. Having inverted the tube, and plunged the open end of it into a basin of mercury, that in the tube a good nearly level with a barometer with which it was compared at the same time, owing to the vapour which was formed by the water; but the spark passed as brilliant through the rarefied water as it does through rarefied air. If spirit of wine be employed instead of water in this experiment, the spark will not be luminous. In the vapour of ether a great force is requisite to make the spark luminous, but good ether will pref the mercury down as far as 16 or 17 inches. By rarefying the vapour, however, the spark will pass through it with more ease.

On examining the mineral acids in vacuo, Mr Morgan could not find that any vapour escaped from them. To give them the requisite degree of rarity, therefore, he traced a line upon glass about an eighth part of an inch broad, with a camel's hair pencil dipped in the acids: the line extended sometimes to the length of 27 inches; in which case, the electric spark would pass over the whole with great brilliancy. If by widening the line, however, or putting on a drop of acid in any particular part, the quantity was increased, the spark never appeared in that part.

The brightness of electric light is always in proportion to its condensation. Thus, if a spark taken bright from a powerful electrical machine divides itself into electric brushes, or throws out sparks from the sides, by which the light is diffused over a larger surface, it thus becomes less brilliant; and in all cases in which any diffusion of light, whether electric or not, takes place, the case will be the same.

In some cases, Mr Morgan is of opinion, that, even sometimes with the electric fluid, only the more refrangible rays the more of light make their escape. Thus, the electrical brush is always of a purplish or bluish colour; and if you convey a spark through a Torricellian vacuum not very perfectly made, it will be of an indigo colour. This, however, does not seem to arise from any other cause than the mere weakness of the light, which, in passing through the vapours of the atmosphere, or perhaps through the humours of the eye itself, affects our organs of light in that manner.

Our author next proceeds to examine the influence of the media upon electric light; which, he says, is similar to their influence upon solar light, and serves to explain several phenomena.

"Let a pointed wire (says he), having a metallic ball fixed to one of its extremities, be forced obliquely into a piece of wood, so as to make a small angle with its surface; and to make the point lie about one eighth of an inch below it. Let another pointed wire, which communicates with the ground, be forced in the same manner into the same wood, so that its point may in like manner be about one eighth of an inch below the surface, and about two inches distant from the point of
Light. [44]

32 Curious experiment of sending the electric spark through wood.

Light.

33 Different appearance of the electric spark at different distances.

On phosphoric light Mr Morgan makes some curious observations; but still argues on the same principles we have already mentioned. "Some shells (says he) prepared according to Mr Wilson’s directions, after being exposed to the sun, or to the flash of a battery, emit a purple, others a green, and others a reddish light. Light."

If, with Mr Wilson, we suppose that these shells are in a state of flow combustion, may we not conclude, that some are just beginning to burn, and therefore emitting the most refrangible rays; while others are in a more advanced state of combustion, and therefore emitting the least refrangible? If this conclusion be right, the shells which are emitting the purple or the green, must still retain the yellow, the orange, and the red, which will also make their appearance as soon as the combustion is sufficiently increased. In confirmation of this, Mr Morgan adds the following experiment, viz. that if a shell, while emitting its green rays, be placed upon a warm flavel, the colour will soon be changed into a yellow mixed with red.—To the theory of flow combustion Mr Morgan makes the following objections.

1. If phosphoric shells owe their light to this cause, we must consider the word combustion, when applied to them, as implying all those circumstances which usually attend a body when on fire. On this supposition there ought to be an increase of the heat as well as of the decomposition of the combustible. But neither of these are found to take place in fact; for a phosphoric body never fails to lose its light entirely in a certain degree of heat, without losing the power of becoming phosphoric again when it has been sufficiently cooled. While very hot, the charge of the strongest battery conveyed over it has no effect.

2. When bodies are wasted by combustion, they can never be made to resume the appearances which they previously displayed. "No power (says our author) can give to ashes the phenomena of a burning coal. But phosphoric bodies are very different in this respect; a phosphoric shell may be made to lose all its light by exposure to heat, and again may be made as luminous as ever by exposure to the sun."

3. It is remarkable that some bodies which are most beautifully phosphoric, are at the same time the most obtinate in refusing fire. "Let us now see (says Mr Morgan) the consequence of admitting the common hypothesis, that the detention of those rays which fall upon phosphoric is owing to some force which prevents their immediate reflection, but is not adequate to their entire absorption. This force, whatever it be, cannot well be supposed to operate with equal power on all these rays. If this be not the case, we cannot well avoid concluding, that phosphoric shells will assume different colours, owing to the earlier and later escape of the different rays of light. This conclusion is justified by an experiment already mentioned; viz. that when the force is such as to admit the escape of the purple, blue, and green, we have only to lessen that force, by warming the body, and the yellow, the orange, and red escape. Bessarica has proved, that there is scarcely any body which is not phosphoric, or may not become so by heat. But as the phosphoric force is most powerful when the purple rays only escape, so we are to conclude, that it is we left when it is able to retain the red rays only. This is agreeable to several facts. Chalk,
bodies whose goodness has been very much impaired by long keeping, when finely powdered, and placed within the circuit of an electrical battery, will exhibit, by their scattered particles, a shower of light; but these particles will appear reddish, or their phosphoric power will be sufficient only to detain the yellow, orange, and red rays. When spirit of wine is in a similar manner brought within the circuit of a battery, a similar effect may be discovered: its particles diverge in several directions, displaying a most beautiful golden appearance. The metallic dyes are rendered phosphoric with the greatest difficulty; but even these may be scattered into a shower of red luminous particles by the electric stroke."

In a postscript to this paper, by Dr Price, it is observed, that by phosphoric force, Mr Morgan seems to mean, not the force with which a phosphoric body emits, but that with which it absorbs and retains, the light. This last force is proportioned to the degree of attraction between the phosphoric body and light; and therefore must, according to Mr Morgan's theory, be weakest when it so freely emits the light it has imbibed as not to retain those rays which adhere to it most strongly. According to Mr Morgan's theory, those are the rays which are the least refrangible. "It is, however, (says Dr Price), an objection to it, that the least refrangibility of rays seems to imply a least force of attraction between them and the substances which refract them; but it should be considered, that, possibly, the force of cohesion, which unites the rays of light to bodies, may be a different power from that which refracts them.

Light independent of Heat. In general, a very considerable degree of heat is requisite to the emission of light from any body; but there are several exceptions to this, especially in light proceeding from putrefacient substances and phosphorus, together with that of luminous animals, and other similar appearances. Light proceeding from putrefacient animal and vegetable substances, as well as from glow-worms, is mentioned by Aristotle. Thomas Bartholin mentions four kinds of luminous insects, two with wings, and two without; but in hot climates travellers say they are found in much greater numbers, and of different species. Culex, an industrious naturalist, observes, that their light is not extinguished immediately upon the death of the animal.

The first distinct account that we meet with of light proceeding from putrefacient animal flesh is that which is given by Fabricius ab Aquapendente, who says, that when three Roman youths, residing at Padua, had bought a lamb, and had eaten part of it on Easter day 1662, several pieces of the remainder, which they kept till the day following, shone like so many candles when they were casually viewed in the dark. Part of this luminous flesh was immediately sent to Aquapendente, who was professor of anatomy in that city. He observed that both the lean and the fat of this meat shone with a whitish kind of light; and also took notice that some pieces of kid's flesh, which had happened to have lain in contact with it, was luminous, as well as the fingers and other parts of the bodies of those persons who touched it. Those parts, he observed, shone the mott which were most to the touch, and seemed to be transparent in candle light; but where the flesh was thick and solid, or where a bone was near the outside, it did not shine.

After this appearance, we find no account of any other similar to it, before that which was observed by Bartholin, and of which he gives a very pompous description in his ingenious treatise already quoted. This happened at Montpelier in 1647, when a poor old woman had bought a piece of flesh in the market, intending to make use of it the day following. But happening not to be able to keep well that night, and her bed and pantry being in the same room, the object continued to emit much light even after the flesh, as it were, illuminated all the place where it hung. A part of this luminous flesh was carried as a curiosity to Henry Bourbon, duke of Condé, the governor of the place who viewed it for several hours with the greatest astonishment.

This light was observed to be whitish; and not to cover the whole surface of the flesh, but certain parts only, as if gems of unequal splendor had been scattered over it. This flesh was kept till it began to putrify, when the light vanished; which, as some religious people fancied, it did in the form of a cross.

It is natural to expect, that the almost universal ex-post, by the experimental philosopher Mr Boyle should try the effect of his air-pump upon these luminous substances. As p. 166, according as we find that he did not fail to do it; when he presently found that the light of rotten wood was extinguished in vacuo, and revived again on the admission of the air, even after a long continuance in vacuo; but the extinguishing of this light was not so complete immediately upon exhausting the receiver, as some little time afterwards. He could not perceive, however, that the light of rotten wood was increased in condensed air; but this, he imagined, might arise from his not being able to judge very well of the degree of light, through so thick and cloudy a glass as the then made use of; but we find that the ill. 254.

Birch's light, was rendered more vivid by this means. The principal of Mr Boyle's experiments were made in October 1667.

This philosopher attended to a great variety of circumstances relating to this curious phenomenon. Among other things he observed, that change of air was not necessary to the maintenance of this light; for it continued a long time when a piece of the wood was put into a very small glass hermetically sealed, and it made no difference when this tube which contained the wood was put into an exhausted receiver. This he also observed with respect to a luminous fish, which he put into water, and placed in the same circumstances. He also found, that the light of shining fishes had other properties in common with that of shining wood, but the latter, he says, was presently quenched with water, spirit of wine, a great variety of saline mixtures, and other fluids. Water, however, did not quench all the light of some shining veal on which he tried it, though spirit of wine destroyed its virtue presently.

Mr Boyle's observation of light proceeding from fish-meat was quite casual. On the 15th of February 1662, one of his servants was greatly alarmed with the shining of some veal, which had been kept a few days, but had no bad smell, and was in a place very proper for it. The servant immediately made his master acquainted with this extraordinary appearance.
Light...and though he was then in bed, he ordered it to be immediately brought to him, and he examined it with the greatest attention. Suspecting that the state of the atmosphere had some share in the production of this phenomenon, he takes notice, after describing the appearance, that the wind was south-west and blustering, the air hot for the season, the moon was past its last quarter, and the mercury in the barometer was at 29.7 inches.

Mr. Boyle was often apprised in his experiments on shining fishes; finding that they did not always shine in the very same circumstances, as far as he could judge, with others which had shined before. At one time that they failed to shine, according to his expectations, he observed that the weather was variable, and not without some days of frost and snow. In general he made use of whittings, finding them the fittest for his purpose. In a discourse, however, upon this subject at the Royal Society in 1681, it was ascertained, that, of all fishes, the sturgeon, the eggs of lobsters, after they had been boiled, shone the brightest.

Olig. Jacobus observes, that upon opening a sea-polypus, it was fo luminous, as to dazzle several persons who saw it; and he says, that the more putrid the fish was, the more luminous it grew. The tails also, and the fingers of the persons who touched it, became luminous; and the black liquor which flowed from the animal, and which is its bile, shone, but with a very faint light.

Mr. Boyle draws a minute comparison between the light of burning coals and that of burning wood or fish, flowing in what particulars they agree, and in what they differ. Among other things he observes, that extreme cold extinguishes the light of burning wood, as appeared when a piece of it was put into a glass tube, and held in a frigoric mixture. He also found that rotten wood did not waft itself by shining, and that the application of a thermometer to it did not discover the least degree of heat.

There is a remarkable shell-fish, called Pholas, which forms for itself holes in various kinds of stone, &c. That this fish is luminous, was noticed by Pliny; who observes, that it shines in the mouth of the person who eats it, and, if it touch his hands or clothes, makes them luminous. He also says, that the light depends upon its moisture. The light of this fish has furnished matter for various observations and experiments to M. Reaumur, and the Bolognian academicians, especially Beccarius, who took so much pains with the subject of phosphoreal light.

M. Reaumur observes, that, whereas other fishes give light when they tend to purereluce, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded. The attention of the Bolognian academicians was engaged to this subject by M. F. Marilius, in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Pholas observed, that though this fish ceased to shine when it became putrid; yet that in its most putrid state, it would shine, and make the water in which it was immersed luminous, when they were agitated. Galenius and Montius found, that wine or vinegar extinguished this light; and that in common oil it continued some days; but in rectified spirit of wine or urine, hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water made luminous by these fishes increased in light till the heat arrived to 45 degrees; but that it then became suddenly extinct, and could not be revived.

In the experiments of Beccarius, a solution of vitriol nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, cerus, or sugar, became more luminous. He also tried the effects of it when tried upon various other substances, but there was nothing very remarkable in them. Afterward们 taking luminous milk, he found that oil of vitriol extinguished the light, but that oil of tartar increased it.

This gentleman had the curiosity to try how differently coloured substanices were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however, any particular colour, but only light that was perceived in this case. He then dipped boards painted with the different colours, and also glasses tubes, filled with substanices of different colours, in water rendered luminous by the fishes. In both these cases the red was hardly visible, the yellow was the brightest, and the violet the dullest. But on the boards the blue was nearly equal to the yellow, and the green the more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors into which he put the pholas, milk was rendered the most luminous. A single pholas made seven ounces of milk more luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine unless bubbles of air were mixed with it. Also Montius and Galenius found, that in an exhausted receiver, the pholas lost its light, but the water was sometimes made more luminous, which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these pholas permanent. For this purpose he kneaded the juice into a kind of paste, with flour, and found that it would give light when it was immersed in warm water, but it anwered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than a few months, but in honey it lasted above a year; and then it would change in warm water, give as much light as even it had done.

Similar, in some respects, to those observations on the light of the pholas, was that which was observed p. 483...
Light: 

to proceed from wood which was moist, but not in a

puri’d state, which was very conspicuous in the dark.

That the fish is sometimes luminous, especially when

it is put in motion by the dashing of oars or the

beating of it against a ship, has been observed with

admiration by a great number of persons. Mr Boyle,

after reciting all the circumstances of this appearance,

as far as he could collect them from the accounts of

navigators; as its being extended as far as the eye

could reach, and at other times being visible only when

the water was dashed against some other body; that,
in some seas, this phenomenon is accompanied by some

particular winds, but not in others; and that sometime

times one part of the sea will be luminous, when an­­

other part, not far from it, will not be so; concludes

with saying, that he could not help suspecting that

these odd phenomena, belonging to great masses of

water, were in some measure owing to some coni­­

cional law or custom of the terrestrial globe, or at least

of the planetary vortex.

Some curious observations on the shining of some

fishes, and the pickle in which they were im­­

merced, were made by Dr Beal, in May 1665; and had they

been properly attended to and pursued, might have led to

the discovery of the cause of this appearance.

Having some boiled mackerel into water, together

with salt and sweet herbs; when the cook was, some­­

times after, stirring it in order to take out some of the

drops, which were

he observed, that, at the first motion, the water

was luminous; and that the day shining the

water added much to the light which the water

yielded. The water was of itself thick and blackish;

rather than of any other colour; and yet it shined on

being stirred, and at the same time the fishes appeared

more luminous than the water. Wherever the drops of

this water, after it had been stirred, fell to the

ground, they shined; and the children in the family

diverted themselves with taking the drops, which were

as broad as a penny, and running with them about the

house. The cook observed, that when he turned up

that side of the fish that was lowest, no light came from it;

and that, when the water had settled for some time

after it, that the day shining the

water gave but little light, and only after a brisk agi­­
tation, though the fishes continued to shine as well

from the inside as the outside, and especially about the

throat, and such places as seemed to have been a lit­­
tle broken in the boiling.

When, in the light of the sun, he examined, with a

microscope, a small piece of a fish which had shined very

much the night before, he found nothing remarkable

on its surface, except that he thought he perceived

what he calls a steam, rather dark than luminous, arising

like a very small dust from the fish, and here and there

a very small and almost imperceptible sparkcle. Of the

sparkles he had no doubt; but he thought it possible

that the steam might be a deception of the light, or

some dust in the air.

Finding the fish to be quite dry, he moistened it

with his spitule; and then observed that it gave a little

light, though but for a short time. The fish at that

time was not fetid, nor yet insipid to the best discern­­
ing palate. Two of the fishes he kept two or three
days longer for farther trial; but, the weather being

very hot, they became fetid; and, contrary to his ex­­
pctations, there was no more light produced either

by the agitation of the water or in the fish.

Father Bourzes, in his voyage to the Indies in

1704, took particular notice of the luminous appear­­

ance of the sea. He reports that he could easily read the title of a book by it,

though he was nine or ten feet from the surface of

the water. Sometimes he could easily distinguish, in

the wake of the ship, the particles that were luminous from

those that were not; and they appeared not to be all

of the same figure. Some of them were like points of

light; and others such as stars appear to the naked eye.

Sometimes they seemed globes, of a line or two in
diameter; and others as big as one’s head. Sometimes

they formed themselves into figures of three or four

inches long, and one or two broad. Sometimes all

these different figures were visible at the same time;

and sometimes there were what he calls vortexes of

light, which at one particular time appeared and dis­­
appeared immediately like flashes of lightning.

Nor did only the wake of the ship produce this

light, but fishes also in swimming, left so luminous a

track behind them, that both their size and species

might be distinguished by it. When he took some

of the water out of the sea, and stirred it ever so little

with his hand, in the dark, he always saw in it an

infinite number of bright particles; and he had the same

appearance whenever he dipped a piece of linen in the

sea, and wrung it in a dark place, even though it was

half dry; and he observed, that when the sparks tell

upon any thing that was solid, it would continue shin­­
ing for some hours together.

After mentioning several circumstances which did

not contribute to this appearance, this father ob­­
rerves, that it depends very much upon the qua­­

tity of the water; and he was very sure that this light is the greatest

when the water is fat and full of foam. For in the

main sea, he says, the water is not everywhere equally pure; and that sometimes, if linen be dipped in the sea, it is clammy when it is drawn up again; and he often observed, that when the wake of the ship was

the brightest, the water was most fat and glutinous, and that linen moistened

with produced a great deal of light; if it was stirred or moved briskly.

Besides, in some parts of the sea, he saw a substance

like sawdust, sometimes red and sometimes yellow; and when he drew up the water in those places, it was always viscus and glutinous. The sailors told him, that it was the spawn of whales; that there are great quantities of it in the north; and that some­­
times, in the night, they appeared all over of a bright­­
light, without being put in motion by any vessel or fish

passing by them.

As a confirmation of this conjecture, that the more

glutinous the sea-water is, the more it is diploped to

become luminous, he observes, that one day they took

a fish which was called a huss; theinside of the mouth

of which was so luminous, that without any other light,

he could read the same characters which he had before

read by the light in the wake of the ship; and the

mouth of this fish was full of a viscus matter, which,

when it was rubbed upon a piece of wood, made it im­­
mmediately all over luminous; though, when the mois­­
ture was dried up, the light was extinguished.

The abbe Nollet was much struck with the lumi­­

nous
M. le Roi, making a voyage on the Mediterranean, 

... with the light. The experiments of M. Vianelli, professor of medicine in Chioggia near Venice; and both he and M. Grizelli, a physician in Venice, have given drawings of the infect from which they imagined this light to proceed.

The abbé was the more confirmed in his hypothesis, by observing, some time after, the motion of some luminous particles in the sea. For going into the water, and keeping his head just above the surface, he saw them dart from the bottom, which was covered with weeds, to the top, in a manner which he thought very much resembled the motions of insects; though, when he endeavoured to catch them, he only found some luminous spots upon his handkerchief, which were enlarged when he pressed them with his finger.

M. le Roi, making a voyage on the Mediterranean, presenty after the abbé Nollet made his observations at Venice, took notice, that in the day-time, the prow of the ship in motion threw up many small particles, which, falling upon the water, rolled upon the surface of the sea for a few seconds before they mixed with it; and in the night the same particles, as he concluded, had the appearance of fire. Taking a quantity of the water, the same small sparks appeared whenever it was agitated; but as was observed with respect to Dr Beal's experiments, every incipience agitation produced a less effect than the preceding, except after being suffered to rest a while; for then a fresh agitation would make it almost as luminous as the first. This water, he observed, would retain its property of shining by agitation a day or two; but it disappeared immediately on being set on the fire, though it was not made to boil.

This gentleman, after giving much attention to this phenomenon, concludes, that it is not occassioned by any shining infects, as the abbé Nollet imagined; especially as, after carefully examining some of the luminous points, which he caught upon a banked with, he found them to be round like large pins heads, but with nothing of the appearance of any animal, though he viewed them with a microscope. He also found, that the mixture of a little spirit of wine with water, just drawn from the sea, would give the appearance of a great number of little sparks, which would continue visible longer than those in the ocean. All the acids, and various other liquors, produced the same effect, though not quite so confpicuously; but no fresh agitation would make them luminous again. M. le Roi is far from ascertaining that there are no luminous infects in the sea. He even supposes that the abbé Nollet and M. Vianelli had found them. But he was satisfied that the sea is luminous chiefly on some other account, though he does not so much as advance a conjecture about what it is.

M. Ant. Martin made many experiments on the light of fish, with a view to discover the cause of the light of the sea. He thought that he had reason to conclude, from a great variety of experiments, that all fish-fishes have this property; but that it is not to be found in any that are produced in fresh water. Nothing depended upon the colour of the fish, except that he thought that the white ones, and especially those that had white scales, were a little more luminous than others. His light, he found, was increased by a small quantity of salt; and also by a small degree of warmth, though a greater degree extinguished it. This agrees with another observation of his, that it depends entirely upon a kind of moisture which they had about them, and which a small degree of heat would expel, when an oiliness remained which did not give this light, but would burn in the fire. Light from the flesh of birds or beasts is not so bright, says he, as that which proceeds from fish. Human bodies, he says, have sometimes emitted light about the time that they began to putrefy, and the walls and roof of a place in which dead bodies had often been exposed, had a kind of a dew or clamminess upon it, which was sometimes luminous; and he imagined that the lights which are said to be seen in burying-grounds may be owing to this cause.

From some experiments made by Mr. Canton, he concludes, that the luminousness of sea-water is owing to the slimy and other purer effusions it contains. On the evening of the 14th of June 1768, he put a small fresh whiting into a gallon of sea-water, into a pan which was about 14 inches in diameter, and took notice that neither the whiting nor the water, when agitated, gave any light. A Fahrenheit's thermometer, in the cellar where the pan was placed, stood at 54°. The 15th, at night, that part of the fish which was even with the surface of the water was luminous, but the water itself was dark. He drew the end of a stick through it, from one side of the pan to the other; and the water appeared luminous behind the stick all the way, but gave light only where it was disturbed. When all the water was fired, the whole became luminous, and appeared like milk, giving a considerable degree of light to the sides of the pan; and it continued to do so for some time after it was at rest. The water was most luminous when the fish had been in it about 28 hours; but would not give any light by being fired, after it had been in it three days.

He then put a gallon of fresh water into one pan, and an equal quantity of sea-water into another, and into each pan he put a fresh herring of about three ounces. The next night the whole surface of the sea-water was luminous, without being fired; but it was much more so when it was put in motion; and the upper part of the herring, which was considerably below the surface of the water, was also very bright; while at the same time, the fresh water, and the fish that was in it, were quite dark. There were several very bright luminous spots on different parts of the surface of the sea-water; and the whole, when viewed by the light of a candle, seemed covered with a greasy film. The third night, the light of the sea-water, while at rest, was very little, if at all; but when fired, its light was so great as to discover the time by a watch, and the fish in it appeared as a dark subsance. After this, its light was evidently decreasing, but was not quite gone before the 7th night.
The fresh water and the fish in it were perfectly dark during the whole time. The thermometer was generally above 60°.

The preceding experiments were made with sea-water: but he now made use of other water, into which he put common or sea-salt, till he found, by a hydrometer, that it was of the same specific gravity with the sea-water; and, at the same time, in another gallon of water, he dissolved two pounds of salt; and into each of these waters he put a small fresh herring. The next evening the whole surface of the artificial sea-water was luminous without being filled; but gave much more light when it was disturbed. It appeared exactly like the real sea-water in the preceding experiment; its light lasted about the same time, and went off in the same manner: while the other water, which was almost as salt as it could be made, never gave any light. The herring which was taken out of it the seventeenth night, and walked from its salt, was found firm and sweet; but the other herring was very soft and yellow much more than that which had lain kept as long in fresh water. If a herring, in warm weather, be put into 10 gallons of artificial sea-water, instead of one, the water, he says, will still become luminous, but its light will not be so strong.

It appeared by some of the first observations on this subject, that heat extinguishes the light of purulent substances. Mr Canton also attended to this circumstance; and observes, that though the greatest summer heat is well known to promote putrefaction, yet 20 degrees more than that of the human blood seems to hinder it. For putting a small piece of a luminous fish into a thin glass ball, he found, that water of the heat of 18 degrees would extinguish its light in less than half a minute; but that, on taking it out of the water, it would begin to recover its light in about 10 seconds; but it was never afterwards so bright as before.

Mr Canton made the same observation that Mr Ant. Martin had done, viz. that several kinds of river fish could not be made to give light, in the same circumstances in which any sea-fish become luminous. He says, however, that a piece of earp made the water very luminous, though the outside, or fcial part of it, did not shine at all.

For the sake of those persons who may choose to repeat his experiments, he observes, that artificial sea-water may be made without the use of a hydrometer, by the proportion of four ounces avoidupoise of salt to seven pints of water, wine-measure.

From undoubted observations, however, it appears, that in many places of the ocean it is covered with luminous infects to a very considerable extent. Mr Dagelet, a French astronomer who returned from the Terra Australis in the year 1774, brought with him several kinds of worms which swim in water when it is hot in motion; and M. Rigaud, in a paper inferred (if we are not mistaken) in the Journal des Saisons for the month of March 1770, affirms, that the luminous surface of the sea, from the port of Brest to the Antilles, contains an immense quantity of little, round, shining poly-
happened one night to perceive one of them, and got so near that he could have a very advantageous view of it. This is by no means easy to be obtained; for, among other singularities of the ignis fatuus, it is observed to avoid the approach of any person, and fly from place to place as if it was animated. That which Dr Derham observed was in some boggy ground between two rocky hills; and the night was dark and calm; by which means, probably, he was enabled to advance within two or three yards of it. It appeared like a complete body of light without any division, so that he was sure it could not be occasioned by insects; as some have supposed; the separate lights of which he could not have failed to distinguish, had it been occasioned by them. The light kept dancing about a dead thistle, till a very light motion of the air, occasioned, as he supposed, by his near approach to it, made it jump to another place; after which it kept flying before him as he advanced. M. Beccari endeavoured to procure all the intelligence he could concerning this phenomenon, by enquiring of all his acquaintance, with whom it was seen. The ground to which it appeared to a gentleman of his acquaintance as he was observing it, was covered with snow, and which was to be seen almost every night, especially that to the eastward, giving a light equal to an ordinary faggot. The latter appeared to a gentleman of his acquaintance as he was travelling; moved constantly before him for about a mile; and gave a better light than a torch which was carried before him. Both these appearances gave a very strong light, and were constantly in motion though this was various and uncertain. Sometimes they would rise, sometimes sink; but commonly they would hover about six feet from the ground; they would also frequently disappear and reappear again in some other place. They differed also in size and figure, sometimes spreading pretty wide, and then contracting themselves; sometimes breaking into two, and then joining again. Sometimes they would appear like waves, at others they would seem to drop sparks of fire: they were but little affected by the wind; and in wet and rainy weather were frequently observed to cast a stronger light than in dry weather: they were also observed more frequently when snow lay upon the ground, than in the hottest summer; but he was assured that there was not a dark night throughout the whole year in which they were not to be seen. The ground to the eastward of Bologna, where the largest of these appearances was observed, is a hard chalky soil mixed with clay, which will retain the moisture for a long time, but breaks and cracks in hot weather. On the mountains, where the soil is of a lofer texture, and less capable of retaining moisture, the ignis fatuus were less.

From the best information which M. Beccari was able to procure, he found that these lights were very frequent about rivers and brooks. He concludes his narrative with the following singular account. "An intelligent gentleman travelling in the evening, between eight and nine, in a mountainous road about ten miles south of Bologna, perceived a light which thence very strangely upon some stones which lay on the banks of the river Riveride. It seemed to be about two feet above the stones, and not far from the water. In size and figure it had the appearance of a parallelopiped, somewhat more than a foot in length, and a half a foot high, the longest side being parallel to the horizon. Its light was so strong, that he could plainly discern it by part of a neighbouring hedge and the water of the river; only in the east corner of it the light was rather faint, and the square figure less perfect, as if it was cut off or darkened by the shadow of a circle. On examining it a little nearer, he was surprized to find that it changed gradually from a bright red, first to a yellowish, and then to a pale colour, in proportion as he drew nearer; and when he came to the place itself, it quite vanished. Upon this he stepped back, and not only saw it again, but found that the farther he went from it, the stronger and brighter it grew. When he examined the place of this luminous appearance, he could perceive no fnell nor any other mark of fire." This account was confirmed by another gentleman, who informed M. Beccari, that he had seen the same light five or six different times in spring and in autumn; and that it always appeared of the same shape, and in the very same place. One night in particular he observed it come out of a neighbouring field to settle in the usual place.

A very remarkable account of the ignis fatuus is given by Dr Shaw in his Travels to the Holy Land. It appeared in the valleys of mount Ephraim, and attended him and his company for more than an hour. Sometimes it would appear globular, or in the shape of the flame of a candle; at others it would spread itself to a degree as to involve the whole company in a pale offensive light, then contract itself, and suddenly disappear; but in less than a minute it would appear again; sometimes running swiftly along, it would expand itself at certain intervals over more than two or three acres of the adjacent mountains. The atmosphere from the beginning of the evening had been remarkably thick and hazy; and the dew, as they felt it on the bridles of their horses, was very clammy and unwholesome.

Lights resembling the ignis fatuus are sometimes observed at sea, skipping about the masts and rigging of ships; and Dr Shaw informs us, that he has seen these in such weather as that just mentioned when he saw the ignis fatuus in Palestine. Similar appearances have been observed in various other situations; and we are told of one which appeared about the bed of a woman in Milan, surrounding it as well as her body entirely. This light fled from the hand which approached it; but was at length entirely dispersed by the motion of the air. Of the same kind also, most probably, are those small luminous appearances which sometimes appear in houses or near them, called in Scotland Els-candies, and which are supposed to portend the death of some person about the house. In general these lights are harmless, though not always; for we have accounts of some luminous vapours which would encompass flakes of hay and corn, and set them on fire; so that they became objects of great terror and concern to the country people. Of these it was observed, that they would avoid a drawn sword, or sharp-pointed iron instrument, and that they would be driven away by a great noise; both which methods were
we have a strong proof that electricity is concerned, or indeed the principal agent, in producing the ignis fatuus, from an experiment related by Dr Priestley of a flame of this kind being artificially produced. A gentleman, who had been making many electrical experiments for a whole afternoon in a small room, on going out of it, observed a flame following him at some little distance. This we have no reason to doubt, was a true ignis fatuus, and the circumstances necessary to produce it were then present, an atmosphere impregnated with animal vapour, and likewise strongly electrified. Both these circumstances undoubtedly must have taken place in the present case: for the quantity of perspiration emitted by a human body is by no means inconsiderable; and it as well as the electricity would be collected by reason of the smallness of the room. In this case, however, there seems to have been a considerable difference between the artificial ignis fatuus and those commonly met with: for this flame followed the gentleman as he went out of the room; but the natural ones commonly fly from those who approach them. This may be accounted for from a difference between the electricity of the atmosphere in the room and the other; in which case the flame would naturally be attracted towards that place where the electricity was either different in quality or in quantity; but in the natural way, where all bodies may be supposed equally electrified for a great way round, a repulsion will as naturally take place. Still, however, this does not seem to be always the case. In those instances where travellers have been attended by an ignis fatuus, we cannot suppose it to have been influenced by any other power than what we call attraction, and which electricity is very capable of producing. Its keeping at some distance is likewise easily accounted for, as we know that bodies possessed of different quantities of electricity may be made to attract another for a certain space, and then repel without having ever come into contact. On this principle we may account for the light which surrounded the woman at Milan, but fled from the hand of any other person. On the same principle we account for those mischievous vapours which set fire to the hay and corn flacks, but were driven away by preventing to them a pointed iron instrument, or by making a noise. Both these are known to have a great effect upon the electric matter; and by means of either, even lightning may occasionally be made to fall upon or to avoid particular places, according to the circumstances by which the general mass happens to be affected at that time.

On the whole, therefore, it seems most probable, that the ignis fatuus is a collection of vapour of the purest kind, very much affected by electricity; according to the degree of which, it will either give a weak or strong light, or even set fire to certain substances disposed to receive its operation. This opinion seems greatly to be confirmed from some luminous appearances, observed in privies, where the putrid vapours have even collected themselves into balls, and exploded violently on the approach of a candle. This last effect, however, we cannot so well ascribe to the electricity, as to the attention of the inflammable air which frequently abounds in such places.

In the appendix to Dr Priestley's third volume of experiments...
A light in some respects similar to those above mentioned has been found to proceed from that celebrated chemical production called phosphenes, which always tends to decompose itself, so as to take fire by the access of air only. Phosphenes, therefore, when it emits light, is properly a body ignited; though when a very light,

little quantity of it is used, as what is left after drawing it over paper, or what may be dissolved in essential oil, the heat is not sensible. But perhaps the matter which emits the light, in what we call phosphenes, may be similar to it, though it is generated by a different process, and burn with a less degree of heat. Purification does not seem to be necessary to the light of glow-worms, or of the pholes; and yet their light is sufficiently similar to that of shining wood or flesh. Electric light is unquestionably similar to that of phosphenes, though the source of it is apparently very different.

Kneckel formed his phosphenes into a kind of pills, about the size of peas, which being moistened a little and scraped in the dark, yielded a very considerable light, but not without smoke. The light was much more pleasing when eight or ten of these pills were put into a glass of water; for being shaken in the dark, the whole glass seemed to be filled with light. Kneckel also reduced his phosphenes into the form of larger stones; which being warmed by a person's hand, and rubbed upon paper, would describe letters that were very legible in the dark.

The greatest variety of experiments with the light of phosphenes was made by Dr. Slate; who says, that the solid phosphenes (which is nothing more than the solid phosphenes dissolved in any of the essential oils), would not hurt even a lady's hand; or that, when the hands or face were washed with it, it would not only make them visible to other persons in the dark, but that the light was so considerable as to make other neighbouring objects visible.

When the solid phosphenes is quite immersed in water, he observes, that it ceases to shine; but that if any part of it chance to emmerge or get into the air, it will shine though the glass be hermetically sealed. In a large glass he kept it without water for several days; and yet it continued shining, with very little diminution of its light or weight. If the letters that were written with this phosphenes were warmed by the fire, they presently became dark lines, which continued upon the paper, like ink. To try how much light was given by a small quantity of this phosphenes, he observed that it continued to shine in the open air for seven or eight days, the light being visible whenever he shut his window.

As air was generally thought to contain the pho-bium of flame, Dr. Slate was determined to try this with respect to phosphenes; and for this purpose he placed a large piece of it in a receiver; but upon exhausting it, he perceived that it became more luminous, and that upon admitting the air, it returned to its former state. This property of the light of phosphenes, which is the very reverse of that of shining wood and fishies, was also ascertained by several very accurate experiments of Mr. Hawkebee's.

Endeavouring to blow the phosphenes into a flame with a pair of bellows, Dr. Slate found that it was presently blown out, and that it was a considerable time before
Light.

before the light revived again. All liquors would extinguish this light when the phosphorus was put into them; nor would it shine or burn, though it was even boiled in the most inflammable liquors, as oil of olive, spirit of turpentine, or even spirit of wine.

in order to keep his phosphorus from consuming, he used to put it in a glass of water; and sometimes he has seen it, when thus immered in water, make such bright and vigorous combustions in the air, as, he says, would surprise and frighten those who are not used to the phenomenon. This fiery meteor, he says, is contracted in its passage through the water, but expands as soon as it gets above it. If any person would make this experiment to advantage, he informs them that the glass must be deep, and cylindrical and not above three quarters filled with water. This effect he perceived in warm weather only, and never in cold.

The phosphorus of which we have been treating is prepared from urine; but in some cases the sweat, which is similar to urine, has been observed to be phosphorous; without any preparation. This once happened to a person who used to eat great quantities of salt, and who was a little subject to the gout, after sweating with violent exercise. Stripping himself in the dark, his shirt seemed to be all on fire, which surprised him very much. Upon examination, red spots were found upon his shirt; and the physician who was present perceived an unusual smell, though it had nothing in it of volatile alkali, but of theuratic acid; the fame, he says, that issues from cabbage much falted, and strongly fermented.

The caillet method of accounting for all these kinds of lights, perhaps, is from electricity. If light confits in a certain vibration of the electric fluid, then it follows, that in whatever substances such a vibration takes place, there light must appear, whether in purefcent animal subftances, sea-water phosphorus, or any thing elfe. We know that the electric matter pervades all terrestrial subftances, and is very liable to be fet in motion from causes of which we are ignorant. The action of the air by which purefaction is produced may be one of these causes; and it can by no means appear surprifing that the electric matter should act in the bodies of living animals in fuch a manner as to produce a permanent light, when we certainly know it acts in fome of them fo powerfully as to produce a fhook familiar to that of a charged vitul.---On this fubjeft we shall only observe farther, that when this vibration becomes fo powerful as to penetrate the solid subftance of the body itself, the luminous body then becomes transparent, as in the milk mentioned in the former part of this article; but, when it is only superficial, the body, though it emits light, is itself opaque.

Light from diamonds. Among luminous bodies the diamond is to be reckoned; as some diamonds are known to shine in the dark. But on account of the feebenees of their splendor, it is neceffary for the person who is to obferve them, previously to fay in the dark at leaft a quarter of an hour, that the pupil of the eye may be dilated and enlarged, and fo rendered capable of receiving a larger quantity of the rays of light. M. du Fay has alfo obferved, that the eyes ought to be that for this time, or at least one of them; and that in that cafe, the light of the diamond is afterwards only feen by that eye which has been bent. Before the diamond is brought into the dark room, it must be exposed to the fun-light, or at leat to the open day light, to imbibe a sufficient quantity of rays; and this is done in one minute, or even less; eight or ten feconds having been found to furnish as much light as the stone is capable of receiving; and when brought into the dark, its light continues about twelve or thirteen minutes, weakening all the while by ineffible degrees. It is very remarkable that in bodies fo extremely similar to each other as diamonds are, fome have this property of imbidding the fun’s rays, and shining in the dark, and that others搞好 not; yet fo it is found to be by experiment, and the moft nearly refembling stones hall be found one to have this property, and another to be deftitute of it; while many of the moft diftinctive have the property in common. There seems to be no rule, nor even the leaft traces of an imperfect rule of judging, which diamonds have, and which have not this property; their natural brightnefs, their purity, their fize, or their fhape, contribute nothing to it; and all that has yet been discovered of the leaft regularity among them, is, that all the yellow diamonds have this property. This may probably arise from their having more fulleth in their composition, and therefore illuminating more readily, or emitting a more visible fame.

The burning of diamonds is a term used among the jewellers, for putting them into a firece fire, as they frequently do, when they are fouled with brown, or yellow, or the like; this always defefts them of their colour, without doing them the leaft tennible injury. M. du Fay, having been informed of this common practice, formed a conjecture, that the difference of diamonds in their flaming, or not flaming in the dark, was owing to it; and that either all thofe which had been burned, or all thofe which had not, were thofe which alone fhone in the dark. But this was found an erroneous conjecture; for two diamonds, one lucid in the dark the other not, were both burned, and afterwards both were found to retain the fame properties they had before. It is not only the open fun-light, or open day-light, which gives to these diamonds the power of flaming in the dark: they receive it in the fame manner even if laid under a glafs, or plunged in water or in milk.

M. Du Fay tried whether it was po enlarge the diamond retain, for any longer time, the light it naturally parts with fo foon; and found, that if the diamond, after being exposed to the light, be covered with black wax it will fhinfe in the dark, as well fix hours afterwards as at the time it was firft impregnated with the light.

The imbibing light, in this manner, being fo nice a property as not to be found in several diamonds, it was not to be fuppofed, that it would be found in any other ftones: accordingly, on trial, the ruby, the fapphire, and the topaz, were found wholly deftitute of it; and among a large number of rough emeralds, one only was found to poiffeit it. Such is the strange uncertainty of these accidents.

All the other lefs precious ftones were tried and found not to poiffeit this property of imbidding light from the day-light or fun-light, but they all became luminous by the different means of heating or friction; with this difference, that fome acquired it by one of the
Light, their methods, and others by the other; each being unaffected by that which gave the property to the other. The diamond becomes luminous by all these ways.

Beccearius also discovered, that diamonds have the property of the Bolognian phosphorus, about the same time that it occurred to M. du Fay. Com. Bonev, vol. ii. p. 176. M. du Fay likewise observed, that the common topaz, when calcined, had all the properties of this phosphorus; and pursuing the discovery, he found the same property, in a great degree, in the blemmites, gypsum, lime-stone, and marbles; though he was obliged to dissolve some very hard substances of this kind in acids, before calcination could produce this change in them; and with some substances he could not succeed even thus: especially with flint-stones, river-sand, jaspers, agates, and rock-crystal.

Light from Plants. In Sweden a very curious phenomenon has been observed on certain flowers by M. Haggern, lecturer in natural history. One evening he perceived a faint flash of light repeatedly dart from a marigold. Surprised at such an uncommon appearance, he resolved to examine it with attention; and to be assured it was no deception of the eye, he placed a man near him, with orders to make a signal at the moment when he observed the light. They both saw it constantly at the same moment.

The light was most brilliant on marigolds of an orange or flame colour; but scarcely visible on pale ones.

The flash was often seen on the same flower two or three times in quick succession; but more commonly at intervals of several minutes; and when several flowers in the same place emitted their light together, it could be observed at a considerable distance.

This phenomenon was remarked in the months of July and August at Fun-st, and for half an hour, when the atmosphere was clear; but after a rainy day, or when the air was loaded with vapours, nothing of it was seen.

The following flowers emitted flashes, more or less vivid, in this order:
1. The menigolds, calendula officinalis.
3. The orange-lily, lilium bulbiferum.
4. The Indian pink, tagetes patula et erecta.

To discover whether some little insects or phosphoric worms might not be the cause of it, the flowers were carefully examined, even with a microscope, without any such being found.

From the rapidity of the flash, and other circumstanciess, it may be conjectured that there is something of electricity in this phenomenon. It is well known, that when the pistil of a flower is impregnated, the pollen bursts away by its elasticity, with which electricity may be combined. But M. Haggern, after having observed the flash from the orangelily, the anthera of which are a considerable space distant from the petals, found that the light proceeded from the petals, only; whence he concludes, that this electric light is caused by the pollen, which, in dying off, is scattered on the petals. Whatever be the cause, the effect is singular and highly curious.

Lights, in painting, are those parts of a piece which are illuminated, or that lie open to the luminary, by which the piece is supposed to be enlightened; and which, for this reason, are painted in bright vivid colours.

In this sense, light is opposed to shadow. Different lights have very different effects on a picture, and occasion a difference in the management of every part. A great deal therefore depends on the painter's choosing a proper light for his piece to be illuminated by; and a great deal more, in the conduct of the lights and shadows, when the luminary is pitched upon.

The strength and relievo of a figure, as well as its gracefulfulness, depend entirely on the management of the lights, and the joining of those to the shadows.

The light a figure receives is either direct or reflected; to each of which special regard must be had. The doctrine of lights and shadows makes that part of painting called chiaro oscura.

Light-Horse, an ancient term in the English customs, signifying an ordinary cavalier or horseman lightly armed, and so as to enter a corps or regiment; in opposition to the men at arms, who were heavily accou­urred, and armed at all points. See Light-Horse.

Lighter, a building erected upon a cape or promontory on the sea-coast, or upon some rock in the sea, and having on its top in the night-time a great fire or light formed by candles, which is constantly attended by some careful person, so as to be seen at a great distance from the land. It is used to direct the shipping on the coast that might otherwise run ashore, or steer an improper course when the darkness of the night and the uncertainty of currents, &c. might render their situation with regard to the shore extremely doubtful. Lamp-lights are, on many accounts, preferable to coal-fires or candles; and the effect of these may be increased by placing them either behind glass-hemispheres, or before properly disposed glass or metal reflectors, which last method is now very generally adopted. See Beacons.

Light-Room, a small apartment inclosed with glass-windows, near the magazine of a ship of war. It is used to contain the lights by which the gunner and his assistants are enabled to fill cartridges with powder to be ready for action.

Lighter, a large, open, flat-bottomed vessel, generally managed with oars, and employed to carry goods to or from a ship when she is to be laden or delivered. — There are also some lighters furnished with a deck throughout their whole length, in order to contain those merchandises which would be damaged by rainy weather: these are usually called close lighters.

Lightfoot (John), a most learned English divine, was the son of a divine, and born in March 1602, at Stoke upon Trent in Staffordshire. After having finished his studies at a school on Morton-green near Congleton in Cheshire, he was removed in 1617 to Cambridge, where he applied himself to eloquence, and succeeded so well in it as to be thought the best orator of the under-graduates in the university. He also made an extraordinary proficiency in the Latin and Greek; but neglected the Hebrew, and even lost that knowledge he brought of it from school. His taste for the oriental languages was not yet excited; and as for logic, the study of it, as managed at that time among the academics, was too quadrifome and fierce
Lightfoot. fierce for his quiet and meek disposition. As soon as he had taken the degree of B. A. he left the university, and became assistant to a school at Repton in Derbyshire. After he had supplied this place a year or two, he entered into orders, and became curate of Norton under Hale in Shropshire. This curacy gave an occasion of awakening his genius for the Hebrew tongue. Norton lies near Bellaport, then the seat of Sir Rowland Cotton, who was his constant hearer, made him his chaplain, and took him into his house. This gentleman being a perfect master of the Hebrew language, engaged Lightfoot in that study; who, by conversing with his patron, soon became sensible that without that knowledge it was impossible to attain an accurate understanding of the scriptures. He therefore applied himself to it with extraordinary vigour, and in a little time made a great progress in it; and his patron removing with his family to reside in London, at the request of Sir Alland Cotton his uncle, who was lord-mayor of that city, he followed his preceptor thither. But he did not stay long there: for, having a mind to improve himself by travelling abroad, he went down into Staffordshire to take leave of his father and mother. Palling through Stone in that county, he found the place during a minister; and the prevailing infinuations of the parishioners prevailed upon him to undertake that cure. Hereupon, laying aside his design of travelling abroad, he began to turn his thoughts upon settling at home. During his residence at Bellaport, he had fallen into the acquaintance of a gentlewoman who was the daughter of William Crompton of Stonepark, Eq; and now, being in possession of that living, he married her in 1628. But notwithstanding this settlement, his uneasiness of being the only rabbinical learning would not suffer him to continue there. Sion-college library at London, he knew, was well stocked with books of that kind. He therefore quitted his charge at Stone, and removed with his family to Hornsey, near the city; where he gave the public a notable specimen of his advancement in those studies, by his "Erubhim, or Miscellaneous Christian and Judicial," in 1629. He was at this time only 27 years of age; and appears to have been well acquainted with the Latin and the Greek fathers, as well as the ancient heathen writers. These first fruits of his studies were dedicated to Sir Rowland Cotton; who, in 1631, presented him to the rectory of Alaley in Staffordshire. He seemed now to be fixed for life: Accordingly, he built a study in the garden, to be out of the noise of the house; and applied himself with indefatigable diligence in searching the scriptures. Thus employed, the days passed very agreeably; and he continued quiet and unmolested, till the great change which happened in the public affairs brought him into a share of the administration relating to the church; for he was nominated a member of the memorable assembly of divines for settling a new form of ecclesiastical polity. This appointment was purely the effect of his distinguished merit; and he accepted it purely with a view to serve his country, as far as lay in his power. The non-residence, which this would necessarily occasion, apparently induced him to resign his rectory; and having obtained the presentation for a younger brother, he set out for London in 1642. He had now satisfied himself in clearing up many of the abstruse passages in the Bible, and therein had provided the chief materials, as well as formed the plan, of his "Harmony," and an opportunity of inspecting it at the press was, no doubt, an additional motive for his going to the capital; where he had not been long before he was chosen minister of St Bartholomew's, behind the Royal Exchange. The assembly of divines meeting in 1643, our author gave his attendance diligently there, and made a distinguished figure in their debates; where he used great freedom, and gave signal proofs of his courage as well as learning, in opposing many of those tenets which the divines were endeavouring to establish. His learning recommended him to the parliament, whose visitors, having ejected Dr William Sprat from the mastership of Catharine-hall in Cambridge, put Lightfoot in his room; this year 1653; and he was also presented to the living of Much-Mauden in Hertfordshire, void by the death of Dr Samuel Ward, Margaret-professor of divinity in that university, before the expiration of this year. Meanwhile he had his turn with other favourites in preaching before the house of commons, most of which sermons were printed; and in them we see him warmly pressing the speedy settlement of the church in the Presbyterian form, which he cordially believed to be according to the pattern in the Mount. He was all the while employed in preparing and publishing the several branches of his Harmony; all which were so many excellent specimens of the usefulness of human learning to true religion: and he met with great difficulties and discouragements in that work, chiefly from that antinomian spirit which prevailed, and even threatened the destruction of the universities. In 1655 he entered upon the office of vice-chancellor of Cambridge, to which he was chosen that year, having taken the degree of doctor of divinity in 1652. He performed all the regular exercises for his degree with great applause, and executed the vice-chancellor's office with exemplary diligence and fidelity; and particularly at the commencement, supplied the place of professor of divinity, then undisputed of as an act which was kept for a doctor's degree in that profession. At the same time he was engaged with others in perfecting the Polyglot Bible, then in the press. At the restoration he offered to resign the mastership of Catharine-hall: But, as what he had done had been rather in compliance with the necessity of the times, than from any zeal or spirit of opposition to the king and government, a confirmation was granted him from the crown, both of the place and of his living. Soon after this he was appointed one of the assistants at the conference upon the liturgy, which was held in the beginning of 1661, but attended only once or twice; probably aggrieved at the heat with which that conference was managed. However, he stuck close to his design of perfecting his Harmony; and being of a strong and healthy constitution, which was alloyed by an exact temperance, he prosecuted his studies with unabated vigour to the last, and continued to publish, notwithstanding the many difficulties he met with from the existence of it. However, not long before he died, some booksellers got a promise from him to collect and methodize his works, in order to print them; but the execution was prevented by his death, which happened Dec. 6. 1675. The doctor was twice married: his first
Lightning. first wife, already mentioned, brought him four sons and two daughters. His second wife was likewise a widow, and relief of Mr Auffin Brograve, uncle of Sir Thomas Brograve, Bart. of Hertfordshire, a gentleman well versed in rabbinical learning and a particular acquaintance of our author. He had no issue by her. She also died before him, and was buried in Munden church, where the doctor was himself likewise interred near both his wives. Dr Lightfoot's works were collected and published first in 1684, in two volumes folio. The second edition was printed at Amsterdam, in 1686, in two volumes folio, containing all his Latin writings, with a Latin translation of those which he wrote in English. At the end of both these editions there is a list of such pieces as he left unfinished. It is the chief of these, in Latin, which make up the third volume, added to the former two, in a third edition of his works, by John Lutreden, at Utrecht, in 1699, fol. They were communicated by Mr Strype, who, in 1700, published another collection of these papers, under the title of "Some genuine remains of the late pious and learned Dr John Lightfoot.

LIGHTNING, a bright and vivid flash of fire, suddenly appearing in the atmosphere, and commonly disappearing in an instant, sometimes attended with clouds and thunder, and sometimes not.

The phenomena of lightning are always surprising, and always something extraordinary. There is never any kind of natural appearance in which there is more diversity, not two flashes being ever observed exactly similar to one another. In a serene sky, the lightning, in this country at least, almost always hath a kind of indistinct appearance without any determinate form, like the sudden illumination of the atmosphere occasioned by firing a quantity of loose gunpowder; but when accompanied with thunder, it is well defined, and hath very often a zig-zag form. Sometimes it makes only one angle, like the letter V, sometimes it hath several branches, and sometimes it appears like the arch of a circle. But the most formidable and destructive form which lightning is ever known to assume is that of balls of fire. The motion of these is very often easily perceptible to the eye; but wherever they fall, much mischief is occasioned by their burning, which they always do with a sudden explosion like that of fire-arms. Sometimes they will quietly run along, or rest for a little upon any thing, and then break into several pieces, each of which will explode; or the whole ball will burst at once, and produce its mischievous effects only in one place. The next to this in its destructive effects is the zig-zag kind; for that which appears like indistinct flakes, whose form cannot be readily observed, is seldom or never known to do hurt. The colour of the lightning also indicates in some measure its power to do mischief; the palest and brightest flakes being most destructive; such as are red, or of a darker colour, commonly doing less damage.

A very surprising property of lightening, the zig-zag kind, especially when near, is its seeming omniscience. If two persons are standing in a room looking different ways, and a loud clap of thunder accompanied with zig-zag lightning happens, they will both distinctly see the flash, not only by that indistinct illumination of the atmosphere which is occasioned by fire of any kind; but the very form of the lightning itself, and every angle it makes in its course, will be distinctly perceptible, as though they had looked directly at the cloud from whence it proceeded. If a person happened at that time to be looking on a book, or other object which he held in his hand, he would distinctly see the form of the lightning between him and the object at which he looked. This property seems peculiar to lightning, and to belong to no other kind of fire whatever.

The effects of lightning are generally confined within a small space; and are seldom similar to those which accompany explosions of gun-powder, or of inflammable air in mines. Instances of this kind, however, have occurred; the following is one of the most remarkable of which we have any distinct account.

"August 2, 1763, about fix in the evening, there arose at Anderlight, about a league from Brussells, a conflict of several winds borne upon a thick fog. This conflict lasted four or five minutes, and was attended with a frightful hissing noise, which could be compared to nothing but the yellings of an infinite number of wild beasts. The cloud then opening, discovered a kind of very bright lightning, and in an instant the roofs of one side of the houses were carried off and dispersed at a distance; above 1000 large trees were broke off, some near the ground, others near the top, some torn up by the roots; and many both of branches and tops carried to the distance of 60, 100, or 120 paces; whole coppices were laid on one side, as corn is by ordinary winds. The glafs of the windows which were most exposed was shattered to pieces. A tent in a gentleman's garden was carried to the distance of 4000 paces; and a branch torn from a large tree, struck a girl in the forehead as she was coming into town, at the distance of 40 paces from the trunk of the tree, and killed her on the spot."

These terrible effects seem to have been owing to the prodigious agitation in the air, occasioned by the emission of such a vast quantity of lightning at once; or perhaps to the agitation of the electric fluid itself, which is still more dangerous than any concussion of the atmosphere; for thunder-storms will sometimes produce most violent whirlwinds, such as are by the heath philosophers attributed to electricity, nay, even occasion an agitation of the waters of the ocean itself; and all this too after the thunder and lightning had ceased. Of this we have the following instances.

"Great Malvern, October 16, 1761. On Wednesday last, we had the most violent thunder ever known in the memory of man. At a quarter past four in the afternoon I was surprized with a most shocking and dismal noise; 100 forges the nearest resemblance I can think of), were they all at work at once, could scarce equal it. I ran to the fore-door, and casting my eye upon the side of the hill about 400 yards to the south-west of my house, there appeared a prodigious smoke, attended with the same violent noise. I ran back into the house, and cried out, a volcano (for I thought) had burst out of the hill; but I had no sooner got back again, than I found it had descended, and was passing on within about 100 yards of the south end of my house. It seemed to rise again in the meadow just below it; and con-
Lightning, continued its progress to the east, rising in the same manner for four different times, attended with the same dismal noise as at first; the air being filled with a nauseous and sulphurous smell. I saw it gradually decrease till quite extinguished in a turnip-field about a quarter of a mile below my house. The turnip leaves, with leaves of trees, dirt, flakes, &c., filled the air, and flew higher than any of these hills. The thunder ceased before this happened, and the air soon afterwards became calm and serene. — The vast column of smoke mentioned in the above letter was so large, that a physician of eminence at Worcester saw it in its progress down the hill, about a mile from Fec- kennham, which is above 20 miles from Malveru. — In August 1765, a most violent form of thunder, rain, and hail, happened at London, which did damage in the adjacent country, to the amount of 50,000 l. Hailstones fell of an immense size, from two to ten inches circumstance; but the most surprising circumstance was the sudden flux and reflux of the tide in Plymouth pool, exactly corresponding with the like agitation in the same place, at the time of the great earthquake at Lisbon.

Infants are also to be found, where lightning, by its own proper force, without any assistance from those less common agitations of the atmosphere or electric fluid, hath thrown stones of immense weight to considerable distances; torn up trees by the root, and broke them in pieces; shattered rocks; beat down houses; and set them on fire, &c.

A very singular effect of lightning is mentioned in the 66th volume of the Philosophical Transactions, upon a pyed bullock. It happened in the county of Suffolk about the end of August 1774. The bullock was white and red; and the lightning stripped off the white hair, leaving the red untouched. The following is a particular account of the matter. "In the evening of Sunday, the 28th of August, there was an appearance of a thunder-form, but we heard no report. A gentleman who was riding near the marshes not far distant from this town (Lewes) saw two strong flashes of lightning, seemingly running along the ground of the marsh, at about nine o'clock in the evening. On Monday morning, when the servants of Mr Roger, a farmer at Swanborough, in the parish of Ford, went into the marsh to fetch the oxen to their work, they found one of them, a four-year-old bullock, standing to appearance much burnt, and so weak as to be scarce able to walk. The animal seemed to have been struck by lightning in a very extraordinary manner. He is of a white and red colour: the white in large marks, beginning at the rump bone, and running in various directions along both the sides; the belly is all white, and the whole head and horns white likewise. The lightning, with which he must have been undoubtedly struck, fell upon the rump bone, which is white, and distributed itself along the sides in such a manner as to take off all the white from the white marks as low as the bottom of the ribs, but so as to leave a lift of white hair, about half an inch broad, all round where it joined to the red, and not a single hair of the red appears to be touched. The whole belly is burnt, but the end of the sheath of the penis has the hair taken off; it is also taken off from the dewlap: the horns and the curled hair on the forehead are uninjured; but the hair is taken off from the sides of the face, from the lightning.

The flat part of the jaw-bones, and from the front of the face in stripes. There are a few white marks on the side and neck, which are surrounded with red; and the hair is taken off from them, leaving half an inch of white adjoining to the red. The farmer anointed the ox with oil for a fortnight; the animal purged very much at first, and was greatly reduced in flesh, but is now recovering."

In another account of this accident, the author supposes that the bullock had been lying down at the time he was struck; which shows the reason that the under parts were not touched. "The lightning, conducted by the white hair, from the top of the back down the sides, came to the ground at the place where the white hair was left entire.

The author of this account says, that he inquired of Mr Tooth a farrier, whether he ever knew of a similar accident; and that he told him "the circumstance was not new to him; that he had seen a great many bullocks struck by lightning in the same manner as this; that the texture of the skin under the white hair was always destroyed, though looking fair at first; but after a while it became fore, throwing out a putrid matter in putres, like the small-pox with us, which in time falls off, when the hair grows again, and the bullocks receive no farther injury;" which was the case with the bullock in question. In a subsequent letter, however, the very same author informs us, that he had inquired of Mr Tooth whether he ever saw a stroke of lightning actually fall upon a pyed bullock, so as to destroy the white hair, and show evident marks of burning, leaving the red hair uninjured! He said he never did; nor did he recollect any one that had.

He gave an account, however, of a pyed horse, on a pyed bullock, which had been struck dead by horse lighting in the night-time. The explosion was so violent, that Mr Tooth imagined his horse had been struck, and therefore immediately got up. On going into the stable he found the horse almost dead to appearance, though it kept on its legs near half an hour before it expired. The horse was pyed white on the shoulder and greatest part of the head; viz., the forehead and nose, where the greatest force of the stroke came. "The hair was not burnt nor coloured, only so loosened at the root, that it came off with the least touch. And this one was a four-year-old horse, standing in a stable, much burnt, and so weak as to be scarce able to walk. The animal seemed to have been struck by lightning in a very extraordinary manner. He is of a white and red colour: the white in large marks, beginning at the rump bone, and running in various directions along both the sides; the belly is all white, and the whole head and horns white likewise. The lightning, with which he must have been undoubtedly struck, fell upon the rump bone, which is white, and distributed itself along the sides in such a manner as to take off all the white from the white marks as low as the bottom of the ribs, but so as to leave a lift of white hair, about half an inch broad, all round where it joined to the red, and not a single hair of the red appears to be touched. The whole belly is burnt, but the end of the sheath of the penis has the hair taken off; it is also taken off from the dewlap: the horns and the curled hair on the forehead are uninjured; but the hair is taken off from the sides of the face, from the lightning.

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Another instance is mentioned of this extraordinary effect of lightning upon a bullock, in which even the small red spots on the sides were unaffected; and in this, as well as the former, the white hair on the under part of the belly, and on the legs, was left untouched. All these, however, are to be considered as the more unusual phenomena of lightning; its common mode of action being entirely similar to that of a charged Leyden vial, where the electric matter discharges itself.
Lightning is a phenomenon that is characterized by its zigzag form. The identity of electric matter and lightning is the same, and indeed, it has been established that there is no significant difference between the phenomena of lightning and what may be obtained by comparing them with those of our electrical experiments. The different forms of the flashes are all exemplified in those of electrical sparks. Where the quantity of electricity is small, and consequently incapable of striking at any considerable distance, the spark appears straight, without any curvature, or angular appearance; but where the electricity is very strong, and of consequence capable of striking an object at a pretty considerable distance, it assumes a crooked or zig-zag form. This is always the case with Mr. Nairn's very powerful machines, the conductors of which are six feet in length and one foot in diameter. Sparks may be taken from them at the distance of 6, 17, or even 20 inches; and all of these put on the angular zig-zag form of lightning. The reason of this appearance, both in these sparks and in the lightning, is, that the more fluid electric matter hath to pass through the denser and less fluid atmosphere, the more rapid it will be; and in fact, this is the way in which all the more fluid substances pass through those that are less so, at least when their velocity becomes considerable. If bubbles of air or steam pass very gently up through water, their course from the bottom to the top of the vessel will differ very little, if at all, from a straight line; but when they are impelled by a considerable force, as in air blown from a bellows, or the bubbles of steam which arise in boiling water, their course is then marked by waved and crooked lines, and the deflection of the bubbles to the right or left will be in proportion to their ascending velocity, and to the weight of the water by which they are resisted.

In the case of air blown through water, however, or steam ascending from the bottom of a vessel of boiling water, though the course of the bubbles is wavy and crooked, we never observe it to be angular as in lightning. The reason of this is, that there is no proportion between the capacity of the air for yielding to the impact of lightning, and the velocity with which the latter is moved. Mr. Robin's experiments in gunnery, it appears, that the air cannot yield with a velocity much greater than 10000 feet in a second, and that all projectiles moving with a greater degree of velocity meet with a violent resistance. But if we suppose lightning to move only with one half the velocity of light, that is, near 100,000 miles in a second, or even with that of 1000 miles in a minute, which most probably is the case, its motion in the fluid atmosphere will meet with a resistance very little inferior to what air would meet with in passing through the most solid bodies. The smallest difference of the resistance of the atmosphere on either side, must determine the lightning to that side: and in its passage to that new place where the resistance is least, it must pass on in a straight line, making an angle with its former course, because the atmosphere is altogether incapable of yielding with such rapidity as the electric matter requires, and therefore resists like a solid rock. The case is otherwise in the former examples: for though a small difference in the resistance forces the bubbles to move in an oblique direction, yet there is always a considerable proportion between the capacity of water for yielding, and that force by which the bubbles urge it to yield; so that though it does make a resistance sufficient to prevent the bubbles moving in a straight line, yet it also perceptibly yields in all times, and therefore the track of the bubbles is formed by a number of curves and not angles.

Hence we may understand the reason why the zig-zag kind of lightning is so dangerous, namely, because it must overcome a very violent resistance of the atmosphere; and wherever that resistance is in the smallest degree lessened, there it will undoubtedly strike, and at a very considerable distance too. It is otherwise with that kind which appears in flashes of no determinate form. The electric matter of which these are composed, is evidently dilated in the air by some conducting substances which are present there; and of consequence, though a man, or other conducting body, happened to be very near such a flash, he would not be struck or materially injured by it, though a zig-zag flash, in such circumstances, would have probably discharged its whole force upon him. The most destructive kind of lightning, however, as we have already observed, is that which assumes the form of balls. These are produced by an exceedingly great power of electricity gradually accumulated till the resistance of the atmosphere is no longer able to confine it. In general, the lightning breaks out from the electrified cloud by means of the approach of some conducting substance, either a cloud, or some terrestrial substance: but the fire-balls seem to be formed, not because there is any substance at hand to attract the electric matter from the cloud, but because the electricity is accumulated in such quantity that the cloud itself can no longer contain it. Hence such balls fly off slowly, and have no particular destination. Their appearance indicates a prodigious commotion and accumulation of electricity in the atmosphere, without a proportionable disposition in the earth to receive it. This disposition, however, we know, is perpetually altered by a thousand circumstances, and the place which first becomes most capable of admitting electricity will certainly receive a fire-ball. Hence this kind of lightning has been known to move slowly backwards and forwards in the air for a considerable space of time, and then suddenly to fall on one or more houses, according to their being more or less affected with an electricity opposite to that of the ball at the time. It will also run along the ground, break into several parts, and produce several explosions at the same time.

It is very difficult to imitate lightning of this kind in our electrical experiments. The only cases in which it hath been done in any degree are those in which Dr. Priestley made the explosion of a battery of fire-balls for a considerable way over the surface of raw flesh, water, &c. and in Mr. Arden's experiment, when a fire-ball ascended to the top of an electrified jar, and burst it with a violent explosion. See Electricity n° 89, &c. In these cases, if, while the electric flash passed over the surface of the flesh, it had been possible to interrupt the metallic circuit by taking away the chain, the electric matter discharged from the battery would have been precisely in the situation of one of the fire-balls.
Lightning, in the time of severe thunder-storms, is
supposed to proceed from the earth, as well as from
the clouds: but this fact hath never been well aper-
tained, and indeed from the nature of the thing it
seems very difficult to be ascertained; for the motion
of the electric fluid is so very quick, that it is alto-
gether impossible to determine, by means of our senses,
whether it goes from the earth or comes to it. In
fact, there are in this country many thunder-storms in
which it doth not appear that the lightning touches
any part of the earth, and consequently can neither go
to it or come out from it. In these cases, it flashes
either from an electrified cloud to one endowed with
an opposite electricity, or merely into those parts of Lightning,
the atmosphere which are ready to receive it. But if
not only the clouds, but the atmosphere all the way be-
twixt them and the earth, and likewise for a consider-
able space above the clouds, are electrified one way,
the reason of this will appear from a consideration of the principles laid down
under the article Electricity, sect. vi. It there
appears, that the electric fluid is altogether incapable ei-
er of accumulation or diminution in quantity in any
particular part of space. What we call electricity is only
the motion of this fluid made perceptible to our senses.
Positive electricity is when the current of electric mat-
ter is directed from the electrified body. Negative
electricity is when the current is directed towards it.
Let us now suppose, that a positively electrified cloud is
formed over a certain part of the earth's surface.
The electric matter flows out from it, and enters into the
atmosphere all round; and while it is doing so, the at-
mosphere is negatively electrified. In proportion,
however, as the electric current pervades greater and
greater proportions of the atmospheric space, the
greater is the resistance to its motion, till at last the air
becomes positively electrified as well as the cloud, and
then both act together as one body. The surface of
the earth then begins to be affected, and it silently
receives the electric matter by means of the trees,
grafs, &c. till at last it becomes positively electrified
also, and begins to feed on a current of electricity from
the surface downwards. The causes which at first
produced the electricity of the clouds (and which are
treated of under the article Thunder), still continuing
to act, the power of the electric current becomes
inconceivably great. The danger of the thunder-storm
now begins; as for the force of the lightning is di-
rected to some place below the surface of the earth,
it will certainly dart towards that place, and shatter
every thing to pieces which resists its passage. The
benefit of conducting-rods will now also be evident:
for we are sure that the electric matter will in all cases
take the way where it meets with the least resistance;
and this is through the lightning, or rather over the
surface, of metals. In such a case therefore, if there
happen to be a house furnished with a conductor di-
rectly below the cloud, and at the same time a zone of
negatively electrified earth not very near the
foundation of the house, the conductor will almost
certainly be struck, but the building will be unhurt.
If the house wants a conductor, the lightning will
nevertheless strike in the same place, in order to get at
the negatively electrified zone abovementioned; but
the building will now be damaged, because the ma-
terials of it cannot readily conduct the electric fluid.

We will now be able to enter into the dispute, Why
whether the preference is due to knobbed or pointed con-
ductors for preserving buildings from strokes of light-
ning? Ever since the discovery of the identity of
electricity and lightning, it hath been allowed by all rable
parties, that conductors of one kind are in a manner
essentially necessary for the safety of buildings in those
countries where thunder-storms are very frequent.
The principle on which they act hath been already ex-
plained; namely, that the electric fluid, when im-
pelled by any power, always goes to that place where

It
Lightning, it meets with the least resistance, as all other fluids also do. As metals, therefore, are found to give the least resistance to its passage, it will always choose to run along a metallic rod, in preference to a passage of any other kind. We must, however, carefully consider a circumstance which seems to have been too much overlooked by electricians in their reasonings concerning the effects of thunder-rods; namely, that lightning or electricity, never strikes a body, merely for the sake of the body itself, but only because of means of that body it can readily arrive at the place of its destination. When a quantity of electricity is collected from the earth, by means of an electric machine, a body communicating with the earth, will receive a strong spark from the prime conductor. The body receives this spark, not because it is itself capable of containing all the electricity of the conductor and cylinder, but because the natural situation of the fluid being disturbed by the motion of the machine, a stream of it is sent off from the earth. The natural powers, therefore, make an effort to supply what is thus drained off from the earth; and as the individual quantity which comes out is most proper for supplying the deficiency, as not being employed in any natural purpose, there is always an effort made for returning it to the earth. No sooner, then, is a conducting body, communicating with the earth, presented to the electrical machine, than the whole effect of the electricity is directly directed against that body, not merely because it is a conductor, but because it leads to the place where the fluid is directed by the natural powers by which it is governed, and at which it would find other means to arrive, though that body were not to be preferred. That this is the case, we may very easily satisfy ourselves, by presenting the very same conducting substance in an insulated state to the prime conductor of the machine; for then we shall find, that only a very small spark will be produced. In like manner, when lightning strikes a tree, a house, or a thunder rod, it is not because these objects are high, or in the neighbourhood of the cloud, but because they communicate with some place below the surface of the ground, against which the impetus of the lightning is directed; and at that place the lightning would certainly arrive, though none of the above-mentioned objects had been interposed.

The fallacy of that kind of reasoning generally employed concerning the use of thunder-rods, will now be sufficiently apparent. Because a point prefented to an electrified body in our experiments, always draws off the electricity in a silent manner; therefore Dr Franklin and his followers have concluded, that a pointed conductor will do the same thing to a thundercloud, and thus effectively prevent any kind of danger from a stroke of lightning. Their reasoning on this subject, they think, is confirmed by the following fact among many others. "Dr Franklin's house at Philadelphia was furnished with a rod extending nine feet above the top of the chimney. To this rod was connected a wire of the thickness of a goole-quill, which descended through the wall of the fair-case; where an interruption was made, so that the ends of the wire, to each of which a little bell was fixed, were distant from each other about six inches; an insulated brass ball hanging between the two bells. The author was Lightning, one night waked by loud cracks, proceeding from his apparatus in the fair-case. He perceived, for the brass ball, instead of vibrating as usual between the balls, was repelled and kept at a distance from both; while the fire sometimes palled in very large quick cracks directly from bell to bell; and sometimes in a continued dense white stream, seemingly as large as his finger; by means of which the whole fair case was electrified, as with sun-flame, so that he could see to pick up a pin. From the apparent quantity of electric matter of which the cloud was thus evidently robbed, by means of the pointed rod (and of which a blunt conductor would not have deprived it), the author conceives, that a number of such conductors must considerably lessen the quantity of electif fluid contained in any approaching cloud, before it comes so near as to deliver its contents in a general stroke."

For this very reason, Mr Benjamin Wilson and his followers, who constitute the opposite party, have determined that the use of pointed conductors is utterly unsafe. They say, that in violent thunder storms the whole atmosphere is full of electricity; and that attempts to exhaust the vast quantity there collected, are like attempting to clear away an inundation with a shovel, or to exhaust the atmosphere with a pair of bellows. They maintain, that though pointed bodies will effectually prevent the accumulation of electricity in any substance; yet if a non-electrified body is interposed between a point and the conductor of an electrical machine, the point will be struck at the same moment with the non-electrified body, and at a much greater distance than that at which a knob would be struck. They affirm also, that by means of this silent solicitation of the lightning, inflammable bodies, such as gun-powder, tinder, and Kunkel's phosphorus, may be set on fire; and for these last facts they bring decisive experiments. From all this, they say, it is evident that the use of pointed conductors is unsafe. They solicit a discharge to the place where they are; and as they are unconnected with the conductor of the whole electricity in the atmosphere, it is impossible, for us to determine whether the discharge they solicit may not be too great for our conductor to bear; and consequently all the mischief arising from thunder-storms might be expected, with this additional and mortifying circumstance, that this very conductor hath probably solicited the fatal stroke, when without it the cloud might have passed harmles over our heads without striking at all.

Here the reasoning of both parties seems equally wrong. They both proceed on this erroneous principle, that in thunder-storms the conductor will always solicit a discharge, or that at such times all the elevated objects on the surface of the earth are drawing off the electricity of the atmosphere. But this cannot be the case, unless the electricity of the earth and of the atmosphere is of a different kind. Now, it is demonstrable, that until this difference between the electricity of the atmosphere and of the surface of the earth ceases, there cannot be a thunder-storm. When the atmosphere begins to be electrified either positively or negatively, the earth, by means of the inequalities and moisture of its surface, but especially by the vegetables which grow.
Lightning. grow upon it, absorbs that electricity, and quickly becomes electrified in the fame manner with the atmosphere. This absorption, however, ceases in a very short time, because it cannot be continued without setting in motion the whole of the electric matter contained in the earth itself. Alternate zones of positive and negative electricity will then begin to take place below the surface of the earth, for the reasons mentioned under the article Electricity, sect. vi. § 3. Between the atmosphere and one of these zones, the stroke of the lightning always will be. Thus supposing the atmosphere is positively electrified, the surface of the earth will, by means of trees, &c, quickly become positively electrified also; we shall suppose to the depth of 10 feet. The electricity cannot penetrate farther on account of the resistance of the electric matter in the bowels of the earth. At the depth of 10 feet from the surface, therefore, a zone of negatively electrified earth begins, and to this zone the electricity of the atmosphere is attracted; but to this it cannot get, without breaking through the positively electrified zone which lies uppermost, and shattering to pieces every bad conductor which comes in its way. We are very sure, therefore, that in whatever places the outer-zone of positively electrified earth is thinner there the lightning will strike, whether a conductor happens to be present or not. If there is a conductor, either knobbed or sharp-pointed, the lightning will indeed infallibly strike it; but it would also be frisky a house situated on that spot, without any conductor; and though the house had not been there, it would have frisked the surface of the ground itself. Again, if we suppose the house with its conductor to stand on a part of the ground where the positively electrified zone is very thick the conductor will neither silently draw off the electricity, nor will the lightning strike it, though perhaps it may strike a much lower object, or even the surface of the ground itself, at no great distance; the reason of which undoubtedly is, that there the zone of positively electrified earth is thinner than where the conductor was.

We must also observe, that the Franklinians make their pointed conductors to be of too great consequence. To the houses on which they are fixed, no doubt, their importance is very great: but in exhausting a thunder-cloud of its electricity, their use must appear trifling; and to insist on it, ridiculous. Innumerable objects, as trees, grasses, &c. are all conspiring to draw off the electricity, as well as the conductor, if it could be drawn off; but of effecting this there is an impossibility, because they have the same kind of electricity with the clouds themselves. The conductor hath not even the power of attracting the lightning a few feet out of the direction which it would choose of itself. Of this we have a most remarkable and decisive instance in what happened to the magazine at Purfleet in Essex, on May 15, 1777. That house was furnished with a pointed conductor, raised above the highest part of the building; nevertheless, about fix in the evening of the above-mentioned day, a flash of lightning struck an iron cramp in the corner of the wall considerably lower than the top of the conductor, and only 46 feet in a sloping line distant from the point. This produced a long dispute with Mr. Wilfon concerning the propriety of using pointed conductors; and, by the
Lightning, which is to be made at any rate; and if none were to be made through the conductor was absent, its presence will not be able to effect any.

An objection to the use of conductors, whether blue or pointed, may be drawn from the accident which happened to the poor house at Hecington, which was struck by lightning though furnished with eight pointed conductors; but from an accurate consideration of the manner in which the conductors were situated, it appears that there was not a possibility of their preventing any stroke. See Philosophical Transactions, Vol. LXXII. p. 361.

In a late publication on the subject of electricity by Lord Monf, we find a new kind of lightning made mention of, which he is of opinion may give a fatal stroke, even though the main explosion be at a considerable distance; a mile, for instance, or more. This he calls the electrical returning stroke; and exemplifies it in the following manner, from some experiments made with a very powerful electrical machine, the prime conductor of which (six feet long, by one foot diameter) would generally, when the weather was favourable, strike into a brass ball connected with the earth, to the distance of 18 inches or more. In the following account, this brass ball, which we shall call A, is supposed to be constantly placed at the striking distance; so that the prime conductor, the instant that it becomes fully charged, explodes into it.

Another large conductor, which we shall call the second conductor, is suspended, in a perfectly inflated state, from the prime conductor than the striking distance, but within its electrical atmosphere; at the distance of six feet, for instance. A person standing on an insulating stool touches this second conductor very lightly with a finger of his right hand; while, with a finger of his left hand, he communicates with the earth, by touching very lightly a very large conductor, which we shall call B, a metallic ball fixed at the top of a metallic stand, on the floor, and which we shall call B.

While the prime conductor is receiving its electricity, sparks pass (at least if the distance between the two conductors is not too great from the second conductor than the striking distance, to the inflated person's right hand) while similar and simultaneous sparks pass out from the finger of his left hand into the second metallic ball B, communicating with the earth. These sparks are part of the natural quantity of electric matter belonging to the second conductor, and to the inflated person; driven from them into the earth, through the ball B, and its stand by the elastic pressure or action of the electrical atmosphere of the prime conductor. The second conductor and the inflated person are hereby reduced to a negative state.

At length, however, the prime conductor, having acquired its full charge, suddenly strikes into the ball A, of the first metallic stand, placed for that purpose at the striking distance of 17 or 18 inches. The explosion being made, and the prime conductor suddenly robbed of its electric atmosphere, its pressure or action on the second conductor, and on the inflated person, as suddenly ceases; and the latter instantly feels a smart returning stroke, though he has no direct or visible communication (except by the floor) either with the striking or struck body, and is placed at the distance of five or six feet from both of them. This returning stroke is evidently occasioned by the sudden re-entrance of the electric fire naturally belonging to his body and to the second conductor, which had before been expelled from them by the action of the charged prime conductor upon them; and which returns to its former place in the instant that action or elastic pressure ceases. The author shows, that there can be no reason to suppose that the electrical discharge from the prime conductor should in this experiment divide itself at the instant of the explosion, and go different ways, so as to strike the second conductor and inflated person in this manner, and at such a distance from it.

When the second conductor and the inflated person are placed in the densest part of the electrical atmosphere of the prime conductor, or just beyond the striking distance, the effects are still more considerable; the returning stroke being extremely severe and pungent, and appearing considerably sharper than even the main stroke itself, received directly from the prime conductor. This circumstance the author alleges as an unanswerable proof that the effect which he calls the returning stroke, was not produced by the main stroke being any wire divided at the time of the explosion, since no effect can ever be greater than the cause by which it is immediately produced. Having taken the returning stroke eight or ten times one morning, he felt a considerable degree of pain across his chest during the whole evening, and a disagreeable sensation in his arms and wrists all the next day.

We come now to the application of this experiment, and of the doctrine deduced from it, to what pass in nature, and during a thunder-storm; in which there is reason to expect similar effects, but on a larger scale:—a scale so large indeed, according to the author's representation, that persons and animals may be destroyed, and particular parts of buildings may be considerably damaged, by an electrical returning stroke, occasioned even by some very distant explosion from a thunder-cloud:—politely at the distance of a mile or more.

It is certainly easy to conceive, that a charged extensive thunder-cloud must be productive of effects similar to those produced by the author's prime conductor. Like it, while it continues charged, it will, by the superinduced electric pressure of its atmosphere, use the author's own expression, drive into the earth apart of the electric fluid naturally belonging to the bodies which are within the reach of its widely extended atmosphere; and which will therefore become negatively electrical. This portion too of their electric fire, as in the artificial experiments, will on the explosion of the cloud, at a distance, and the effusion of its action upon them, suddenly return to them; so as to produce an equilibrium, and restore them to their natural state.

To this theory, the authors of the Monthly Review have given the following answer: "We cannot, however, agree with the ingenious author, with respect to the greatest of the effects, or of the danger to be apprehended from the returning stroke in this case: as we think his estimate is grounded on an erroneous foundation. Since (says he) the density of the electrical atmosphere of a thunder-cloud is so immense, when compared to the electrical density of the electrical atmosphere of any prime conductor, charged by means of any electrical
In the case of a man who is abroad, and in an open field, during the time of an explosion— as he is unconnected with other masses of matter above him, no more than the precise quantity of electric fire, which had been before expelled from his body, will suddenly return into it at the instant of a distant explosion: and that this quantity is not usually very large, may be inferred from many considerations.

When a person standing on the ground holds a pair of Mr. Canton's balls in his hand, while a highly charged thunder-cloud is suspended over his head; the angle made by the balls indicates the electrical state of that person, or the quantity of natural electricity of which his body is at that time deprived, by the action of the (positively) charged cloud hanging over him. But we have never seen the repletion of the balls so considerable, as to furnish any just apprehensions that the return of his natural electric matter, however sudden, could be attended with injury to him: nor would he be sensible of any commotion on the balls suddenly coming together; though a spark might undoubtedly be perceived, at that instant, were he insulated, and placed in the same manner with the author when he tried the above-mentioned experiment.

The author neverthless observes, that there have been instances of persons who have been killed by natural electricity having been found with their fingers, and with their feet damaged by the electrical fire; but who have not had, over their whole body, any other apparent marks of having been struck with lightning. He adds, 'if a man walking out of doors were to be killed by a returning stroke, the electrical fire would rush into that man's body through his feet, and his feet only; which would not be the case, were he to be killed by any main stroke of explosion, either positive or negative.'

It would be no difficult task, we think, to account for these appearances in a different manner; were all the circumstances attending the case minutely ascertained: but without interrogating the dead on this subject, we may more satisfactorily appeal to the experience of the living (p), to show, that though the returning stroke must take place, in all thunder-forms, in some degree or other; yet it is not of that alarming magnitude which the author ascribes to it. If, in any particular thunder-form, a man in the open fields could be killed, at the instant of a distant explosion, merely by the return of his own electric fire, which had before been driven out of his body; surely numerous observations of persons who had experienced the returning stroke, in lighter degrees, would be familiar; and scarce a great thunder-storm must have occurred, in which one


(c) "We suppose the person not to be so situated, that the returning fire of other bodies must necessarily pass through his body."

(p) "The author does indeed produce a living evidence, in the case of a person at Vienna, who, he has been credibly informed, received an electrical stroke, by having held one hand accidentally in contact with an interrupted metallic conducting rod, at the instant that a thunder-cloud exploded at the distance, as was conjectured, of above half an English mile. He likewise observes, that a 'very strong, bright, and sudden stroke' (or spark) of electrical fire has been seen, by several electricians, to pass in the interval, or interruption, purposely left in the conducting rod of a house at the instant of a distant explosion; and 'when it was fully proved, by the sharp point of the conductor not being melted, or even tinged,' that the conductor itself had not been struck. These observations, however, do not by any means prove the magnitude or danger of the returning stroke, but merely its existence, which we do not contest."
Lightning, one person or another must not, at the instant of an explosion, have felt the effects of the returning stroke in some degree or other—from that of a violent concussion, to that of a faint and almost imperceptible pulsation. But no observer of this kind is known to us, nor have we ever heard of any person's experiencing any kind of electrical commotion in a thunder-storm, except such as have either been directly struck, or have happened to be in the vicinity of the spot where the explosion took place.

The author has been aware of this objection, which he proposes, and endeavours to remove; but his answer to it amounts to little more than what has been already quoted from him: that is, to a simple estimate of the enormous difference between the electrical density of the atmosphere and the elastic electrical pressure, of the atmosphere of an extensive thunder cloud, and that of a charged prime conductor. We have already observed, that this is not a proper method of estimating their different effects, when these two causes, how unequal ever in power, are considered as exerting that power on bodies containing a limited and comparatively small, quantity of electric matter.

We have been induced to discuss this subject thus particularly, with a view to quiet the minds of the timorous; as the author's extension of his principles respecting the returning stroke in artificial electricity to what passes in natural electricity, holds out a new, and, in our opinion, groundless subject of terror to those who in the midst of their apprehensions, have hitherto only dreaded the effects of a thunder-storm when it made near approaches to them: but who, if this doctrine were believed, would never think themselves in security while a thunder-cloud appeared in sight, unless sheltered in a house furnished with proper conductors:—for we should not omit to remark that a subsequent observation tends to diminish their fears, by showing that high and pointed conductors tend to secure both persons and buildings against the various effects of a Return stroke whatever, as well as of the main stroke.

A late melancholy accident which happened in Scotland has afforded Lord Mahon an opportunity of bringing additional arguments in favour of his system. An account of this accident is given by Patrick Brydone, Esq.; R. S. in the 77th volume of the Philosophical Transactions. It happened on the 19th of July 1785, near Coldstream on the Tweed. The morning was fine, with the thermometer at 68°; but about eleven o'clock the sky became obscured with clouds in the south-east; and betwixt twelve and one a storm of thunder and lightning came on. This storm was at a considerable distance from Mr Brydone's house, the intervals between the flashes and crack being from 2 to 30 seconds, so that the place of explosion must have been betwixt five and six miles off; but while our author was observing the progress of the storm, he was suddenly surprized with a loud report neither preceded nor accompanied by any flash of lightning, which resembled the explosion of a great number of muskets, in such quick succession, that the ear could scarcely discriminate the sounds. On this this thunder and lightning infantly ceased, the clouds began to separate, and the sky soon recovered its serenity.

In a little time Mr Brydone was informed, that a man with two horses had been killed by the thunder; and, on running out to the place, our author found the two horses lying on the spot where they had been first struck, and still yoked to the car. On the body of the man who was killed had been carried, Mr Brydone himself had not an opportunity of examining it, but was informed by Mr Bell, minister of Coldstream, who saw it, that the skin of the right thigh was much burnt and shrivelled; that there were many marks of the same kind all over the body, but none on the legs; his clothes, particularly his shirt, had a strong smell of burning; and there was a zigzag line of about an inch and a quarter broad, extending from the chin to the right thigh, and which seemed to have followed the direction of the buttons of his waistcoat. The body was buried in two days without any appearance of purification.

Mr Brydone was informed by another person who accompanied him that was killed, of the particular circumstances. They were both driving carts loaded with coal; and James Lander, the person who was killed, had the charge of the foremost cart and was sitting on the fore part of it. They had crossed the Tweed a few minutes before at a deep ford, and had almost gained the highest part of an ascent of about 65 or 70 feet above the bed of the river, when he was flung on with the report above mentioned, and saw his companion with the horses and cart, fall down. On running up to him, he found him quite dead, with his face livid, his clothes torn in pieces, and a great smell of burning about him. At the time of the explosion he was about 24 yards distant from Lander's cart, and had him full in view when he fell; but felt no shock, neither did he perceive any flash or appearance of fire. At the time of the explosion his horses turned round, and broke their harness. The horses had fallen on their left side, and their legs had made a deep impression on the dust; which, on lifting them up, showed the exact form of each leg, so that every principle of life seemed to have been extinguished at once, without the least struggle or convulsive motion. The hair was mingled over the greatest part of their bodies, but was most perceptible on their belly and legs. Their eyes were dull and opaque, as if they had been burnt; and though Mr Brydone saw them in half an hour after the accident happened. The joints were all taut, and he could not observe that any of the bones were broken or dislocated, as is said to be sometimes the case with those who are killed by lightning. The left shaft of the cart was broken, and splinters had been thrown off in many places; particularly where the timber of the cart was connected by nails or cramps of iron. Many pieces of the coal were thrown off a considerable distance, and some of them had the appearance of being torn up as if by a violent blow of a pick-axe; and the small stones and dust were scattered on each side of the road. The tracks of the wheels were strongly marked in the dust, both before and behind those holes, but did not in the smallest
Lightning, smallest degree appear on the spots themselves for upwards of a foot and a half. There were evident marks of fusion on the iron rings of the wheels; the surface of the iron, the whole breadth of the wheel, and for the length of about three inches, was become bluish, and lost its polish and smoothness, and was formed into drops which projected febibly, and had a roundish form; but the wood did not appear any way injured by the heat which the iron must have conceived. To determine whether these were made by the explosion which had torn up the ground, the cart was pushed back on the same track he had described on the road; and the marks of fusion were found exactly to correspond with the centres of the holes. They had made almost half a revolution after the explosion; which our author affcribes to the cart being pulled a little forward by the fall of the horses. Nothing remarkable was observed on the opposite part of the wheel. The broken ground had a smell something like that of ether; the soil itself was very dry and gravelly.

The catastrophe was likewise observed by a shepherd, at the distance of about 200 or 300 yards from the spot. He said, that he was looking at the two carts going up the bank when he heard the report, and saw the foremost man and horses fall down; but observed no lightning, nor the least appearance of fire, only he saw the dust rise about the place. There had been several flashes of lightning before that from the south-east; whereas the accident happened to the north-west of the place where he stood. He was not sensible of any shock; the soil itself was very dry and gravelly.

The author next gives an account of several phenomena which happened the same day, and which were evidently connected with the explosion. A shepherd tending his flock in the neighbourhood, observed a lamb drop down; and said, that he felt at the same time as if fire had passed over his face, though the lightning and claps of thunder were at a considerable distance. He ran up to the creature immediately, but found it quite dead; on which he tied it with his knife, and the blood flowed freely. The earth was not torn up; nor did he observe any dust rise, though he was only a few yards distant. This happened about a quarter of an hour before Lauder was killed, and the place was only about 300 yards distant.

About an hour before the explosion, two men standing in the middle of the Tweed, filling for salmon, were caught in a violent whirlwind, which felt sultry and hot, and almost prevented them from breathing. They could not reach the bank without much difficulty and fatigue; but the whirlwind lasted only a very short time, and was succeeded by a perfect calm.

A woman making hay, near the banks of the river, fell suddenly to the ground, and called out that she had received a violent blow on the foot, and could not imagine from whence it came; and Mr Bell, the minister aforesaid, when walking in his garden, a little before the accident happened to Lauder, felt several times a tremor in the ground.

The conclusion drawn from these facts by Brydone is, that at the time of the explosion the equilibrium between the earth and the atmosphere seems to have been completely restored, as no more thunder was heard nor lightning observed; the clouds were dispelled, and the atmosphere returned to its most perfect tranquility; but how this vast quantity of electric matter (say he) could be discharged from the one element to the other, without any appearance of fire, shall not pretend to examine. From the whole it would appear, that the earth had acquired a great superabundance of electric matter, which was every where endeavouring to fly off into the atmosphere. Perhaps it might be accounted from the excessive dryness of the ground, and for many months the almost total want of rain, which is probably the agent that nature employs in preserving the equilibrium between the two elements.

Lord Malmesbury states, that his observations on this accident are published in the same volume, endeavour to establish the following positions as facts.

1. That the man and horses were not killed by any direct main stroke of explosion from a thunder-cloud either positively or negatively electrified.

2. They were not killed by any transferred main stroke either positive or negative.

3. The mischief was not done by any lateral explosion. All these are evidently true, at least with respect to lightning at that time falling from the clouds; for all the lightning which had taken place before was at a great distance.

4. They were not suffocated by a sulphureous vapour or smell which frequently accompanies electricity. This could not account for the pieces of coal being thrown to a considerable distance all round the cart, and for the splinters of the wood which were thrown off from many parts of the cart.

5. It might be imagined by some that they were killed by the violent commotion of the atmosphere, occasioned by the vicinity of the electrical explosion, in a manner similar to the fatal wounds that sometimes have been known to have been given by the air having been suddenly displaced by a cannon-ball in its passage through the atmospheric fluid, though the cannon-ball itself had evidently neither struck the person wounded nor grazed his clothes. The dust that rose at the time of the explosion might be brought as an argument in favour of the opinion, that a sudden and violent commotion of the air did occasion the effects produced. But such an explanation would not account for the marks of fusion on the iron of the wheels, nor for the hair of the horses being singed, nor for the skin of Lauder's body having been burnt in several places.

6. From these different circumstances his Lordship is of opinion, that the effects proceeded from electricity; and that no electrical fire did pass immediately, either from the clouds into the cart, or from the cart into the clouds. From the circular holes in the ground, of about 20 inches diameter, the respective centres of which were exactly in the track of each wheel, and the corresponding marks of fusion in the iron of the wheels, it is evident that the electrical fire did pass from the earth to the cart, or from the cart to the earth, through that part of the iron of the wheels which was in contact with the ground. From the splinters which had been thrown off in many places, particularly where the timber was connected by nails or cramps of iron, and from various other effects mentioned in Mr Brydone's account, it is evident, that there must have been a great commotion in the electrical fluid in all, or at least in different parts of the cart, and in the bodies of the man and horses, although there were no lightning.

7. All these phenomena, his lordship argues, may be explained in a satisfactory manner from the doctrine already...
before entering upon the subject of the main explosion, however, he takes notice of the other phenomena already mentioned in Mr Brydone's account.

With regard to the case of the lamb, his lordship is of opinion, that it belongs to the most simple class of returning strokes, viz. that which happens at a place where there is neither thunder nor lightning near and prominent or jingle lattice electrical pressure of the electrical atmosphere of a single main cloud, as well as an assemblage of clouds. It appears (says he) by Mr Brydone's account, that the shepherd who saw the lamb fall, was near enough to it to feel, in a small degree, the electrical returning stroke at the same time that the lamb dropped down.

The blow which the woman received on the foot was unquestionably the returning stroke. When a person walking, or standing out of doors, is knocked down or killed by the returning stroke, the electrical fire must rush in, or rush out, as the case may be, through the person's feet, and through them only; generally known and generally believed, by reason of the thick smoke, and the report the lightning was at a considerable distance, viz. between five and six miles. The loud report resembled the firing of several muskets or clove together, that the ear could scarcely separate the sounds, and was followed by no rumbling noise like the other claps. This indicates, that the explosion was not far distant, and likewise that it was not extremely near: for, if the explosion had been very near, the ear could not at all have separated the sounds.

Let us now suppose a cloud, eight, ten, or twelve miles in length to be extended over the earth, and let another cloud be situated between that and the earth, and let them both be supposed charged with the same kind of electricity, and both positive. Let us farther suppose the lower cloud to be near the earth, only a little beyond the striking distance; and the man, cart, and horses, to be situated under that part of the cloud which is nearest the earth, and to be exactly as described by Mr Brydone, viz. near the summit of an hill, and followed by another a little farther down; and let us suppose the two clouds to be near each other just over the place where the man and horses are: Let the remote end of the cloud approach the earth, and discharge its electricity into it. In this case the following effects will take place.

With the upper cloud discharges its electricity into the earth from the remote end, the lower cloud will discharge its electricity into the nearer end of the upper cloud, which is supposed to be directly over the place of the cart and horses, or nearly so. This accounts for the loud report of thunder that was unaccompanied by lightning. The report must be loud from its being near; but no lightning could be perceived, by reason of the thick cloud situated immediately between the spectator and the place between the two clouds where the lightning appears.

As the lower cloud gradually approached towards the earth, that part of the latter where the man and horses were most of course become superinduced Lightning, by the elastic electrical pressure of the electrical atmosphere of the thunder-cloud, which superinduced elastic electrical pressure must gradually have increased as the cloud came closer to the earth, and approached nearer to the limit of the striking distance.

Hence, if any conducting body (not having prominent or conducting points) were to be placed upon the surface of the earth, and there electrically insulated; then such conducting body, by the laws of electricity, must, at its upper extremity (namely the part nearest to the positive cloud) become negative; at its lower extremity it must become positive; and, at a certain intermediate point, it will be neither plus nor minus. This insulated conducting body, thus situated, will be in three opposite states at the same time, that is to say, it will be at the same time, positively electrified, negatively electrified, and not electrified at all. For a demonstration of this proposition, his lordship refers to his Principles of Electricity; it is a generally known and established fact in electricity.

If this conducting body on the surface of the earth be not insulated, or be but imperfectly insulated, then the whole of such body, from its being immersed in the electrical atmosphere of the positive cloud, will become negative; because part of the electricity of the conducting body will in this case pass into the earth; and the conducting body will become the more negative in exact proportion as the more deeply immersed into the dense part of the elastic electrical atmosphere of the approaching thunder-cloud.

When the lower cloud comes suddenly to discharge with an explosion its superabundant electricity into the upper one, then the elastic electrical atmosphere of the former will cease to exist; consequently the electrical fluid, which had been gradually expelled into the common stock from the conducting body on the surface of the earth, must, by the sudden removal of the superinduced elastic electrical pressure of the electrical atmosphere of the thunder-cloud, suddenly return from the earth into the said conducting body, producing a violent commotion similar to that of the current shock of a Leyden jar in its sensation and effects.

This, which his lordship calls the electrical returning stroke, he supposes to have been what killed the effects of man and horses in the present case, they having become strongly negative before the explosion. The man, according to Mr Brydone's account, was fitting up his horse to receive the stroke, and his legs were hanging over the fore part of the cart at the time of the explosion. The returning stroke, therefore, could not enter his body through the legs; and this accounts for the skin of his legs not having been at all burnt or thrivelled, as the skin was on many other parts of his body; and it likewise shows the reason why the zigzag line, which was terminated by the chin, did not extend lower than the thigh.

Mr Brydone likewise informs us, that the hair of the horses was much singed over the greatest part of their bodies, but was most perceptible on the belly and legs. This is easily accounted for by the returning stroke; for the lower part of the bodies of these animals must of course have been more affected than any other part, as the electrical fire must have rushed suddenly into their bodies through their legs, which had made a deep impression on the duff.
17. The various effects produced on the cart may be explained also from the returning stroke with equal facility. The splinters were thrown off by reason of the interruption of good conductors; the wood being a much less perfect conductor than the iron. It is also evident, that it was the electrical returning fire that produced the marks of friction on that part of the iron of the wheels which was in contact with the ground; insuch as the whole electricity, at the instant of the explosion, did enter at these places.

18. No person in the least versed in the principles of electricity can hesitate to assent to the proposition, that the electrical returning stroke must exist under circumstances similar to those explained above; but it may be objected, as the reviewers formerly did, that the quantity of electricity naturally contained in the body of a man is far too small to produce such violent effects. For an answer to this objection, his lordship refers to his book: By way of corroboration, however, he makes the following remarks.

19. No person can reasonably conclude, that the force of a returning stroke must always be weak when compared with the discharging fire. The returning stroke from the body, by reason that a man’s body contains but a small quantity of electricity: for it has never been proved that a man’s body contains only a small quantity of electrical fluid; neither is there the smallest reason to believe such an hypothesis, which appears, on many accounts, to be completely erroneous; and if that hypothesis be erroneous, the objection to the strength of an electrical returning stroke remains altogether unsupported by argument. When a body is said to be positive (says his lordship), it simply means, that the body contains more than its natural share of electricity, but does not say that it is completely saturated with it. In like manner, when a body is said to be minus or negative, it only signifies, that the body contains less than its natural share of electricity; but does not imply that such a body is completely exhausted of the electricity which it contains in its natural state.

20. An hypothesis which easily accounts for any natural phenomenon has a much better claim to our attention than an opposite one, which prevents it from being intelligibly explained. There is no reason to conclude that any electrical machine, of any given size, is capable of rendering a conducting body either completely plus or completely minus; but far otherwise. And it would have been as logical for any person some years ago (when electrical machines were not brought to their present state) to have maintained, that those very imperfect machines were capable of rendering a body completely positive or completely negative, as for us to pretend to do it at this day. We evidently have not, with our machines, even approached the limit of electrical strength, particularly in respect to the returning stroke, produced by the disturbed electrical fluid of a man’s body; hence the returning stroke is not so sudden as that of the prime conductor; the returning stroke from the common glass globes of less than nine inches in diameter: the returning stroke in this case will be so weak, that it can hardly be said to exist, but if the experiment be made by means of a large cylinder, and by means of a metallic prime conductor of about three feet four inches long, by nearly four inches and half diameter, and also by means of another metallic body of equal dimensions with this prime conductor, then there will be no kind of comparison between the strength of the returning stroke obtained out of the striking distance, and the strength of the main stroke received immediately from the prime conductor; the sharpness and pungency of the returning stroke being so much greater. The returning stroke, like the sudden discharge of a weakly electrified Leyden jar, provided due attention be paid to the rules for obtaining a strong returning stroke.

21. In the case of a returning stroke, the strength depends, according to his lordship’s hypothesis, not so much on the quantity of the electrical fluid, as on its velocity; whence also it depends less on the quantity of surface used than on the strength of the electrical pressure of the electrical atmospheric superinduced upon the body struck previous to the explosion. But the electrical pressure of the electrical atmospheric electric of the great thunder-cloud which produced the mischief on the present occasion, must have been immensely greater than that of a metallic prime conductor; and it is not surprising that the effects should be proportioned to the causes.

22. His lordship next accounts for the returning stroke not being felt by the man who followed Launder’s cart. This, he thinks, may in some degree be accounted for by the latter having been higher up the bank; though it may better be done by supposing the man to have been pending nearer the earth over the spot where Launder was killed, than over the place where his companion was; for, in order to receive a dangerous returning stroke, it is necessary that he should be imbered, not merely in the cloud’s atmosphere, but in the dense part of the cloud’s electrical atmosphere. It may also be accounted for by supposing that the second cart was either better connected with the common flock, or better insulated; for either of these circumstances will weaken a returning stroke prodigiously. Now Mr. Brydone mentions, that there had been an almost total want of rain for many months. He also says, that the ground, at the place where Launder was killed, was remarkably dry, and of a gravelly foil. This state of the ground was particularly adapted to the production of the electrical returning stroke, when produced upon the large scale of nature, where the elastic electrical pressure is so powerful. To these arguments adduced by his lordship for the existence and strength of the electrical returning stroke, we shall add an account of some experiments published.
Lightning in the Gentleman's Magazine for 1758. They were made with an insulated rod of iron of considerable length, rising some feet higher than a common conductor placed at the other end of the house. A set of bells were affixed to the former, which in a thunder storm, even when the thunder was four or five miles distant, was rung by the electricity of the atmosphere; but whenever a flash of lightning burst from the cloud, even though at the distance just mentioned, the same flash, according to our author, passed through the conductor also, and the bells ceased to ring sometimes for several seconds; then they began again, and continued to ring till they were stopped by another flash. This flash which passed thro' the conductor was undoubtedly what earl Stanhope calls the returning stroke, of which we must now give some explanation: And in considering the whole doctrine of that stroke, together with the particular explanation laid down by his lordship, the following observations naturally occur.

1. In the experiments made by his lordship to demonstrate the existence of the returning stroke, there is a deception, of which the reviewers take notice, viz. that the man touches a large prime conductor, which, by the operation of the machine, becomes negatively electrified as well as himself. Hence when the discharge is made, all the fire returning to that conductor must pass through his body as well as that of which his body itself is supposed to be deprived; and this, though no other cause intervened, must nearly double the strength of the shock. To make the experiment more fairly, it would be necessary to take away this second conductor, and let the man only touch the brass ball communicating with the earth.

2. In this experiment there is another deception, not taken notice of by the reviewers, viz. that any body immersed in a positive electrical atmosphere becomes negative. Hence the second conductor, by being applied to the air positively electrified by the machine, becomes almost as strongly negative as if another machine had been applied to it on purpose; and this negative electricity will be stronger in proportion to the strength of electricity in the air surrounding it. Again, it is well known that a plate of air may be charged by means of two smooth pieces of metal held at a small distance from each other, one of them connected with an electrical machine, and the other with the earth. Now supposing instead of the usual communication, that a man standing upon an insulating floor, held the lower metallic plate in one hand, and with the other hand touched the earth, or a conductor communicating with it, it is plain, that by touching the upper plate, the electricity acquired by the air between them would be discharged, and that the man would feel what earl Stanhope calls the returning stroke; but which in truth is the shock of a charged electric substance, and would therefore be proportionately pungent. Now, in his lordship's experiments, the two conductors answer exactly to the two metallic plates above mentioned; the air between them receives a charge, and is discharged by the explosion from the prime conductor, because this conductor forms one of the charging plates. It is true, that the round shape of the conductors renders them unfavourable for trying the experiment; and this is one reason why it requires a great power of electricity to make the returning stroke sensible. The thickness of the plate of air interposed between the two conductors is another reason: but this makes no difference as to the principles for his lordship's experiment is undoubtedly no other than that of the Leyden phial. Were his lordship to use two flat plates instead of round conductors, the deception would then be removed; and we may venture to determine a priori, that the returning stroke would then be not only very severe, but even dangerous, with a very powerful machine and large plates.

3. Though the second conductor were entirely removed, yet there would still be a deception in this experiment, for then the surface of the man's body would act in some measure as one of the metallic plates; so that fill the experiment would be on the principles of the Leyden phial, though much weaker than before.

4. In order to make this experiment absolutely without deception the man should stand upon the ground without touching anything; and in that case we may venture to affirm, that he would feel no returning shock. His being insulated varies the nature of the experiment entirely, as will easily be understood from the following considerations.

Under the article Electricity, we have shown, that positive electricity does not collect in accumulation, nor negative electricity in a deficiency, of the fluid; but that all electric phenomena are to be accounted for from the mere motion of the fluid; and that this motion is always a circulation. We have shown, that in the working of a common machine, the electric fluid comes from the earth; that it is accumulated around the prime conductor: evaporates in the air; and is then silently absorbed by the earth, and reconducted to the machine. Hence, in the charging of a machine which works positively, the earth, and all bodies on its surface, for some way round, are in a negative state; because they are then absorbing the electrical fluid from the atmosphere. That part of the earth indeed directly under the feet of the machine, and perhaps some little way farther, is positive; because it is giving out electricity: but the negative portion will be much more extensive. When the conductor is discharged by a spark, then the circulation ceases in a great measure by the collision of the two opposite streams of electric matter. All bodies on the surface of the earth then, as far as it was negatively electrified, must receive what his lordship calls the returning stroke; but the electricity being diffused among such a number, and over such a wide extent, it is no wonder that it should be insensible. If, however, we insulate a large conducting body, and another part of it communicate with the earth by means of a good conductor, we infantly put it in a situation fit for transmitting more than its share of the electricity of the atmosphere, and reducing it to the state of the insulated rubber of an electrical machine, through which the whole quantity of electricity must pass to the phial held towards it, in order to be charged negatively. In proportion to this quantity transmitted the shock must be, not because the conductor has lost a large share of its natural electricity, but because a large quantity is artificially made to pass through it. We may therefore safely venture to assert, that in thunder-florus unless a body transmits more than
5. In his explanation of the accident which happened to Lauder, his lordship is reduced to the greatest difficulty, and makes one of the most philosophically satisfactory shiftings in the world; no less than that of arranging the clouds of heaven, not according to fact, but according to his own imagination. He supposes the existence of two clouds, one below the other; and attributes to them various motions and situations, which we have already taken notice of; but who knows whether such clouds ever existed? His lordship does not pretend that any body ever saw them; and thus he runs into what is termed by logicians a 'vicious circle': he first assumes data, purposely made to accord with his hypothesis, and then proves the hypothesis from the data.

6. Granting the arrangement of the clouds, and every thing his lordship desires, the main requisite is still wanting, viz. a flash of lightning at a distance to produce the returning stroke. According to him, the distant flash and returning stroke must be simultaneous; but Mr Brydone mentions no such thing: on the contrary, there had been no flash for some little time before; and the immense velocity of the electric fluid will not allow us to suppose that it would take up the usual time between thunder-claps in travelling five or six miles.

7. His lordship accounts for no lightning being seen at the time of the explosion in a very arbitrary and unnatural manner, by supposing it to have proceeded from a discharge of the one imaginary cloud into the other; and that it was not seen on account of the thickenss of the lower cloud. A much more natural supposition must be, that it happened below the cart-wheels, but was not seen on account of its being dim: and the cloud of dust which it raised. The fiction of noises, too, indicated a succession of explosions, the flashes of which would be less easily observed than a single large one.

8. It seems altogether impossible, that the return of any quantity of natural electricity into a body should happen that body to pieces. In the present case, the fire entered by a small part of the iron of the wheels, and this part was melted. His lordship does not hesitate to own, that the fusion was a proof that the whole fire belonging to the cart, man, and horses, or at least to the cart and man, had entered by this part of the wheels, and consequently more than naturally belonged to that small part of iron. The same evidence, however, will hold good with regard to every other part. We grant that the fire enters the man's body by his right thigh: this might have therefore been burnt by receiving the fire belonging to the whole body; but it ought then to have quickly diffused itself through the other parts of his body, or at least if any damage had been done, it ought to have been done only to the internal parts. Instead of this, a broad zig-zag line upon his body indicated a vast quantity of electric matter running along the surface without entering the body at all. In like manner, his hat being torn in pieces, indicated a violent explosion of electric matter at his head, where there ought to have been little or no explosion, as none could be wanted there except what the hat had parted with; and it is ridiculous to suppose that hats part with such quantities of electricity as would tear them in pieces by its return. The shivering of the cart, the burning and throwing about of the coals, and all the other circumstances of the case, slip point out in the clearest manner, not a quantity of electric matter returning to supply any natural deficiency, but an enormous explosion of that matter from the earth overwhelming and destroying whatever flood in its way. That two cards were made from the earth is very evident, because there were two holes in it; and the fire of these holes indicates a much greater discharge of electricity than we can reasonably suppose to have been lost by the man, horses, and cart.

We shall now consider the experiment quoted from the correspondent in the Gentleman's Magazine, na of the Thafe, as well as in the report, un-doubtedly show, that, during the time of a thunder-storm, both atmosphere and earth are affected for a very considerable way. With regard to the quantity of this electrical affection, however, it must undoubtedly be excessive when taken altogether, we can by no means agree that it is so taken partially. From an experiment related in the Magazine above quoted it appears, that the electricity of a violent thunder-storm extends sometimes over a circle of 100 miles diameter. "Electricity (says the author) seldom appeared without a flower; but I was surprized, on the 5th of June 1774, that the bells rang with thin and very high sounds, and without the least appearance of rain, till the next post brought me an account of a violent thunder-storm, and very destructive hail, at a village 50 miles distant." We cannot by any means suppose, that all this space was electrified like a charged phial; otherwise, great as the explosions of lightning are, they would still be much greater. This is evident even in our electrical machines. A large phial may be charged much higher than a battery, as appears by the electrometer; but the battery, though charged, will have incomparably more power than a single phial. His lordship appears to have deceived himself in this matter, by mistaking the extent of the electrified surface for the quantity of charge in every part of it. The surface of the earth in a thunder-storm is exactly similar to that of a charged conductor. According to the extent of electrified surface, the park will be great or small; and just so it is with lightning, for some kinds of it are much more destructive than others. In all cases, however, the quantity of electricity in a particular spot is very incomprehensible. Lightning strikes bodies, not because they are highly electrified, but because they afford a communication between the atmosphere and some place below the surface of the earth. This stroke is the aggregate of the whole electricity contained in a circle of probably many miles in diameter; but the returning stroke, if bodies are in their natural state, can only be in proportion to the quantity of electricity in each substance contained within that space. It is in fact the lightning itself diffused through the earth which makes the returning stroke; and it is impossible that every substance within two or three miles of the explosion can receive the whole flash, or another equal to it. It is only in cases where the quantity of electricity, diffused through a great space, happens to discharge...
Lightning itself through a human body or other conducting substance of no great bulk, that the effects upon the latter can be any way considerable. This was undoubtedly the case with the thunder-rod mentioned by the correspondent in the Magazine; for it received either from the atmosphere or from the earth, at the time of every flash, the whole quantity of electricity which had been diffused for a considerable way round. Pointed bodies, we know, draw off electricity very powerfully; in much that an highly charged jar may be deprived of almost all its power by merely presenting a needle to it. We can be at no loss therefore to understand why a pointed conductor should draw off the electricity from a large portion of the surface of the earth, or from a considerable portion of the atmosphere.

We must now, however, inquire into the reason of these appearances of sparks in places at such distance from the explosion of the lightning. To understand this we must always keep in our eye that principle so fully explained under the article Electricity, viz. that there never is, nor can be a real deficiency of the electric fluid in any substance or in any place. It is to be considered as an absolute plenum, and of consequence it can have no other motion than a circulatory one. At every discharge of lightning therefore from the clouds into the earth, or from one cloud into another, there must be a return of the same quantity to those clouds which have made the discharge. In the vast extent of electrified surface, some part of the return must undoubtedly be made at great distances from the place where the explosion of lightning happens. As long as matters remain in their natural state, the electric matter will return by innumerable passages in such small streams, that no perceptible effect upon any single substance can take place. But if a body be so situated, that a large portion of the electric matter must return through it from the earth, then such body will undoubtedly be more affected by every flash than the rest of the substances around it; and if the communication with the earth be interrupted, a flash of fire will be perceived betwixt the conducting substance and the earth at the time that a flash bursts out from the cloud. The strength of such a flash, however, must by no means be supposed equivalent to that of the main stroke of lightning, unless we could suppose the whole electrical power of the vast circle already mentioned to be discharged through the conductor.

But though this may explain the reason of the sparks or flashes observed in the case of the thunder-rod just mentioned, we cannot from this principle account for the accident which befell the man and horses. There was indeed at that time a very violent emission of electricity from the earth, but no dint of flash of lightning happened at the same moment with it, to expel the electricity from the earth. It appears therefore, that the electricity had in this case been accumulating in the earth itself, in a manner similar to that which produces earthquakes; and which is fully explained under that article. The thunder-form was the natural means employed to supply that part of the earth with electricity, which was in the state of charging; and the moment that the quantity thus supplied was thrown back, all signs of electricity must cease, as much as when that thrown in upon one side of a Leyden phial is again thrown off. Hence, when the flash burst out of the earth, and killed the man and horses, that portion of earth which absorbed the electricity till then, required it no longer; and of consequence the thunder-form occasioned by this absorption naturally ceased.

That this disposition to an earthquake did really prevail in the earth at that time, is evident from the tremor which Mr Bell felt on the ground when walking in his garden. The stroke which the woman received on the foot, the death of the lamb, and no doubt many similar circumstances, concurring to show that there was an attempt to restore the equilibrium from the earth, as has been already related. The same disposition to an earthquake, however, was afterwards renewed; and on the 11th of August that same year, a smart shock of an earthquake did actually take place, as Mr Brydone informs us in the same paper.

Besides the different kinds of lightning already treated of, it is by no means uncommon to see flashes unattended by any report. These are always of the fleet kind; they happen very frequently in windy weather when the sky is clear; and likewise when the sky is cloudy, immediately before a fall of rain or snow. The general reason of these appears to be, that the electric fluid is the medium by which the vapours are suspended in the atmosphere; and of consequence, every separation of vapour, whether as rain, snow, or hail, must be attended with what is called a discharge of electrical matter. The reason why this kind of lightning is never attended with any report in that there is no particular object against which the force of the flash is directed; but it dissipates itself among the innumerable conducting bodies with which the atmosphere always abounds. It is, however, in a manner impossible to explain the various ways, in which this subtile fluid acts. We know not, for instance, in what state it is when acting as a medium of connection betwixt the air and vapour, nor in what its discharge into other parts of the atmosphere properly confines. At any rate, we see that a flash of lightning, however limited its extent may appear to us, diffuses its effects over a great space of atmosphere; for after one of these silent flashes in no uncommon things to observe the sky to become obscure though it had been quite clear before; or, if it had been cloudy, to see rain or snow begin to fall in a very few minutes. It is probable indeed, that there is no change whatever that can take place in the atmosphere but by means of electricity; and there is great reason to believe, that the silent discharges of this fluid from one part of the atmosphere to another, many of which are totally invisible, ultimately occasion the whole of the phenomena of Meteorology. See that article.

Various parts of his Lordship's Treatise on Electricity, besides those already quoted, tend to prove the utility of high and pointed conductors, in preference to those which terminate in a ball, or rounded end. Towards the end of the performance, the author discusses this matter very particularly; and enumerates the 'necessary requisites' in erecting them, in number 11; to every one of which we readily sub-
Lightning. As this matter is of a popular nature, and on a subject generally interesting, we shall transcribe this letter, adding a short explanation to particular articles.

The requisites (lays the author) are 11 in number:

1stly, That the rod be made of such substances as are, in their nature, the best conductors of electricity.

2dly, That the rod be uninterrupted, and perfectly continuous.—This is a very material circumstance. One entire piece of metal cannot perhaps be had: but it is not sufficient that the rods, of which the conductor consists, be separably in contact; they should be pressed into actual contact by means of nuts and screws, with a thin piece of sheet-lead between the shoulders of the joints.

3dly, That it be of a sufficient thickness.—A copper rod half an inch square, or an iron rod one inch square, or one of lead two inches square, are thought fully sufficient by the author.

4thly, That it be perfectly connected with the common stock.—That is, it should be carried deep into the earth, which is frequently dry near the surface; and then continued in a horizontal direction, so as to have the farther extremity dipped, should this be practicable, into water, at the distance of 10 yards or more from the foundation.

5thly, That the upper extremity of the rod be as acutely pointed as possible.—This termination should be of copper; or rather a very fine and exceedingly acute needle of gold should be employed, which will not materially add to the expense.

6thly, That it be very finely tapered:—so that the upper extremity may be a cone, the diameter of the base of which may bear an extremely small proportion to its height; for instance, that of one to forty.

7thly, That it be extremely prominent:—that is, 8, 10, or 15 feet at least above the highest parts of the building. The author lays great stress on this circumstance, in consequence of the law abovementioned, deduced by him from his experiments, relating to electric atmospheres. According to this law, the density of an electric atmosphere (the negative atmosphere, for instance, of the roof of a house, &c. while a positive (closed body) over it) diminishes in the inverse ratio of the square of the distance from the surface of the body to which that atmosphere belongs. Accordingly, if the rod project 12 feet into this atmosphere, it will reach to a part of it four times less dense than if the rod projected only to half that distance, or six feet;—and to a part one hundred and forty four times rarer, than if it projected only one foot.

8thly, That each rod be carried, in the shortest convenient direction, from the point at its upper end, to the common flock.

9thly, That there be neither large nor prominent bodies of metal upon the top of the building proposed to be secured, but such as are connected with the conductor, by some proper metallic communication.

1othly, That there be a sufficient number of high and pointed rods.—On edifices of great importance, especially magazines of gun-powder, the author thinks these ought never to be above 40 or 50 feet asunder.

11thly, That every part of the rods be very substantially erected.

The author declares that he has never been able to hear of a single instance, nor does he believe that any one can be produced, of an high, tapering, and acutely pointed metallic conductor, having ever, in any country, been struck by lightning; if it had all the necessary requisites abovementioned, especially the second and fourth.

On the whole, it seems to be pretty certain, that the use of conductors, both pointed and knobbled metallic conductors, have the power of preserving any body placed at a small distance from them from being struck by lightning. This they do, not because they can attract the lightning far out of its way, but because the resistance to its pialage is always left on that side where they are; and as pointed conductors diminish the resistance more considerably than blunt ones, they seem in all cases to be preferable.—It appears, however, that a single conductor, whether blunt or pointed, is not capable of securing all the parts of a large building from strokes of lightning; and therefore several of them will be required for this purpose: but to what distance their influence extends, hath not been determined, nor does it seem easily capable of being ascertained.

It now remains only to explain some of the more uncommon appearances and effects of lightning. One of these is, that it is frequently observed to kill alternately; that is, supposing a number of people standing in a line, if the first person was killed, the second perhaps would be safe; the third would be killed, and the fourth safe; the fifth killed, &c. Effects of this kind are generally produced by the most violent kind of lightning; namely, that which appears in the form of balls, and which are frequently seen to divide themselves into several parts before they strike. If one of these parts of a fire-ball strike, a man, another will not strike the person who stands immediately close to him; because there is always a repulsion between bodies electrified the same way. Now, as these parts into which the ball breaks have all the same kind of electricity, it is evident that they must for that reason repel one another; and this repulsion is so strong, that a man may be interposed within the stroke of two of them, without being hurt by either.

The other effect of lightning is mentioned under the article Jerusalem, where those who attempted to rebuild the temple had the marks of crosses impressed upon their garments and bodies. This may reasonably be thought to arise from the same cause to which the angular appearance of lightning in the air is owing, namely, its violent impetus and velocity, together with the opposition of the atmosphere. A small stroke of lightning, sometimes indeed a very considerable one, cannot always enter the substance of terrestrial bodies, even when it touches them, for reasons already given. In this case it runs along their surface, and, as in its motion it is perpetually reified by the atmosphere, it undoubtedly has the same angular motion which we often perceive in the atmosphere. If in this situation it happens to touch the human skin, or a garment, especially of linen, as being a conductor, it will undoubtedly leave a mark upon it; and this mark being of a zig-zag form, might, in the above instance, have been either taken for the exact form of a cross.
Lightning may serve to give some idea of the nature of lightning, and its operations after it appears in its proper form and bursts out from the cloud; but for an account of its original formation, and of the powers by which the clouds are at first electrified, and their electricity kept up notwithstanding many successive discharges of lightning, and the quantity of electric matter continually carried off by the rain, &c. see the article Thunder.

Artificial Lightning. Before the discoveries of Dr Franklin concerning the identity of electricity and lightning, many contrivances were invented in order to represent this terrifying phenomenon in miniature: the corruptions of phosphorus in warm weather, the ascension of the vapour of spirit of wine evaporated in a close place, &c. were used in order to support the hypothesis which at that time prevailed; namely, that lightning was formed of some phœnicous, nitrous, or other combustible vapours floating in long trains in the atmosphere, which by some unaccountable means took fire, and produced all the destructive effects of that phenomenon. These representations, however, are now no more exhibited; and the only true artificial lightning is universally acknowledged to be the discharge of electric matter from bodies in which it is artificially set in motion by our means.

Lightning was looked upon as sacred both by the Greeks and Romans, and was supposed to be sent to execute vengeance on the earth: Hence persons killed by lightning, being thought hateful to the gods, were buried apart by themselves, left the ashes of other men should receive pollution from them. Some say they were interred upon the very spot where they died: others will have it that they had no interment, but were suffered to rot where they fell, because it was unlawful for any man to approach the place. For this reason the ground was hedged in, left any person unawares should contract pollution from it. All places frequented with lightning were carefully avoided and fenced round, out of an opinion that Jupiter had either taken offence at them, and fixed upon them the marks of his displeasure, or that he had, by this means, pitched upon them as sacred to himself. The ground thus fenced about was called by the Romans ludent. Lightning was much observed in augury, and was a good or bad omen, according to the circumstances attending it.

Lignum Campescentis. See Hematoxylum.
Lignum Colubrinum. See Ophiorhiza.
Ligated, among botanists, an appellation, given to such floesules as have a straight end turned downwards, with three indentures, but not separated into segments.
Liguria (anc. geog.), a country of Italy, bound
ed on the south by the Mediterranean sea, on the north by the Appennine mountains, on the west by part of Transalpine Gaul, and on the east by Etruria. There is a great disagreement among authors concerning the origin of the Ligurians, though most probably they were descended from the Gauls. Some carry up their origin as far as the fabulous heroes of antiquity; while others trace them from the Ligyes, a people mentioned by Herodotus as attending Xerxes in his expeditions against Greece. These Ligyes are by some ancient geographers placed in Colchis; by others, in Albania.—According to Diodorus Siculus, the Ligurians led a very wretched life; their country being
LIGUSTICUM, LOVAGE, in botany: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, Umbellifera. The fruit is oblong and quinquefoliate on each side; the florets are equal; the petals involuted; rolled inwards, and entire. There are seven species; of which the most remarkable are, the levisticum, or common, and the fecticum or Scots, lovage. The first is a native of the Apennine mountains in Italy. It has a thick fleshy, deeply-penetrating perennial root, crowned by very large, many-parted, radical leaves, with broad lobes, having incisions at top, upright, strong, channelled stalks, branching six or seven feet high, and all the branches terminated by yellow flowers in large umbels. The second is a native of Scotland, and grows near the sea plants; and in the longer season is a native of Scotland, and grows near the sea plants; and in the longer season.

Medicinal use, &c. The root of the first species agrees nearly in quality with that of angelica: the principal difference is, that the lovage root has a stronger smell, and a somewhat less pungent taste, accompanied with a more durable sweetness, the seeds being rather warmer than the root; but although certainly capable of being applied to useful purposes, this root is not regarded in the present practice. The leaves of the second are sometimes eaten raw as a salad, or boiled as greens by the inhabitants of the Hebrides. The root is reckoned a good carminative. They give an infusion of the leaves in whey to their calves to purge them.

LIGUSTRUM, PRIVET, in botany: A genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking under the 10th order, Coronaria. The corolla is hexastylous, and campanulated, with a longitudinal nectariferous line or fow: the capsules connected by small canaliculated hairs. There are many species; all of them bulbous-rooted, herbaceous, flowery perennials, rising with erect annual stalks three or four feet high, garnished with long narrow leaves, and terminated by fine clusters of large bell-shaped, hexastylous flowers of exceeding great beauty, of white, red, scarlet, orange, purple, and yellow colours.

Culture. All the species are propagated by sowing the seeds; and if care is taken to preserve these seeds from good flowers, very beautiful varieties are often produced. The manner of sowing them is as follows. Some square boxes should be procured, about six inches deep, with holes bored in the bottoms to let out the water; these must be filled with fresh, light, sandy earth; and the seeds sown upon them pretty thick in the beginning of August, and covered over about half an inch deep with light sifted earth of the same kind. They should then be placed where they may have the morning sun; and if the weather proves dry, they must be watered at times, and the weeds carefully picked out. In the month of October the boxes are to be removed to a place where they may have as much sun as possible, and be secured from the north and north-east winds. In spring the young plants will appear, and the boxes are then to be removed into their former situation. In August the smallest roots are to be emptied out of these boxes, and dried over a bed of light earth, and covered with about half an inch depth of earth of the same kind, sifted over them. Here they must be watered, and the boxes replenished from the severity of winter by a slight covering of straw or pease-haulm in the hardest weather. In

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February, the surface of the bed should be cleared, and a little light earth sifted over it. When the leaves are decayed, the earth should be a little firmed over the roots; and in the month of September following some more earth sifted on. In the September of the following year, the roots must be transplanted to the places where they are to remain, and set at the distance of eight inches; the roots being placed four inches below the surface: this should be done in moist weather. They will now require the same care as in the preceding winter; and, the second year after they are transplanted, the strongest roots will begin to flower. The fine ones should then be removed at the proper season into flower beds, and planted at great distances from one another that they may flower strong.

Medical uses. The roots of the white lily are emollient, maturating, and greatly suppurative. They are used externally in catarrhals for these purposes with success. The common form of applying them is boiled and bruised; but some prefer the roasting them till tender, and then beating them to a paste with oil, in which form they are said to be excellent against burns. Gerard recommends them internally against dropsy.

The Kamtschatken, or Kamtschatka lily, called there faranne, makes a principal part of the food of the Kamtschatkans. Its roots are gathered by the women in August, dried in the sun, and laid up for use: they are the best bread of the country; and after being baked are reduced to powder, and serve instead of flour in soups and several dishes. They are sometimes washed, and eaten as potatoes; are extremely nourishing, and have a pleasant bitter taste. Our navigators boiled and eat them with their meat. The natives often parboil, and beat it up with several sorts of berries, especially among the ladies, is, according to Berkenhout, essentially a medicinal use.

The species of mouse saves them a great memory, ready faculty of application, and suitably a. Among the ladies, is, according to Berkenhout, essentially a medicinal use.

LILLO (George), an excellent dramatic writer, born at London in 1693. He was a jeweller by profession, and followed his business for many years in that neighbourhood with the fairest reputation. He was at the same time strongly attached to the muses, yet seemed to have laid it down as a maxim, that the devotion paid to them ought always to tend to the promotion of virtue, morality, and religion. In pursuance of this aim, Lillo was happy in the choice of his subjects, and showed great power of affecting the heart, by working up the passions to such a height, as to render the diffidences of common and domestic life equally interesting to the audiences as that of kings and heroes, and the ruin brought on private families by an indulgence of avarice, lust, &c. as the havoc made in states and empires by ambition, cruelty, or tyranny. His "George Barnwell," "Fatal Curiosity," and "Arden of Feverham," are all planned on common and well-known stories; yet they have perhaps more frequently drawn tears from an audience than the more pompous tragedies of Alexander the Great, All for Love, &c. In the prologue to "Elmerie," which was not acted till after the author's death, it is said, that when he wrote that play, he "was depressed by want," and afflicted by disease; but in the former particular there appears to be evidently a mistake, as he died possessed of an estate of L.60 a-year, besides other effects to a considerable value. His death happened in 1739, in the 47th year of his age. His works have been lately collected, and published, with an account of his life, in 2 vols 12mo, by Mr T. Davis.

LILLY (John), a dramatic poet, was born in the wilds of Kent, about the year 1553, and educated in Magdalen-college, Oxford, where he took the degree of bachelor of arts in 1573, and that of master in 1575. From Oxford he removed to Harbridge, but how long he continued there, is uncertain. On his arrival in London, he became acquainted with some of Queen Elizabeth's courtiers, by whom he was courted, and admired as a poet and a wit; and his majesty, on particular festivals, honoured his dramatic pieces with her presence. His plays are nine in number. His first publication, however, printed in 1580, was a romance called Euphues, which was universally read and admired. This romance, which Blount, the editor of six of his plays, says introduced a new language, especially among the ladies, is, according to Berkenhout, in fact a most contemptible piece of affectation and nonsense: nevertheless it seems very certain, that it was in high estimation by the women of fashion of those times, who, as we are told by Whalley the editor of Ben Jonson's works, had all the phrases by heart; and those who did not speak Euphues were as little regarded at court as if they could not speak French. "He was (says Oldys) a man of great reading, good memory, ready faculty of application, and uncommon eloquence; but he ran into a vast excess of allusion." When or where he died is not known. Anthony Wood says he was living in 1597, when his last comedy was published. After attending the court of Queen Elizabeth 13 years, notwithstanding his reputation as an author, he was under a necessity of petitioning the queen for some small stipend to support him in his old age. His two letters or petitions to her majesty on this subject are preferred in manuscript.

LILLY (William), a noted English astrologer, born in Leicestershire in 1602; where his father not being able to give him more learning than common writing and arithmetic, he resolved to seek his fortune in London. He arrived in 1620, and lived four years as a servant to a mantua-maker in the parish of St Clements Danes; but then moved a step higher to the service of Mr Wright, master of the Sater's company in the Strand, who not being able to write, Lilly among other offices kept his books. In 1627, when his master died, he paid his addresses to the widow, whom he married with a fortune of 1000L. Being now
LILLY, in botany. See LILUUM.

LILLY, the Valte. See CONVALLARIA.

LILYBEUM (anc. geog.), a city of Sicily, situated on the most westerly promontory of the island of Sicily, and said to have been founded by the Carthaginians on their expulsion from Motya by Dionysius tyrant of Syracuse. It is remarkable for three Abges it sustained: one against Dionysius the tyrant, another against Pyrrhus king of Epirus, and the third against the Romans. The two first failed in their attempts, but the Romans with great difficulty made themselves masters of it. No remains of this once fane city are now to be seen, except some aqueducts and temples; though it was standing in Strabo's time.

LILYE (William,) the grammarian, was born in the year 1466 at Oldham in Hampshire; and in 1486, was admitted a semi-commoner of Magdalen college, in Oxford. Having taken the degree of bachelor of arts, he left the university and travelled to Jerusalem. Returning from thence, he continued five years in the island of Rhodes, where he studied the Greek language, several learned men having retired thither after the taking of Constantiopol. From Rhodes he travelled to Rome; where he improved himself in the Greek and Latin languages, under Sulpius and P. Sabinus. He then returned to London, where for some time he taught a private grammar-school, being the first person who taught Greek in the metropolis. In 1510, when Dr Colet founded St Paul's school, Lilye was appointed the first master; at which time, it seems, he was married and had many children. In this employment he had laboured 12 years, when, being feized by the plague, which then raged in London, he died in February 1523, and was buried in the north yard of St Paul's. He had the character of an excellent grammarian, and a successful teacher of the learned languages. His principal work is Brevisima infinitus, seu ratio grammaticorum cognomenta; Lond. 1543. Reprinted times without number, and commonly called Lilye's grammar. The English rudiments were written by Dr Colet, and the grammarian prefixed a preface to the first edition, by cardinal Wolsey. The English syntax was written by Lilye; also the rules for the genders of nouns, beginning with Propria que marius; and those for the perfect tense and future, beginning with As in presenti. The Latin syntax was chiefly the work of Erasmus, See Ward's preface to his edition of Lilye's Grammar, 1572.

LIMA, a city of South-America, in Peru, of which it is capital, with an archbishop's see, and an university. It gives its name to the principal audience of Peru; and is surrounded with brick-walls, fortified with several ramparts and bastions, eight yards high. The streets are handsome, and as straight as a line, but the houses are generally only one story high, on account of the earthquakes. However, they are pretty enough, and well adorned, having long galleries on the front. One part of the roofs are covered with coarse linen cloth, and other only with reeds, which is not inconvenient, because it never rains here; however, the richest inhabitants cover theirs with fine mats or beautiful cotton-cloths. There are trees planted all round their houses, to keep off the heat of the sun. What the houses want in height they have in length and depth; for some of them are 200 feet long, and proportionably broad, so that they have 10 or 12 large apartments on the ground-floor. The royal square is very handsome, and in the middle there is a fountain of bronze, adorned with the image of Fame which foops up water. On the east and west sides are the public structures, which are well built. The river which crofes Lima forms canals or streams which run to most of the houses, and serve to water their gardens, as well as for other uses. All the churches and convents are extremely rich; and many images of the saints are of maffy gold, adorned with jewels. This city is four miles
LIMAX, or Limasso, a town of Cyprus, in the south of the island. Of the ancient city nothing but ruins now remain; though it was a celebrated place, even under the government of the kings. Richard, the conqueror of the last of these vassals of the empire, razed it in 1191, and it was never afterwards rebuilt. This city originally was the fame as Amathus or Amathonte; so famous, as Pauflanias tells us, for its temple erected in honour of Venus and Adonis. Amathus was the residence of the nine first kings of the island; and amongst others of Oneiflus, who was famed for his liberality by the name of Artabanes, the Perian general. This city, erected into an archbishopric in the time of the Christian, has produced a number of personages celebrated for their knowledge and the sanctity of their lives. In the neighbourhood there are several copper mines, which the Turks have been forced to abandon. The following lines, in the tenth book of Ovid's Metamorphoses, prove that they were known in the time of that poet:

Captâ viri forma, non jam Cytherea curat
Littora, non alto repetit Paphon aequore cinclam,
Pilcolamque Guidon, grasulamque Amathotea metallis.

The place where the new Limassol now stands, formerly had the name of Nemtis, from the multitude of wheels by which it was surrounded. Richard king of England having destroyed Amathonte, Guy de Lusignan in the 12th century laid the foundations of that new city which the Greeks calls Neopolis. The family of Lusignan, who continued to embellish and fortify it, built there palaces, and Greek and Latin churches; and made it the seat of a bishop. When the island was taken by the Turks in 1570, the Ottoman army entered the city on the 2d of July, and ravaged it without mercy. It was then destroyed by the flames; and at present it is only a wretched place, in which one can scarcely distinguish any remains of its ancient edifices. It is governed by a commissary and a cadi; the latter judges cases only provisionally, before they are carried to the superior tribunal of Nicofia. The harbour is very commodious; and being sheltered from tempestuous winds, it affords a safe and calm asylum to vessels when overtaken by a storm. The carob tree is here more abundant than anywhere else; and it is from the port of Limassol that the greatest quantity of its fruit is exported. The inhabitants export also salt, procured from a lake near Salines. Cotton, wheat, barley, and mulberry-trees, are both plentiful and well cultivated in this part of the island: the ground also produces all kinds of garden stuff. The best Cyprus wine is made from the vines that grow on the hills of Limassol. All the wines of the country are collected in this city to be transported to Larissa, where there are the largest cellars, and which on that account becomes the natural centre of commerce.

LIMAX, the Slavo, or Naked Snail; a genus of insects belonging to the order of vermes mollusci. The body is oblong, fitted for crawling, with a kind of mucular coat on the upper part; and the belly is plain. They have four tentacula, or horns, situated above the mouth, which they extend or retract at pleasure. This reptile is always destitute of shell; but besides that it is more clammy and of a greater configuration than that of the snail, the black naked flag has a furrowed cloak, almost thick as hard as leather, under which it withdraws its head as within a shell. The head is distinguished from the breast by a black line. It is in its head and back that the snail-stone is found; which is a small pearl and sandy stone, of the nature of lime stones: according to a popular opinion, it cures the tertian agitation, if fastened to the patient's arm. These flags move on slowly, leaving every where clammy and shining marks of their passage. Their coming together is about the end of spring. The organs of generation are placed, as in the snail, on the right side of the body. The male implement unfolds with the female mechanism; the finger of a glove when turned inside out. They are sometimes met with hanging in the air with their heads downwards; and their tails, united by a kind of viscous and thick tie, grappled to the branch of a tree. In this situation they remain for three hours, and that is the time of impregnation. They deposit their eggs in the earth. There are eight species, distinguished entirely by their colour; as the black flag, the white flag, the reddish flag, the ah-coloured flag, &c. The black flag is hemrophrodite, both sexes being in each individual, and in the coitus both impregnate and are impregnated at the same time.—A black flag powdered over with foam, salt, or sugar, falls into convolutions, casts forth all its foam, and dies. See Reproduction.

LIMB, in general, denotes the border or edge of a thing; thus we say, the limb of a quadrant, of the fun, of a leaf, &c.

LIMB, in anatomy, an appellation given to the extremities of the body, as to the arms and legs.

Limbus, in the church of Rome, is used in two different senses. 1. The limb of the patriarchs is said
LIMBAT, the name of a periodical wind common in the island of Cyprus, and of great service in moderating the heats of the climate, which would otherwise be intolerable.

According to the Abbé Marii, it begins to blow at eight in the morning the first day; increases as the sun advances till noon; then gradually weakens, and at three falls entirely. On the second day it arises at the same hour; but it does not attain its greatest strength till about one in the afternoon, and ceases at four precisely. On the third day it begins as before, but it falls an hour later. On the five succeeding days, it follows the same progression as on the third; but it is remarked, that a little before it ceases, it becomes extremely violent. At the expiration of five days it commences a new period like the former. By narrowly observing the sea on that side from which it is about to blow a little before it arises, one may determine what degree of strength it will have during the day. If the horizon is clear, and entirely free from clouds, the wind will be weak, and even almost insensible; but if it is dark and cloudy, the wind will be strong and violent. This limbat wind, notwithstanding its utility in moderating excessive heat, often becomes the cause of fevers, especially to the Europeans, from their being less habituated to the climate, more apt to be affected by calms, which often succeed from the irregularity of the season. In spring it does not continue longer than midnight; and it is then succeeded by that happy calm, during which the refreshing dews are formed that moisten the earth at morning. This wind bears a name from the inhabitants of the southern and eastern parts of the island; but it is called a fresh breeze by those in the northern and western, who indeed receive it immediately from the sea. In summer it blows till four o'clock in the morning and when it ceases, it leaves a profound calm, during which the air is so fresh that trees may be cut down, and the inhabitants may work with the greatest ease. In autumn and winter it never falls till daybreak, when it is succeeded by other winds, which proceed from the irregularity of the season. In spring it does not continue longer than midnight; and it is then succeeded by that happy calm, during which the refreshing dews are formed that moisten the earth at morning.

LIMBORCH (Philippus), a learned writer among the remonstrants, born at Amsterdam in 1633. After having made great proficiency in his studies, he was, in Limburgh, in 1655, admitted to preach in public, which he did first at Haarlem. His sermons had in them no affected eloquence; but were solid, methodical, and edifying. He was chosen minister of Gouda; from whence he was called to Amsterdam, where he had the professorship of divinity, in which he acquired himself with great reputation till his death which happened in 1712. He had an admirable genius, and a tenacious memory. He had many friends of distinction in foreign parts as well as in his own country. Some of his letters to Mr. Locke are printed with those of other celebrated authors. He had all the qualifications suitable to the character of a sincere divine, lived an example of every virtue, and preferred the vigour of his body and mind to a considerate age. He wrote many works, which are esteemed; the principal of which are, 1. Amoeba colo­latio de veritate religiosi Christianae con crudite Judaeos, in 12mo. 2. A complete body of Divinity, according to the opinions and doctrines of the remon­strants. 3. A history of the Inquisition; which has been translated into English by Dr. Samuel Chandler. Limborch also published the works of the famous Augustinus, who was his great uncle by the mother’s side.

LIMBURGH, the capital city of the duchy of Lim­burgh, in the Austrian Netherlands, is seated on a steep rock near the river Vese. This town is small, but pleasantly seated on a hill, with shady woods; and consists chiefly of one broad street, not very well built. It is strong by situation, and almost inaccessible; however, it was taken by the French in 1675, and by the confederates under the duke of Marlborough in 1703, for the house of Austria, to whom it remains by the treaties of Rastadt and Baden, after having been dismantled. It is famous for its cheese, which is exceedingly good. E. Long, 6. 8. N. Lat. 50. 40.

LIME. See Quicklime.

LIME-Tree. See Citrus.

LIME of LINDEN-Tree. See Tilia.

LIME-Water. See Pharmacy-Index.

LIME, or Lime. See Lyce.
LIMERICK is a market-town, a borough, and a bishop's see, now the metropolis of the province of Munster. It is situated on the river Shannon, 94 miles from Dublin; and was the strongest forresses in the kingdom. Its ancient name was Lungeable. It was plundered by Mahon, brother from Galway, in 12th century. It was erected and endowed the cathedral; and Donat O'Brien, bishop of Limerick, in the 13th century, contributed much to the opulence of the see. About the close of the 12th century, the bishirp of Innis-Cathay was united to that of Limerick. It was besieged by king William III. in the year 1690; and though there was no army to assist it, the king was obliged to raise the siege. In the year 1691, it was again besieged by the English and Dutch on the 21st of September; and it was obliged to surrender on the 13th of October following, not without the loss of abundance of men: however, the garrison had very honourable and advantageous conditions, being permitted to retire where they thought fit; and the Roman catholics by these articles were to be tolerated in the free exercise of their religion. Within a century this place was reckoned the second city in Ireland; at present it has lost its rank; not because it thrives less, but because Cork thrives more. It is composed of the Irish and English town; the latter stands on the King's island, formed by the river Shannon. The town is three miles in circumference, having weekly markets on Wednesday and Saturday, and fairs on Easter Tuesday, 1st July, 4th August, and 12th December. There is a privilege annexed to the fair held on 4th August, that, during 15 days, no person can be arrested in the city or liberties, on any processes filing out of the Tholof court of Limerick. Ardare and Achoadoe, in the county of Kerry, are united to the bishirp of Limerick. This city returns two members to parliament; and gives title of viscount to the family of Hamilton. It is governed by a mayor, sheriffs, recorder, aldermen, and burgesses; there is also a bishirp and Limming a military governor and town-major; it had some time the privilege of coinage; and different parliaments have been held there. The town was formerly entirely walled in; and in 1760, there were 12 of the city gates standing; but to the great improvement of the place they are now all demolished, except the water-gate of king John's castle. The linen, woollen, and paper manufactures are carried on here to great extent, and the export of provisions is very considerable. Here are many charitable hospitals and handsome public buildings, besides the cathedral and other churches. A charter was granted to this city by king John, and confirmed in succeeding reigns. Dr Campbell observes, that as you approach Limerick, the grounds grow rich and exquisitely beautiful; the only disagreeable matter is, that the situation renders the air moist, and consequently rather unwelcome to strangers. About six miles from this is the famous Cattle-connel spa. Limerick is 50 miles from Cork, 50 from Galway, and 73 from Waterford. It appears that Limerick obtained the privilege of having mayors 10 years before that right was allowed to the citizens of London. It was before governed by provosts, of which the first was John Spafford, in 1195 and 1197; during the provostship of Henry Troy a charter was granted, to Richard I., whereby the citizens were allowed to choose mayors and bailiffs, Adam Servant, in 1198, being the first mayor. It continued to be governed by mayors and bailiffs, until the office of bailiff was changed into that of sheriff, in 1609.

LIMERICK is also the name of a fair town in the county of Waterford and province of Leinster; the fairs are four in the year.

LIMINGTON, a town of Hampshire in England. See LYMINGTON.

LIM, in a restrained sense, is used by mathematicians for a determined quantity to which a variable one continually approaches; in which sense the circle may be said to be the limit of its circumscribed and inscribed polygons. In Algebra, the term limit is applied to two quantities, one of which is greater and the other less than another quantity; and in this sense it is used in speaking of the limits of equations, whereby their solution is much facilitated.

LIMME, a town of Kent, in England, near Hitho, and four miles from Romney, was formerly a port, till choked up by the sands; and though it is thereby become a poor town, yet it has the horn and mace and other tokens left of its ancient grandeur, and used to be the place where the lord warden of the cinqueports was sworn at his entrance upon his office. The Roman road from Canterbury, called Stone-breet, ended here; and from the brow of its hill may be seen the ruinous Roman walls almost at the bottom of the marshes. Here formerly was a castle, now converted into a farm-house. When or by whom this edifice was erected is not known. It has, however, great marks of antiquity; as has also the adjoining church, in which are several old tombstones with crosses on them.

LIMNING, the art of painting in water-colours, in contradistinction to painting which is done in oil-colours.

Limning is much the more ancient kind of painting;
In limning, all colours are proper enough, except the white made of lime, which is only used in fresco. The azure and ultramarine are both on their walls, always be mixed with size or gum; but there are always applied two layers of hot size before the size-colours are laid on: the colours are all ground in water each by itself; and, as they are required in working, are diluted with size-water. When the piece is finished, they go over it with the white of an egg well beaten; and then with varnish, if required.

To limn, or draw a face in colours: the art of painting in oil, the painters all painted ill require work, which is card even and thin, free from hairs and spots over the whole; carefully remarking whatever may conduce to render the piece perfect, as the exit of the eyes, moles, scars, gazures, and the like.

LIMOGES, an ancient and considerable town of France, in the province of Guienne, and capital of Limosin, with a bishop's see. It is a trading place, and its horfes are in great esteem. It is feated on the river Vienne, in E. Long. 1. 22. N. Lat. 42. 48.

LIMOSIN, a province of France, bounded on the north by La Marche, on the east by Auvergne, on the south by Quercy, and on the west by Perigord and Angoumois. It is divided into the Upper and Lower; the former of which is very cold, but the latter mere temperate. It is covered with forrests of chesnut-trees; and contains mines of lead, copper, tin, and iron; but the principal trade consists in cattle and horses.

LIMPET. See Patella.

LIMPURG, a barony of Germany, in the circle of Franconia, included almost entirely within Swabia, and feated to the south of Hall in Swabia. It is about 15 miles long, and eight broad. Gaildorf and Schonburg, near which is the castle of Limburg, are the principal places.

LIMPURG, a town of Germany, in the electorate of Triers or Treves, and in Wetteravia, formerly free and imperial, but now subject to the electorate of Treves. It is feated on the river Lhon. E. Long. 8. 13. N. Lat. 50. 18.

LINARIA, in ornithology. See Fringilla.

LINACRE (Thomas), physician, was born at Canterbury about the year 1460, and there educated under the learned William Seling; thence he removed to Oxford, and in 1484 was chosen fellow of All-Souls college. Tilly, alias Seling, his former instructor, being at this time appointed ambassador from King Henry VII. to the court of Rome, Mr Linacre accompanied him to Italy, where he attained the highest degree of perfection in the Greek and Latin languages. At Rome, he applied himself particularly to the study of Aristotle and Galen, in the original. On his return to Oxford, he was incorporated doctor of physic, and chosen public professor in that faculty. But he had not been long in England, before he was commanded to court by King Henry VII. to attend the young Prince Arthur as his tutor and physician. He was afterwards appointed physician to the king, and, after his death, to his successor Henry VIII. Dr Linacre founded two medical lectures at Oxford, and one at Cambridge; but that which most effectually immortalized his name among the faculty, is his being the first founder of the college of physicians in London. He beheld with vexation the wretched state of physic in those times; and, by an application to Cardinal Wolsey, obtained a patent in 1518, by which the physicians of London were incorporated. The intention of this corporation was to prevent illiterate and ignorant medecinaters from practising the art of healing. Dr Linacre was the first president, and held the office as long as he lived. Their meetings were in his own house in Knight-riders street which house he bequeathed to the college. But our doctor, when he was about the age of 50, took it into his head to study divinity; entered into orders; and was collated, in 1509, to the rectory of Merham. In the same year he was installed prebendary of Wells, in 1518 prebendary of York, and in the following year was admitted precentor of that cathedral. This, we are told, he resigned for other preferments. He died of the stone in the bladder in October 1524, aged 64; and was buried in St. Paul's. Thirty-three years after his death, Doctor John Caius caused a monument to be erected to his memory, with a Latin inscription, which contains the outlines of his life and character. He was a man of great natural sagacity, a skilful physician, a profound grammarian, and one of the best Greek and Latin scholars of his time. Erasmus in his epistles speaks highly of the doctor's translations from Galen, preferring them even to the original Greek. His works are, 1. De opendata structura Latini, &c. 2. De medicinæ et chirurgiæ usu generosi; London, printed by Pynfon, 1524, 8vo, and by Stephens, 1527, 1528. 3. The rudiments of grammar, for the use of the pricnes Mary, printed by Pynfon. Buchanan translated it into Latin; Paris, 1536. He likewise translated into very elegant Latin, several of Galen's works, which were printed chiefly abroad at different times. Alfo Procli Diadochi sphera, translated from the Greek; Venet. 1499, 1500.

LINCOLN, a city of England, and capital of a county of the same name, is distant 132 miles from London. It stands on the side of a hill; at the bottom of which runs the river Witham in three small channels, over which are several bridges. The old Lubetum of the Britons, was founded on the top of the hill, as appears from the vestiges of a rampart, and deep ditches still remaining, was taken and demolished by the Saxons: who built a town upon the south side of the hill down to the river side, which was several times...
times taken by the Danes, and as often retaken by the Saxons. In Edward the Confessor's time, it appears, from Doomebook, to have been a very considera-
table place; and in the time of the Normans, Malmsbury, says, it was one of the most populous cities in Eng-
land. William I. built the castle upon the summit of
the hill above the town. The dioceze, though the bish-
} 00p of Ely was taken out of it by Henry II. and
thow of Peterborough and Oxford by Henry VIII. is
still vastly large, containing the counties of Leicester,
Huntingdon, Bedford, and part of Bucks, making 1255
parishes. Though the other churches are mean, the
cathedral or minster is a most magnificent piece of Go-

tic architecture. Here is a prodigious large bell,
called the Tower of Lincoln, which is near 5 ton in weight,
and 23 feet in compass. The hill on which the church
stands is so high, and the church itself so lofty, that
it may be seen 50 miles to the north, and 30 to the
south. Besides other tombs, it contains one of bracis,
in which are the entalls of Queen Eleanor, wife to
Edward I. It is said there were anciently 52 churches,
which are now reduced to 14. Such is the magni-
ficence and elevation of the cathedral, that the monks
thought the height of it must be very mortifying to the
deity; wherefore it came to be said of one who was dis-
pleased that he looked like the devil over Lincoln. The
decievity on which the city is built being steep, the
communication between the upper and lower town is
very troublesome, and coaches and horses are obliged
to make a compas.

King Edward III. made this city a staple for wool,
leather, lead, &c. It was once burnt; once besieged
by King Stephen, who was here defeated and taken
prisoner; and once taken by Henry III. from his re-
bellious barons. It abounded heretofore with mona-
steries and other religious houses. There is a great
pool here, formed by the river on the west side of it,
called Swan-Pool, because of the multitude of swans
on it. The Romans north gate still remains entire, by
the name of Newport Gate. It is one of the noblest
of this fort in Britain. It is a vast semicircle of stones
of very large dimensions laid without mortar, connect-
ed only by their uniform shape. This magnificent arch
is 16 feet in diameter, the stones are four feet thick at
the bottom. It seems to have a joint in the middle,
not a key-stone: and on both sides, towards the upper
part, are laid horizontal stones of great dimensions,
some to or 12 feet long. This arch rises from an im-
port of large mouldings, which are not perceivable
now; there are also divers fragments of the old Roman
wall. Over against the castle is an entrenchment cast
up by king Stephen; and here are carved the arms of
John of Gaunt, duke of Lancaster, who lived here like
a king, and had a mint. The city has a communication
with the Trent, by a canal called the Fosdyke. In the
centre of the ruined old castle there is a hand-
some modern structure for holding the affizres. Its
walls are almost entire, and very substantial: the Keep
or principal tower is situated on a high and very steep
mount, which yet continues in its original base, but the
remains of the tower on it are only five or six yards
high. The outer walls of the castle are of very con-
siderable height, which appear still higher than they
really are from their lofty situation and the moat below
them. The great gateway is still entire. This city
is a county of itself, and has a viscountsiallurisfici:o
for 20 miles round, which is a privilege that no other
city in England can equal. It now consists principally
of one street above two miles long, well paved, be-
sides several crofs and parallel streets well populated.
Here are some very handsome modern buildings, but
more antique ones; upon the whole it has an air of
ancient greatness, arising in a great measure from the
number of monastic remains, most of which are now
converted into stables, out-houses, &c. Upon the hill,
in the castle are the ruins of the bishop's palace, and
other ruins of ancient grandeur and magnificence.
The city is supplied with water by several conduits,
among which is a modern one, somewhat in the pyra-
midal style, enriched with sculpture. It is governed
by a mayor, 12 aldermen, two sheriffs, a recorder,
four chamberlains, a sword-bearer, four coroners, and
above forty common-council men. Here are four char-
ity schools, where 120 poor children are taught by
the widows of clergymen. The neighbouring coure
is noted for its frequent horse-races. On the down of
Lincoln, towards Boston, that rare foul the buffet is
seen sometimes, as well as on Salisbury Plain. Lincoln-
Heath extends above 50 miles, viz. from Sleaford and
Ashwell to the Humber north, though it is but
three or four miles over where brooked. Five miles
from Boston on this extensive heath, the late Lord Le-
Defenfier built a few years agoa tower for the direc-
tion of strangers. It is a lofty square building with a
stair-case, which terminates in a flat roof, and round
the base is a square court-yard. Great part of this
extensive heath is lately inclosed. The markets here
are Tuesdays and Fridays; and there are four fairs in
the year. We read that David king of Scots met king
John here, on the 22d of November, in the third year
of his reign, and performed homage to him on a hill
without the city, for his English territories, in pre-
ence of the archbishop of Canterbury. York, and Ragula,
11 bishops, and a vast number of temporal lords and
knights. King Henry VII. kept his court here at Eas-
ter in 1586. The Jews were once its chief inhabitants,
till they were forced to remove, after having impiously
crucified the child of one Grantham, and thrown it
into a well, to this day called Grantham's Well. Lin-
coln has given the title of earl to the family of Clin-
ton ever since the reign of Queen Elizabeth. W.
Long. 1. 27. N. Lat. 53. 16.

Lincolnshire, a maritime county of England, 77
miles in length and 48 in breadth, is bounded on the
east by the German ocean, on the west by Notting-
hamshire, on the north by Yorkshire, on the south by
Rutlandshire, Northamptonshire, and Canterbury.
It contains 4590 houses, 24340 inhabitants, 631 pa-
riishes, and 31 market towns, whereof five send mem-
bers to parliament, which, with two for the county,
made twelve in all. The principal rivers are the Hum-
ber, the Trent, the Witham, the Nene, the Welland,
the Ankham, and the Don. It is divided into three
parts, Lindsey, Kelsoven, and Holland: the air of
which last is wholesome and foggy, on account of the
fens and large marshes. The soil of the north and
west parts is very fertile, and abound in corn and pa-
tries. The east and south parts are not so proper for
corn, but then they supply them with fish and fowl in
great plenty, particularly ducks and geese. Lincoln
LINDUS, (anc. geog.), a town of Rhodes, situated on a hill on the west side of the island. It was built by Telephus the son of Hercules, according to Diodorus Siculus; by one of the Helleads, grandsons of the Sun, named Lindus, according to Strabo. It was the native place of Cleobulus, one of the wise men. Here we see the famous temple of Lindian Minerva, which was built by the daughters of Danaus. Cadmus enriched this temple with many splendid offerings. The citizens dedicated and hung up here the seventh of Pindar's Olympic odes, written in letters of gold. The ruins of that fine edifice are still to be seen on the top of a high hill which overlooks the sea. Some remains of the walls, consisting of stones of an enormous size, still show it to have been built in the Egyptian style. The pillars and other ornaments have been carried off. On the most elevated peak of the rock are the ruins of a cattle which may have served as a fort to the city. Its circumference is very extensive, and is filled with rubbish.

Linde, the modern city, stands at the foot of the hill. A bay, of considerable width and depth, serves as a harbour to the city. Ships find good anchorage there in twenty fathoms water. They are sheltered from the south-west winds, which constantly prevail through the severest season of the year. In the beginning of winter, they cast anchor off a small village named Maffary. Before the building of Rhodes, Lindus was the harbour which received the fleets of Egypt and Tyre. It was enriched by commerce. Mr. Savary observes, that a judicious government, by taking advantage of its harbour and happy situation, might yet restore it to a flourishing state.

LINE, in geometry, a quantity extended in length only, without any breadth or thickness. It is formed by the flux, or motion of a point. See FLUXIONS, and GEOMETRY.

LINE, in the art of war, is understood of the disposition of an army ranged in order of battle, with the front extended as far as may be, that it may not be flanked.

LINE of Battle, is also understood of a disposition of the fleet in the day of engagement; on which occasion the vessels are usually drawn up as much as possible in a straight line, as well to gain and keep the advantage of the wind as to run the same board. See NAVAL ARTS.

Horizontal LINE, in geography, and astronomy, a line drawn parallel to the horizon of any part of the earth.

Equinoctial Line, in geography, is a great circle on the earth's surface, exactly at the distance of 90° from each of the poles, and of consequence bisecting the earth in that part. From this imaginary line, the degrees of longitude and latitude are counted. In astronomy, the equinoctial line is that circle which the sun seems to describe round the earth on the days of the equinox in March and September. See ASTROLOGY and GEOGRAPHY.

Meridian Line, is an imaginary circle drawn through the two poles of the earth and any part of its surface. See GEOGRAPHY, § 29.

Ship of the Line, a vessel large enough to be drawn up in the line, and to have a place in a fleet.
L I N

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LIN,
in genealogy, a series or succession of relations in various degrees, all descending from the same common ancestor. See Descent.

LINE, also denotes a French measure containing the 12th part of an inch, or the 144th part of a foot. Geometers conceive the line subdivided into six points. The French line answers to the English barley-corn.

Fishing Line. See Fishing Lines.

Lines, in heraldry, the figures used in armories to divide the shield into different parts, and to compose different figures. These lines, according to their different forms and names, give denomination to the pieces or figures which they form, except the straight or plain lines. See Heraldry.

Linea alba, in anatomy, the concourse of the oblique and transverse muscles of the abdomen; dividing the abdomen in two, in the middle. It is called linea, line, as being straight; and alba, from its colour, which is white. The linea alba receives a twig of a nerve from each of its digitations or indentings, which are visible to the eye, in lean persons especially.

Lineament, among painters, is used for the outlines of a face.

Linear Numbers, in mathematics, such as have relation to length only; such is a number which represents one side of a plain figure. If the plain figure be a square, the linear figure is called a root.

Linear Problem; that which may be solved geometrically by the intersection of two right lines. This is called a Simple Problem, and is capable but of one solution.

Linen, in commerce, a well known kind of cloth chiefly made of flax. Linen was not worn by the Jews, Greeks, or Romans, as any part of their ordinary dress. Under tunics of a finer texture supplied the place of shirts: Hence the occasion for frequent bathing. Alexander Severus was the first emperor who wore a shirt; but the use of it necessary a garment did not become common till long after him.

The linen manufacture was probably introduced into Britain with the first settlement of the Romans. The flax was certainly first planted by that nation in the British soil. The plant itself indeed appears to have been originally a native of the east. The woollen drapery would naturally be prior in its origin to the linen; and the fibrous plants from which the threads of the latter are produced, seem to have been first noticed and worked by the inhabitants of Egypt. In Egypt, indeed, the linen manufacture appears to have been very early: for even in Joseph’s time it had risen to a considerable height. From the Egyptians the knowledge of it proceeded probably to the Greeks, and from them to the Romans. Even at this day the flax is imported among Europeans from the eastern nations; the western kind being merely a degenerate species of it.

In order to succeed in the linen manufacture, one of good quality should be confined to the ploughing and preparing the soil, fowling and covering the seed, to the weeding, pulling, rippling, and taking care of the new seed, and watering and drilling the flax till it is lodged at home: others should be concerned in the drying, breaking, scutching, and heckling the flax, to fit it for the spinners; and others in spinning and reeling it, to fit it for the weaver; others should be concerned in taking due care of the weaving, bleaching, beetling, and finishing the cloth for the market. It is reasonable to believe, that if these several branches of the manufacture were carried on by distinct dealers, where the home-made linens are manufactured, the several parts would be better executed, and the whole would be afforded cheaper, and with greater profit.

Staining of Linen. Linen receives a black colour with much more difficulty than woollen or cotton. The black fruct on linen with common vitriol and gall or logwood, is very perishable, and soon washes out. Instead of the vitriol, a solution of iron is to be made of. This is well known to all the calico printers; and by the use of this, which they call their iron liquor, and madder-root, are the blacks and purples made which we see on the common printed linens. The method of making this iron-liquor is as follows: A quantity of iron is put into the four strong beer; and to promote the dissolution of the metal, the whole is occasionally well stirred, the liquor occasionally drawn off, and the rust beat from the iron, after which the liquor is poured on again. A length of time is required to make the impregnation perfect; the solution being reckoned unfit for use till it has stood at least a twelvemonth. This solution stains the linen of a yellow, and different shades of buff-colour; and is the only known substance by which these colours can be fixed on linen. The cloth stained deep with the iron liquor, and afterwards boiled with madder without any other addition, becomes of the dark colour which we see on printed linens and cottons; which if not a perfect black, has a very near resemblance to it. Others are stained paler with the same liquor diluted with water, and come out purple.

Linen may also be stained of a durable purple by means of solution of gold in aqua regia. The solution for this purpose should be as fully saturated as possible; it should be diluted with three times its quantity of water; and if the colour is required deep, the piece, when dry, must be repeatedly moistened with it. The colour does not take place till a considerable time, sometimes several days, after the liquor has been applied: to hasten its appearance, the subject should be exposed to the sun and free air, and occasionally removed to a moist place, or moistened with water.

When solution of gold in aqua regia is soaked up in linen cloths, the metal may be recovered by drying and burning them.

The anacardium nut, which comes from the East-Indies, is remarkable for its property of staining linen of a deep black colour, which cannot be washed out either with soap or alkaline ley. The stain is at first of a reddish-brown, but afterwards turns to a deep black on exposure to the air. The calcew-nut, called the anacardium of the East-Indies, differs from the oriental anacardium in its colouring quality. The juice of this nut is much paler than the other, and stains linen or cotton only of a brownish colour; which if not dried is very durable, but does not at all change toward blackness.—There are, however, trees, natives of the United States, which appear to contain juices of the fame
Linen. [83] L

Linen. fame nature with those of India. Of this kind are several, and perhaps the greater number, of the species of the toxicodendron or poison tree. Mr. Catesby, in his history of Carolina, describes one called there the poison-berries, from whose trunk flowed a liquid as black as ink, and supposed to be poisonous; which reputed poisonous quality has hitherto prevented the inhabitants from collecting or attempting to make any use of it. In the Philosophical Transactions for the year 1755, the abbé Mazée gives an account of three sorts of the toxicodendron raised in a botanical garden in France, containing in their leaves a milky juice, which in drying became quite black, and communicated the same colour to the linen on which it was dropped. The linen thus stained was boiled with soap, and came out without the least diminution of colour; nor did a strong leaft of wood-ashes make any change in it. Several of these trees have been planted in the open ground in England, and some still remain in the bishop of London's garden at Fulham.

That species called by Mr. Miller the true lac tree, was found by Dr Lewis to have properties of a similar kind. It contains in its bark, and the pedicles and ribs of the leaves, a juice somewhat milky, which soon changed in the air to a reddish-brown, and in two or three hours to a deep blackish or brownish-black colour: wherever the bark was cut or wounded, the incision became blackish; and on several parts of the leaves the juice had spontaneously exuded, and stained them of the same colour. This juice dropped on linen gave at first little or no colour, looking only like a spot of oil; but, by degrees, the part moistened with it darkened in the same manner as the juice itself. On washing and boiling the linen with soap, the stain not only was not discharged, but seemed to have its blackness rather improved; as if a brown matter, with which the black was manifestly deposited, had been in part washed out, and left the black more pure.

As the milky juice of some of the common plants turn dark-coloured or blackish in drying, the Doctor was induced to try the effects of several of them on linen. The milks of wild-poppies, garden-poppies, dandelion, hawk-weed, and low-thistle, gave brown, blackish-red stains, which were discharged by washing with soap: the milks of the fig-tree, of lettuce, and of different kinds of spurge, gave no colour at all. The colourless juice which flows from hop-flats when cut, stains linen of a pale-reddish, or brownish-red, extremely durable; the colour was deepened by repeated applications of the juice, but it never made any approach to blackness. The juice of fleshes gave likewise a pale-brownish stain, which by repeated washings with soap, and being wetted with strong solution of alkaline salt, was darkened to a deeper brown: on baking the fleshes, their juice turns red; and the red stain which it then imparts to linen is, on washing with soap, changed to a pale-bluish, which also proves durable. These colours could not be deepened by repeated applications of the juice. The fleshes were tried in different states of maturity, from the beginning of September to the middle of December, and the event was always nearly the same.

In the fifth volume of Linnaeus's Species, mention is made of a black colour obtained from two plants which grow spontaneously in Britain; the one is the Cirsium, herb-christopher, or baneberry; the other the Cirsium, herb-christopher, or baneberry. The juice of the bane-berry, boiled with alum, is said to yield a black ink; and the heath-berries, boiled also with alum, to dye linen of a pale-blue black.

Linen flowered with gold-leaf. Dr. Lewis informs us of a late manufacture established in London for embellishing linen with flowers and ornaments of gold-leaf. The linen, he says, looks whiter than most of the printed linens; the gold is extremely beautiful, and bears washing well. The Doctor informs us, that he had seen a piece which he was credibly informed had been washed three or four times, with only the same precautions which are used for the finer printed linens; and on which the gold continued entire, and of great beauty. Concerning the process used in this manufacture, he gives us no particulars.

Pothe Linen, is a kind of amianthus, which contains of flexible, parallel, soft fibres, and which has been celebrated for the uses to which it has been applied, of being woven, and forming an incombustible cloth. Paper also, and wicks for lamps, have been made of it. See AMIANTHUS and ASPERTOS.

Ling, in zoology. See Gadus.

Lingen, a strong town of Germany, in the circle of Westphalia, and capital of a county of the same name. It belongs to the king of Prussia; and is situated on the river Elbe, in E. Long. 7° 30'. N. Lat. 52° 32'.

Lingebach (John), an excellent painter, born at Frankfort on the Maine in 1625. He first learned the art in Holland, but perfected himself at Rome, where he resided till he was 25 years of age; when he settled at Amsterdam. His usual subjects are fairs, mountebanks, tea-pieces, and landscapes, which he composed and executed exceedingly well: his landscapes are enriched with antiquities, animals, and elegant figures; his sea-fights are full of expression, exciting pity and terror, and all his objects are well designed. He had an uncommon readiness in painting figures and animals, on which account he was employed by several eminent artists to adorn their landscapes with such objects; and whatever he inferred in the works of other masters, were always well adapted, and produced an agreeable effect. He died in 1657.

Liniment, in pharmacy, a composition of a consistence somewhat thinner than an unguent, and thicker than an oil used for anointing different parts of the body in various intentions. The materials proper for composing liniments are, fats, oil, balsams, and whatever enters the composition of unguents and plasters.

Linthgow, the chief town of West Lothian in Scotland. It is supposed to be the Lincludum of Poem; and to take its name from its situation on a lake, which the word Lin or Linn signifies—It is distant 12 miles from Edinburgh, and is a royal borough and seat of a prebacy. It contains between three and four thousand souls; and carries on a considerable trade in dressing of white leather, which is sent abroad to be manufactured. It also employs many hands in dressing of flax; also in wool-combing, the wool for which is brought
brought from the borders. Its port was formerly Linlithgow, about two miles distant from Linlithgow. The town consists of one open street, from whence lanes are detached on both sides; the houses are built of stone, tolerably neat and commodious; and the place is adorned with some stately public edifices. The palace, built as Sibbald supposed, on the site of a Roman station, forms a square with towers at the corners, and stands on a gentle eminence, with the beautiful loch behind it to the west. It was one of the nobility of the royalidences; and was greatly ornamented by James V. and VI. Within the palace is a handsome square; one side of which is more modern than the others, having been built by James VI. and kept in good repair since 1746, when it was accidentally damaged by the king's forces making fires on the hearths, by which means the joists were burnt. A stone ornamented fountain in the middle of the court was destroyed at the same time. The other sides of the square are more ancient. In one is a room ninety-five feet long, thirty feet six inches wide, and thirty-three feet high. At one end is a gallery with three arches, perhaps for music. Narrow galleries run quite round the old part, to preserve communications with the rooms; in one of which the unfortunate Mary Stuart first saw light. On the north side of the high street, on an eminence east of the palace, stands St Michael's church; a handsome structure, where James V. intended to have erected a throne and twelve stalls for the sovereign and knights of the order of St Andrew. In the market-place is another fountain of two stories with eight spouts, and surmounted like the former with an imperial crown. In one of the buildings having for some time meditated the establishment of a chair of divinity, and the education of natural history in Sweden, at the university, and, like himself, in a particular manner encouraged in the study of natural history in general, but particularly to ichthyology. Soon after his residence at Upfal, our author was also happy enough to obtain the favour of several gentlemen of established character in literature. He was in a particular manner encouraged in the pursuit of his studies by the patronage of Dr Olaus Cellius, at that time professor of divinity, and the reformer of natural history in Sweden; who, being struck with the diligence of Linnaeus in describing the plants of the Upfal garden, and his extensive knowledge of their names, not only patronized him in a general way, but admitted him to his houfe, his table, and his library. Under such encouragement it is not strange that our author made a rapid progress, both in his studies and the esteem of the professors: in fact, we have a very striking proof of his merit and attainments, as much as we find, that, after only two years residence, he was thought sufficiently qualified to give lectures occasionally from the botanic chair, in the room of the professor Rudbeck. In the year 1731, the royal academy of sciences at Upsal having for some time meditated the design of improving the natural history of Sweden, at the instance particularly of professors Cellius and Rudbeck, deputed Linnaeus to make the tour of Lapland, with the sole view of exploring the natural history of that arctic region; to which undertaking, his reputation, already high as a naturalist, and the strength of his constitution, equally recommended him. He left Upsal the 13th of May, and took his route to Gevalia or Gevels, the principal town of Gestricia, 45 miles distant from Upsal. Hence he travelled through Helsingland into Medalpalsia, where he made an excursion, and ascended a remarkable mountain, before he reached Hudwickswald, the chief town of Helingland. From hence he went through Angermaland to Hernofand, a sea-port on the Bothnic gulf, 70 miles distant from Hudwickswald. When he had proceeded thus far, he found it proper to return
When Linnaeus arrived at Uma, in West Bothnia, about 96 miles from Turku, he quitted the public road, and took his course through the woods westward, in order first to traverse the most southern parts of Lapland. Being now come to the country that was more particularly the object of his inquiries, equally a stranger to the language and to the manners of the people, and without any associate, he committed himself to the hospitality of the inhabitants, and never failed to experience it fully. He speaks in several places, with peculiar satisfaction, of the innocence and simplicity of their lives and their freedom from diseases. In this excursion he reached the mountains towards Norway; and after encountering great hardships, returned into West Bothnia, quite exhausted with fatigue. Our traveller next visited Pitha and Lula, upon the Gulf of Bothnia; from which latter place he took again a western route, by proceeding up the river of that name, and visited the ruins of the temple of Jocknow in Lula Lapland or Lap Mark; thence he traversed what is called the Lapland Desfort, defulte of all villages, cultivation, roads, or any conveniences; inhabited only by a few straggling people, originally descended from the Finlanders, and who settled in this country in remote ages, being entirely a distinct people from the Laplanders. In this district he ascended a noted mountain called Waldeck; in speaking of which he has given us a pleasant relation of his finding a singular and beautiful new plant (Adromeda tetragona) when travelling within the arctic circle, with the sun in his view at midnight, in search of a Lapland hut. From hence he crossed the Lapland Alps into Finmark, and traversed the shores of the northern sea as far as Saltco.

These journeys from Lula and Pitha on the Bothnian gulf, to the northern shore, were made on foot; and our traveller was attended by two Laplanders, one his interpreter, and the other his guide. He tells us, that the vigour and strength of these two men, both old, and sufficiently loaded with his baggage, excited his admiration; since they appeared quite unhurt by their labour, while he himself, although young and robust, was frequently quite exhausted. In this journey he was wont to sleep under the boat with which they forded the rivers, as a defence against rain, and the gnats, which in the Lapland summer are not less teasing than in the torrid zone. In descending one of these rivers he narrowly escaped perishing by the overfetting of the boat, and lost many of the natural productions which he had collected.

Linnaeus thus spent the greater part of the summer in examining this arctic region, and those mountains on which, four years afterwards, the French philosophers secured immortal fame to Sir Isaac Newton. At length, after having suffered incredible fatigues and hardships in climbing precipices, passing rivers in miserable boats, suffering repeated vicissitudes of extreme heat and cold, and not unfrequently hunger and thirst, he returned to Tornoa in September. He did not take the same route from Tornoa as when he came into Lapland, having determined to visit and examine the country on the eastern side of the Bothnian gulf; his first stage, therefore, was to Ula in East Bothnia; from thence to Old and New Carleby, 84 miles south from Ula. He continued his route through Wafa, Christiania, and Birnbeburgh, to Abo, a small university in Finland. Winter was now setting in space; he therefore crossed the Gulf by the island of Aland, and arrived at Ulsfc in November, after having performed, and that mostly on foot, a journey of ten degrees of latitude in extent, exclusively of those deviations which such a design rendered necessary.

In 1732 he visited and examined the several mines in Sweden; and made himself so well acquainted with mineralogy and the docimastic art, that we find he was sufficiently qualified to give lectures on those subjects, upon his return to the university. The outlines of his system on mineralogy appeared in the early editions of the Systema Naturae; but he did not exemplify the whole until the year 1768.

In the year 1734 Linnaeus was sent by baron Rentzheim, governor of Dalekarlia, with several other naturalists in that province, to investigate the natural productions of that part of the Swedish dominions; and it was in this journey that our author first laid the plan of an excellent institution, which was afterwards executed, in a certain degree at least, by himself, with the assistance of many of his pupils, and the result published under the title of Pan Suecius, in the second volume of the Acta Academiarum.

After the completion of this expedition, it appears that Linnaeus resided for a time at Falun, the principal town in Dalekarlia: where he tells us, that he taught mineralogy and the docimastic art, and practised physic; and where he was very hospitably treated by Dr Moore, the physician of the place. It also appears, that he contracted at this time an intimacy with one of that gentleman's daughters, whom he married about five years afterwards upon his settling as a physician at Stockholm.—In this journey he extended his travels quite across the Dalekarlian Alps into Norway; but we have no particular account of his discoveries in that kingdom. In 1735 Linnaeus travelled over many other parts of Sweden, some parts of Denmark and Germany, and fixed in Holland, where he chiefly resided until his return to Stockholm, about the year 1739. In 1735, the year in which he took the degree of M. D. he published the first sketch of his Systema Naturae, in a very compendious way, and in the form of tables only, in 12 pages in folio. By this it appears that he had at a very early period of his life (certainly before he was 24 years old) laid the basis of that great structure which he afterwards raised, not only to the increase of his own fame, but to that of natural science.

In 1736 Linnaeus came into England, and visited Dr Dillenius, the late learned professor at Oxford, whom he justly considered as one of the first botanists in Europe. He mentions with particular respect the civilities he received from him, and the privileges he gave him of inspecting his own and the Sherardian collection of plants. It is needless to say, that he visited Dr Martyr, Mr Rand, and Mr Miller, and that he was in a more singular manner indebted to the friendship of Dr Isaac Lawton. He also contracted an intimate friendship with Mr Peter Collinson, which was reciprocally increased by a multitude
Linnaeus, in multitude of good offices, and continued to the last without any diminution. Dr. Boerhaave had furnished him with letters to that great naturalist Sir Hans Sloane; but it is with regret that we must observe, they did not procure him the reception which the warmth of his recommendation seemed to claim.

One of the most agreeable circumstances that happened to Linnaeus during his residence in Holland, arose from the patronage of Mr. Clifford, in whose house he lived a considerable part of his time, being now as it were the child of fortune:—Ex nihilo patria trivium sex annos aereis dixere—are his own words. With Mr. Clifford, however, he enjoyed pleasures and advantages scarcely at that time to be met with elsewhere in the world; that of a garden excellently stocked with the finest exotics, and a library furnished with almost every author of note. How happy he found himself in this situation, those only who have felt the same kind of ardor can conceive. Whilst in Holland, our author was recommended by Boerhaave to fill the place, then vacant, of physician to the Dutch settlement at Surinam; but he declined it on account of his having been educated in so opposite a climate.

Besides being favored with the particular patronage and friendship of Boerhaave and Mr. Clifford, as is above mentioned, our author had also the pleasure of being contemporary with, and of reckoning among the number of his friends, many other learned persons who have since proved ornaments to their profession, and whose merit has most deservedly raised them to fame and honor. Among these we may properly mention Dr. John Burman, professor of botany at Amsterdam, whose name and family are well known in the republic of letters, and to whom our author dedicated his Bibliotheca Botanica, having been greatly assisted in compiling that work by the free access he had to that gentleman’s excellent library; John Frederick Gronvius of Leyden, editor of Clayton’s Flora Virginica, and who very early adopted Linnaeus’s System; Baron Van Swieten, late physician to the Empress Queen; Isaac Lawfon, beforementioned, afterwards one of the physicians to the British army, who died much regretted at Osterhout in the year 1747, and from whom Linnaeus received singular and very important civilities; Kramer, since well known for an excellent treatise on the dogmatical art; Van Royen, botanic professor at Leyden; Liebberink of Berlin, famous for his skill in microscopical instruments and experiments. To these may be added also the names of Albinus and Gauvain, and of others, were it requisite to show that our author’s talents had very early rendered him conspicuous, and gained him the regard of all those who cultivated and patronized any branch of medical science, and to which, doubtless, the singular notice with which Boerhaave honoured him did not a little contribute.

Early in the year 1738, after Linnaeus had left Mr. Clifford, and, as it should seem, when he resided with Van Royen, he had a long and dangerous fit of sickness; and upon his recovery went to Paris, where he was properly entertained by the Jussieu, at that time the first botanists in France. The opportunity this gave him of inspecting the Herbaria of Surinam and Tournefort, and those of the above-named gentleman, afforded him great satisfaction. He had intended to have gone from thence into Germany, to visit Ludwig and the celebrated Haller, with whom he was in close correspondence: but he was not able to complete this part of his intended route, and was obliged to return without this gratification.

Our author did not fail to avail himself of every advantage that access to the several museums of this country afforded him, in every branch of natural history; and the number and importance of his publications, during his absence from his native country, sufficiently demonstrate that fund of knowledge which he must have imbibed before, and so left to defy his extraordinary application. These were, Syllabus Naturalis, Fundamenta Botanica, Bibliotheca Botanica and Genera Plantarum; the last of which is justly considered as the most valuable of all the works of this celebrated author. What immense application had been bestowed upon it, the reader may easily conceive, on being informed, that before the publication of the first edition the author had examined the characters of 8,000 flowers. The last book of Linnaeus’s composition, published during his stay in Holland, was the Cladis Plantarum, which is a select illustration of the second part of the Fundamenta.

About the latter end of the year 1738, or the beginning of the next, our author settled as a physician at Stockholm, where he seems to have met with considerable opposition, and was oppressed with many difficulties, but all of these at length he overcame, and got into extensive practice; and soon after his settlement, married the lady before spoken of. By the interest of Count Tellin, who was afterwards his great patron, and even procured medals to be struck in honour of him, he obtained the rank of physician to the fleet, and a stipend from the citizens for giving lectures in botany. And what at this time especially was highly favourable to the advancement of his character and fame, by giving him an opportunity of displaying his abilities, was the establishment of the Royal Academy of Sciences at Stockholm; of which Linnaeus was constituted the first president, and to which establishment the king granted several privileges, particularly that of free postage to all papers directed to the secretary. By the rules of the academy, the president held his place but three months. At the expiration of that term, Linnaeus made his Oratio de novo rabilibus in Infectis, Oct. 3. 1739; in which he endeavours to excite an attention and inquiry into the knowledge of insects by displaying the many singular phenomena that occur in contemplating the nature of those animals, and by pointing out, in a variety of instances, their usefulness to mankind in particular, and to the economy of nature in general.

During all this time, however, Linnaeus appears to have had his eye upon the botanical and medical chair at Upsal, at this time occupied by Rudbeck, who was far advanced in life. We learn indeed that he was so intent on purifying and perfecting his great designs in the advancement of his favourite study of nature, that he had determined, if he failed in procuring the professorship at Upsal, to accept the offer that had been made to him by Haller of filling the botanical chair at Gottingen. However, in course of time, he obtained his wish. In the year 1741, upon the resignation
From Stockholm it was understood that the credit of that university, as a school of physic, had been increasing; numbers of students, especially from Germany, attracted there; and their choice was confirmed by the university.

Linnæus took anatomy, physiology, pathology, and the therapeutic part; Linnæus, natural history, botany, materia medica, the diatetic part, and the diagnosis morborum.

During the interval of his removal from Stockholm to Upfal in consequence of this appointment, our professor was deputed by the states of the kingdom to make a tour to the islands of Öland, Gotland, and the Baltic, attended by six of the pupils, commissioned to make such inquiries as might tend to improve agriculture and arts in the kingdom, to which the Swedish nation had for some time paid a particular attention. The result of this journey was very successful, and proved fully satisfactory to the states, and was afterwards communicated to the public. On his return he entered upon the professorship, and pronounced before the university his oration de Persiculationum intra Patrum necessitate, October 17, 1741; in which he forcibly displays the usefulness of such excursions, by pointing out to the students that vast field of objects which their country held out to their cultivation, the univerfity his oration became lucrativa, and greatly esteemed by the excellent manner

By Gronovius at Leyden, had brought, as it were, a confuxion of every thing rare and valuable in every branch of nature, from all parts of the globe, into Sweden. The king and queen of Sweden had their separate collections of rarities; the former at Ulriksdal; the latter, very rich in exotic insects and shells, procured at a great expense, at the palace of Drottningholm; both of which our author was employed in arranging and describing. Besides these, the museum of the royal academy of Upfal had been augmented by a considerable donation from the king, whilst hereditary prince, in 1746; by another from Count Gylenberg the year before; by a third from M. Grill, an opulent citizen of Stockholm.

From this time we see the professor in a more elevated rank and situation—life. His reputation had already procured him honours from almost all the royal societies in Europe; and his own sovereign, truly-felt of his merit, and greatly esteemmg his character and abilities, favoured him with a mark of his distinction and regard, by creating him a knight of the polar star. It was no longer fcadatus et alget. His emoluments kept pace with his fame and honours: his practice in his profession became lucrative; and we find him soon after possessed of his country-house and gardens at Hommarby, about five miles from Upfal. He had moreover received one of the most flattering testimonies of the extent and magnitude of his fame that perhaps was ever shown to any literary character, the state of the nation which conferred it with all its circumstances, duly considered. This was an invitation to Madrid from the king of Spain, there to preside as a naturalist, with the offer of an annual pension for life of 2000 pisoles, letters of nobility, and the perfect free exercise of his own religion: But, after the most perfect acknowledgments of the singular honour done him, he returned for answer, that if he had any merit, they were due to his own country.

In the year 1755, the Royal Academy of Sciences at Stockholm honoured our professor with one of the first premiums, agreeably to the will of Count Sparre; who...
Linnaeus, who had decreed two gold medals, often of great value, each to be annually given by the academy to the author of such papers as the preceding year's Stockholm Acts, as should be judged most useful in promoting agriculture particularly, and all branches of rural economy. This medal bore on one side the arms of the count, with this motto. Superstes in scientiis amors Frederici Garp. Linnaeus obtained it in consequence of a paper De Plantis, quae Sveciis Sueciarium indigens, magnifici et commodi eiusmodis emolumento firma prestitit, and the ultimate intention was to recommend these plants, as adapted to culture in Lapland. This paper was inserted in the Stockholm Acts for 1754, vol. xv. Linnaeus also obtained the premium centum annorum, proposed by the Imperial Academy of Sciences at Petersburg, for the best paper written to establish or disprove, by new arguments, the doctrine of the sexes of plants. It was, if possible, an additional glory to Linnaeus to have merited this premium from the Petersburg academy, as much as a professor of that society, a few years before, had with more than common zeal, although with a facility like that of the other antagonists of our author, endeavoured to overturn the whole Linnaean system of botany, by attempting to show that the doctrine of the sexes of plants had no foundation in nature, and was unsupported by facts and experiments.

It appears that Linnaeus, upon the whole, enjoyed a good constitution; but that he was sometimes severely afflicted with a hemiplegia, and was not exempted from the gout. About the close of 1776, he suffered with an apoplexy, which left him paralytic; and at the beginning of the year 1777, he suffered another stroke, which very much impaired his mental powers. But the disease supposed to have been the more immediate cause of his death, was an ulceration of the urinary bladder, of which, after a tedious indisposition, he died, January 11, 1778, in the 71st year of his age.

His principal other works, besides those already mentioned, are, Iterollandicum et Gotlandicum, Iter Scoticum, Flora Suecia, Fauna Suecia, Materia Medica, Philosophia Botanica, Genera Botanorum, different papers in the Acta Ufaliensia, and the Amoenitates Academicae. The last of this great man's treatises was the Manutia Altera, published in 1771; but before his death he had finished the greatest part of the Manutia Terra, afterwards completed and published by his son.

To the lovers of science it will not appear strange, nor will it be unpleasant to hear, that uncommon respect was shown to the memory of this great man. We are told, that "on his death a general mourning took place at Upal, and that his funeral procession was attended by the whole university, as well professors as students, and the pall supported by sixteen doctors of physic, all of whom had been his pupils." The king of Sweden, after the death of Linnaeus, ordered a medal to be struck, of which one side exhibits Linnaeus's bust and name, and the other Cybele, in a dejected attitude, holding in her left hand a key, and surrounded with animals and growing plants; with this legend, Deam indiis augusti amici, and beneath, Post obitum Up. faliens. Jan. m. dio. x. Aug. 1778. This generous monarch not only honoured the Royal Academy of Sciences with his presence when Linnaeus's commemoration was held at Stockholm, but, as a still higher tribute, in his speech from the throne to the assembly of the states, he lamented Sweden's loss by his death. Nor was Linnaeus honoured only in his own country. The late worthy professor of botany at Edinburgh, Dr Hope, not only pronounced an elegium in honour of him before his students at the opening of his lectures in the spring 1778, but also laid the foundation-stone of a monument (which he afterwards erected) to his memory, in the botanic garden there; which, while it perpetuates the name and merits of Linnaeus, will do honour to the founder, and, it may be hoped, prove the means of raising an emulation favourable to that science which this illustrious Swede so highly dignified and improved.

As to the private and personal character of this illustrious philosopher: His stature was diminutive and puny; his head large, and its hinder part very high; his look was ardent, piercing, and apt to daunt the beholder; his ear not sensible to music; his temper quick, but easily appeased.

Nature had, in an eminently manner, been liberal in the endowments of his mind. He seems to have been possessed of a lively imagination, corrected however by a strong judgment, and guided by the laws of fancy. He was of a most retentive memory, an unmitting industry, and the greatest perseverance in all his pursuits; as is evident from that continued vigour with which he prosecuted the design, that he appears to have formed so early in life, of totally reforming and fabricating anew the whole science of natural history; and this fabric he raised, and gave to it a degree of perfection unknown before; and had moreover the uncommon felicity of living to see his own structure rise above all others, notwithstanding every discouragement its author at first laboured under, and the opposition it afterwards met with. Neither has any writer more cautiously avoided that common error of building his own fame on the ruin of another man's. He every where acknowledged the several merits of each author's system; and no man appears to have been more sensible of the partial defects of his own. Those anomalies which had principally been the objects of criticism, he well knew every artificial arrangement must abound with; and having laid it down as a firm maxim, that every system must finally rest on its intrinsic merit, he willingly commits his own to the judgment of posterity. Perhaps there is no circumstance of Linnaeus's life which shows him in a more dignified light than his conduct towards his opponents. Disavowing controversy, and justly considering it as an unimportant and fruitless sacrifice of time, he never replied to any, numerous as they were at one season.

To all who see the aid this extraordinary man has brought to natural science, his talents must appear in a very illustrious point of view; but more especially to those who, from similarity of taste, are qualified to see more distinctly the vast extent of his original design, the greatness of his labour, and the elaborate execution he has given to the whole. He had a happy command of the Latin tongue, which is alone the language of science; and no man ever applied it more successfully to his purpose, or gave to description such copiousness, united with that precision and conciseness which so eminently characterise his writings.
They lived to enjoy the fruit of his own labour in an uncommon degree. Natural history raised itself in Sweden, under his culture, to a state of perfection unknown elsewhere; and was from thence diffeminated through all Europe. His pupils diffeminated themselves over all the globe; and with their master's fame, extended both science and their own. More than this, he lived to see the sovereigns of Europe establishe several public institutions in favour of this study; and even professorships establishe in divers universities for the same purpose, which do honour to their founders and patrons, and which have excited a curiosity for the science, and a sense of its worth, that cannot fail to further its progress, and in time raise it to that rank which it is entitled to hold among the pursuits of mankind.

LINNÉ, in ornithology. See Fringilla. It is remarkable of this bird, that when it builds in hedges, and when in furze-bushes on heaths, in both which places the nests are very common, they are made of very different materials. When they build in hedges, they use the slender-filaments of the roots of trees, and the down of feathers and thistles; but when they build on heaths, they use moss, principally for the other part, finishing it within with such things as the Vol. X.
LINUM. It received a Roman colony at the same time with Putopol and Vulturnum; was improved and enlarged by Augustus; afterwards forfeited its right of colonyship, and became a prefecture. Hither Scipio Africanus the Elder retired from the mean envy of his ungrateful countrymen; and here he died, and was buried: though this last is uncertain, he having a monument both here and at Rome. No vestige of the place now remains.

LINTSTOCK, in military affairs, a wooden staff about three feet long, having a sharp point in one end and a fort of a fork or crotch on the other; the latter of which serves to contain a lighted match, and by the former the lintstock is occasionally flucked in the ground, or in the deck of a ship during an engagement. It is very frequently used in small vessels, where there is commonly one fixed between every two guns, by which the match is always kept dry, and ready for firing.

LINTZ, a very handsome town of Germany, and capital of Upper Austria, with two fortified castles; the one upon a hill, the other below it. Here is a hall in which the states assemble, a bridge over the Danube, a manufacture of gunpowder, and several other articles. It was taken by the French in 1741, but the Austrians retook it in the following year. E. Long. 14° 33'. N. Lat. 48° 16'.

LINZ, a town of Germany, in the circle of the Lower Rhine, and Electorate of Cologne, subject to that elector. It is seated on the river Rhine, in E. Long. 7° 11'. N. Lat. 50° 31'.

LINUM, flax; a genus of the pellagynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 14th order, Graminaceae. The calyx is pentaphyllous; the petals are five; the capsule is quinquevalved and decemlocular; as the seeds, by way of tea, is recommended in coughs as an excellent emollient and anodyne; they are used externally in catarrhs, to aflige the pain of inflamed tumors; internally, a slight infusion of linseed, by way of tea, is recommended in coughs as an excellent pectoral, and of great service in pleuritises, nephritic complaints, and suppurations of urine. The virtue of the third species is expressed in its title: an infusion in water or whey of a handful of the fresh leaves, or a dram of them in substance when dried, are said to purge without inconvenience.

LINUS, in classical history, a native of Colchis, contemporary with Orpheus, and one of the most ancient poets and musicians of Greece. It is impossible, at this distance of time, to discover whether Linus was the disciple of Orpheus, or Orpheus of Linus. The majority, however, seem to decide this question in favour of Linus. According to archbishop Uther, he flourished about 1280 B. C., and he is mentioned by Euhbian among the poets who wrote before the time of Moses. Diodorus Siculus tells us, from Dionysus of Mitylene the historian, who was contemporary with Cicero, that Linus was the first among the Greeks who invented verses and music, as Cadmus first taught them the use of letters. The same writer likewise attributes to him an account of the exploits of the first Bacchus, and a treatise upon Greek mythology, written in Pelasgian characters, which were also those used by Orpheus, and by Pronapides the preceptor of Homer. Diodorus says that he added the string to the Mercurian lyre, and ascribes to him the invention of rhime and melody; which Suidas, who regards him as the most ancient of lyric poets, confirms. Mr Marpurg tells us, that Linus invented cat-gut firings for the use of the lyre, which, before his time, was only strung with thongs of leather, or with different threads of flax strung together. He is said by many writers to have had several disciples of great renown; among whom were Hercules, Thamyris, and, according to some, Orpheus.—Herocrates, says Diodorus, in learning from Linus to play upon the lyre, being extremely dull and obtuse, provoked his master to strike him; which so enraged the young hero, that, infinitely feizing the lyre of the musician, he beat out his brains with his own instrument.

LION, in zoology. See Felis.

LIONCELLES, in heraldry, a term used for several lions borne in the same coat of arms.

LIOTARD, called the Turk, an eminent painter, was born, at Geneva in 1702, and by his father was destined for a merchant; but by the persuasion of his friends, who observed the genius of the young man, he was permitted to give himself up to the art of painting. He went to Paris in 1725, and in 1738 accompanied the marquis de Puygues to Rome, where he was going ambassador to Naples. At Rome he was taken notice of by the earls of Sandwich and Beaufort, then lord Duncannon, who engaged Liotard to go with them on a voyage to Constantinople. There he became acquainted with the late lord Edgcumbe, and Sir Edward Cavendish, English ambassadors, who prevailed upon him to come to England, where he flourished two years. In his journey to the Levant he adopted the eastern habits.
LIP, in anatomy. See there, \textit{n} 102.

Here Lip, a disorder in which the upper lip is in a manner slit or divided so as to resemble the upper lip of a hare, whence the name. See \textit{Surgery}.

LIPARA (anc. geog.), the principal of the islands called \\textit{Eosia}, situated between Sicily and Italy, with a cognominal town, so powerful as to have a fleet, and the other islands in subjection to it. According to Diodorus Siculus, it was famous for excellent harbours and medicinal waters. He informs us also, that it suddenly emerged from the sea about the time of Hannibal's death. The name is Punica, according to Bochart; and given it, because, being a volcano, it thone in the night. It is now called Lipari, and gives name to nine others in its neighbourhood; viz. Stromboli, Pace, Rotto, Panaria, Saline, Vulcano, Feticula, Alicor, and Utica. These are called, in general, the Lipari Islands. Some of these are active volcanoes at present, though Lipari is not. It is about 12 miles in circumference; and abounds in corn, figs, and grapes; bitumen, sulphur, alum, and mineral waters.

LIPARI, an ancient and very strong town, and capital of an island of the same name in the Mediterranean, with a billy's fee. It was ruined by Barbarossa in 1544, who carried away all the inhabitants into slavery, and demolished the place; but it was rebuilt by Charles V. E. Long. 35. N. Lat. 29. 35.

Lipari, properly, is the general name of a cluster of islands. Thence, according to Mr Houel, are principally ten in number, the rest being only uninhabitable rocks of narrow extent. The largest and the most populous of them, that above-mentioned, communicates its name to the rest. Vulcano is a desert but habitable island, lying south from the large island of Lipari. Saline, which lies west-north-west from the same island; Fe- stiudi, nearly in the same direction, but twenty miles farther distant; and Alcudia, ten miles south-west of Felicudi; are inhabited. Panarea is east of Lipari, the famous Stromboli north-east, and both of them are inhabited. The rest are in a desert state; such as Batilica, which was formerly inhabited; Attalo, which might be inhabited; and L'Echambiana, on which some remains of ancient dwellings are still to be found. L'Echambia is nothing but a bare rock.

The termicola, a word signifying ants, are a chain of small black cliffs which run to the north-east of Lipari, till within a little way of L'Echambiana and Eicunera, rising more or less above the water, according as the sea is more or less agitated.

Ancient authors are not agreed with respect to the number of the Lipari islands. Few of those by whom they are mentioned appear to have seen them; and in places such as these, where subterraneous fires burst open the earth and raise the ocean from its bed, terrible changes must sometimes take place. Vulcano and Vulcano were once separated by a strait so as to form two islands. The lava and ashes have filled up the intervening strait; and they are now united into one island, and have by this change become much more habitable.

The castle of Lipari stands on a rock on the east quarter of the island. The way to it from the city leads up a gentle declivity; there are several roads to it. This castle makes a part of the city; and on the summit of the rock is the citadel, in which the governor and the garrison resides. The cathedral stands in the same situation. Here the ancients, in conformity to their usual practice, had built the temple of a tutelary god. The citadel commands the whole city; and it is accessible only at one place. Were an hostile force to make a descent on the island, the inhabitants might retreat hither, and be secure against all but the attacks of famine.

The ancient inhabitants had also fortified this place. Confiderable portions of the ancient walls are still standing in different places, particularly towards the south; their structure is Grecian; and the stones are exceedingly large, and very well cut. The layers are three feet high, which shows them to have been raised in some very remote period. These remain are surrounded with modern buildings. The remains of walls, which are still to be seen here, have belonged not only to temples, but to all the different sorts of buildings which the ancients used to erect. The vaults, which are in a better state of preservation than any of the other parts of these monuments, are now converted to the purposes of a prison.

In the city of Lipari there are convents of monks of two different orders; but there are no convents for women, that is to say, no cloisters in which women are confined; there, however, whose heads and hearts move them to embrace a state of pious celibacy, are at liberty to engage in a monastic life, with the concurrence of their confessors. They put on the sacred habit, and vow perpetual virginity, but continue to live with their father and mother, and mix in society like other women. The vow and the habit even enlarge their
L I P  

Lipari. their liberty. This custom will, no doubt, M. Houel observes, appear very strange to a Frenchwoman; but this was the way in which the virgins of the primitive church lived. The idea of shutting them up together did not occur till the fifth century. The life of these religious ladies is less gloomy than that which those under the same vows lead in other countries. They wear cloaths of particular colours, according as they belong to this or that order. Their dresses give them a right to frequent the church at any hour; and the voice of centurie, which takes particular pleasure in directing her attacks against pious ladies, goes so far as to assert, that some young women assume this habit with no other views but that they may enjoy greater freedom.

In this island oxen of a remarkably beautiful species are employed in ploughing the ground. The ancient plough is still in use here. The mode of agriculture practised here is very expeditions. One man traces a furrow, and another follows to sow in it grain and pulse. The ploughman, in cutting the next furrow, covers up that in which the feed has been sown: and thus the field is both ploughed and sown at once. Nature seems to be here uncommonly vigorous and fertile. Vegetation is here more luxuriant, and animals gayer and more healthful, than almost anywhere else.

Near the city of Lipari, the traveller enters deep narrow roads, of a very singular appearance. The whole island is nothing but an assemblage of mountains, all of them consisting of ashes or lava discharged from the depths of the volcano by which it was at first produced. The particles of this pumoline, or ashes, are not very hard; the action of the rain-water has accordingly cut out trenches among the mountains; and these trenches being perhaps less uneven than the rest of the surface, have of consequence been used as roads by the inhabitants, and have been rendered much deeper by being worn for so many ages by the feet of men and other animals. These roads are more than five or six fathoms deep, and not more than seven or eight feet wide. They are very crooked, and have echoes in several places. You would think that you were walking through narrow streets without doors or windows. Their depth and windings shelter the traveller from the sun while he is passing through them; and he finds them deliciously cool.

The first volcanic eruption in the Lipari islands, mentioned in history, is that of which Calliastakes notice of in his history of the wars in Sicily. Callias was contemporary with Agathocles. That eruption continued without interval for several days and nights; and threw out great fountains, which fell at more than a mile's distance. The sea boiled all around the island. The works of Callias are lost, and we know not whether he descended too close detail of particulars concerning the ravages produced by this eruption. Under the confusion of Eumelis Lepidus and L. Aurelius Oratus, 126 years before the Christian era, these islands were affected with a dreadful earthquake. The burning of Etna was the first cause of that. Around Lipari and the adjacent islands, the air was all on fire. Vegetation was withered; animals died; and fusible bodies, such as wax and resin, became liquid. If the inhabitants of Lipari, from whom our author received these facts, and the writers who have handed down an account of them, have not exaggerated the truth, we must believe that the sea then boiled round the island; the earth became hot as to burn the cables by which vessels were fixed to the shore, and consumed the planks, the oars, and even the small boats.

Pliny, the naturalist, speaks of another similar event which happened 30 or 40 years afterwards, in the time of the war of the allied states of Italy against Rome. One of the Eolian islands, says he, was all on fire as well as the sea; and that prodigy continued to appear till the senate appealed, by a deputation, the wrath of the gods. From the time of that war, which happened 86 years before the birth of our Saviour, till the year 1444 of our era, we have no account of any eruption of these volcanoes; and from that period again, till the year 1444, we hear of no explosion from them, that is, for the space of 1300 years. But, at that time, both Sicily and the Eolian islands were agitated by dreadful flocks of earthquake: the volcano of these islands poured forth streams of lava with an awful violence, and cut its way on the plain. Smoke which rose to an amazing height. After it discharged enormous fountains which fell at the distance of more than six miles.

A century later, in the year 1550, the fury of this volcano was again renewed. The ashes and fountains discharged from the crater filled up the strait between Volcano and Vulcano.

About two centuries after that, in the year 1739, there was a sixth eruption. The burments of the volcanic fire were attended with a noise so dreadful, that it was heard as far as Melazzo in Sicily.

Father Leandro Alberti says, that on one of those dreadful occasions, the women of Lipari, after employing in vain all the faints, vowed no more wine if the volcano should spare them. Their giving up this small gratification was doubles of great service; yet the eruptions still continue, and have even become more frequent since that time. Only 36 years intervened between this eruption and that which happened in the year 1775. The whole island was then shaken; subterraneous thunder was heard; and considerable fountains of flame, with smoke, fstones, and vitreous lava, issued from the crater. Lipari was covered over with ashes; and part of the city was conveyed by the winds all the way into Sicily. Five years after, however, in the month of April 1780, there issued a new explosion from Volcano; the smoke was thick, the shocks contempt, and the subterraneous noise very frequent. So great was the confusion among the inhabitants of Lipari on this occasion, that the commander Deodati Dolomieu, who visited these islands not long after that event, informs us, that the inhabitants in general, but especially the women, devoted themselves as slaves to the service of the blessed virgin; and wore on their arms, as tokens of their fervitude, small iron chains, which they fill continue to wear.

This act of piety, however, was not so efficacious as the deputation of the fathers had been. For after that deputation, more than 200 years passed, and many a year, without the Eolian islands were afflicted by any other eruptions, at least by any considerable one; whereas, in three years after the ladies devoted themselves in so submissive a manner to the service of the virgin, the islands of Lipari...
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Lipari. The dry baths of St Calogero, in the island of Lipari, are flores, where sulphureous exhalations, known to be of a fiddle nature, alight out of the earth by holes or siphonais. A range of apartments are built around the place where the exhalations arise.

The heat is communicated through those apartments in such a way, that when entering at one end, you advance towards the other, the heat still increases upon you till you gain the middle apartment, and again diminishes in the same manner as you proceed from the middle to the other end of the range of chambers. In consequence of this disposition of these apartments, the sick person can make choice of that temperature which best suits the nature of his disease. There are a few miserable huts and a small chapel for the accommodation of the people who repair to these baths.

The people of the place are ready to attend them. Physicians likewise follow their patients thither, when the disease is of such a nature as to render their attendance requisite, and the patient rich enough to afford them hand-some fees: but there is no physician settled in the place. Besides these dry baths, there are baths of hot water distinguished by the name of St Calogero's baths. There are around them buildings sufficient to lodge a considerable number of sick people with their necessary attendants.

At present, however, those buildings are in bad condition. The baths consist of two halls; one square, the other round. The former is antique; it has been built by the Romans; it is arched with a cupola, and 12 feet in diameter; it has been repaired: The other is likewise arched with a cupola both within and without. The water comes very hot into the first. It gushes up among pieces of lava, which compose a part of the mountain at the foot of which these baths are built. Those fones remain in their natural state. All that has been done is the raising of a square building, including them. Within that building the sick persons either sit down on the stones, or immerse themselves in the intervening cavities which are filled with water.

They continue there for a certain time, and approach nearer to, or remain at a farther distance from, the spring, according as their physicians direct. The place serves also as a flowers. The hot vapours arising from the water communicate to the surrounding atmosphere a considerable degree of heat. It is indeed not inferior to that of the hot baths of Termini, which owe their heat to a similar cause. In these baths, therefore, a person can have the benefit either of bathing in the hot water, or of expelling himself to the vapour, the heat of which is more moderate. The bath before mentioned, under the appellation of dry bath, is also a flower; but the hot vapour with which it is filled issue directly from the volcano. The place of the bath is, however, at such a distance from the volcanic focus, that the heat is not at all intolerable.

The mountain at the foot of which these baths are situated is round, and terminates at the summit in a rock of petrified ashes, which are very hard and of a very fine grain. This petrification consists of pretty regular strata, and appears to have been greatly prior in its origin to the adjacent rocks; which consist likewise of ashes, but ashes that have been deposited at a much later period. From this rock there proceeds likewise a stream of hot water, by which some mills in the neighbourhood are moved.

It cannot but appear surprising, that nature has placed nearly on the summit of a volcanic mountain springs which supply so considerable a quantity of water. To account for such a phenomenon would be well worthy of some ingenious naturalist. Nor are the hot springs all; proceeding around the same hill, at about a mile's distance, we find a spring of cold water, which originates from the summit of the same rock; that on the north-west produces three hot springs. The cold water is very pleasant to drink, and much used by both men and cattle.

Among these mountains there are many enormous loose masses of lava, the appearance of which, M. Houel informs us, naturally leads the observer to take notice that the lava of the volcano of Lipari is of a much greater diversity of colours, and those richer and more lively, than the lava of Vesuvius and Etne. The lava of Lipari is in some places, for several miles, of a beautiful red colour. It contains likewise in great abundance small black crystallized sioræ, as well as the small white grains which are commonly found in lava.

Among the eminences which overlook the city of Lipari, there are some rocks of a species which is very rare in Europe. Those are large masses of vitrified matter, which rise six or eight feet above the surface of the ground, and appear to extend to a great depth under it. They exist, through that range of mountains, in enormous masses, mixed with lavas of every different colour, and always standing detached and isolated. Were they cut and followed under ground, they would probably be found to exist in immense quarries in the bowels of the earth. The glass of which they consist might be employed with great advantage in manufactures. It is ready made, and might be easily purified. It is green, compact, and transparent.

The cultivation of the ground is the chief employment of the inhabitants of Lipari. The possession of a few acres of land here gives a man great importance. Parents, when they settle their children, rather give them money than any part of their lands.

More than two-thirds of the island is planted with vines: three-fourths of the grapes which these produce are dried, and sent mostly to London under the name of Paffola. There are different sorts of paffola; one of these, called the black paffola, is prepared from a particular kind of grape, of which the berries are uncommonly small; sold to Monthrés, Holland, and Tiroi. The vials are in small arbourns, which rise only to the height of two feet and an half above the ground. Under those arbours there grow beans, gourds, and other leguminous vegetables. In so hot a climate, the shade of the vials does not injure but protects the vegetables growing under it; they would otherwise be withered by the heat of the sun.

The method of preparing paffola and paflòina is curious enough: They first make a liquissum of common ashes; after boiling this, they pass it through a cloth or a sieve; they then put it again on the fire; and
when it is observed to boil hard, suddenly immerse the
grapes, but instantly bring them out again, and ex­
plode them to the fun to dry on broad frames of cane.
When sufficiently dry, the raisins are put into casks
and barrels to be folded and exported. The number of
casks of different sorts of raisins annually exported
from Lipari are estimated at 10,000.

This island likewise produces figs. There is some
white mulmey and a little red wine exported from it.

About 60 or 80 years since, sulphur was one of the
articles with which the inhabitants of this island sup­
plied foreign merchants. But that trade has been gi­
given up; from an idea which the Liparese entertain,
that sulphur infects the air so as to injure the fertility
of the vines. The same prejudice prevails in Sic­
ily; but it seems to be ill-founded.

There are courts of justice in Lipari, of the same
powers and character with those in the cities of Si­
cily. Causes of more than ordinary importance are
Carried to Palermo.

The island is entirely free from every kind of im­
position. The king receives nothing from it; because
Count Roger anciently bestowed on his bishop all his
rights of royalty over Lipari. The bishop there re­
ceived annually from the inhabitants a tenth part of
the products of their lands. They after wards to pre­
vent fraud, calculated the value of that tithe for one
year; and on the condition of their paying in future
a sum of money equal to what that year’s tithe was
valued at, he not only gave up his right to the tithe,
but also ceded to them a considerable extent of land
which belonged to him.

In the archiepiscopal palace, and in the palace of
the Baron de Monizzi, there are some noble pieces
of painting by Sicilian painters:—A St Peter, a St
Rosalia, Jesus disputing with the Jewish doctors, the
archiepiscopal throne, the incredibility of St Thomas.

LIPOThymIA, Painting, may arise from several
causes: as too violent exercise, suppression of the
menstruæ, or other accustomed evacuations, &c. See
the Index subjoined to Medicine.

Lippa, a town of Hungary, with a castle. It
was taken by the Turks in 1552; by the Imperialists
in 1688; and by the Turks again in 1691; who aban­
donied it in 1695, after having demolished the fortifi­
cations. It is leat on a mountain, in E. long. 21°
55. N. lat. 26. 5.

Lippa, the capital of a country of the same name
in Germany, and in the circle of Westphalia. It sits
on a river of the same name, and was formerly the
residence of the principal branch of the house of Lippe.
It is now in the possession of the king of Prussia, and
carries on a good trade in preparing timber for build­
ing vessels on the Rhine, with which it has a commu­
nication by the river Lippe. The country round it is un­
wholesome and marshy. E. long. 8° 12. N. lat. 51°
43.

LIPPI (Lorenzo), a painter of history and portraits,
was born in 1485, and learned the principles of pain­
ting from his father, and from Matteo Boffelli. He had an exquisite genius
for music and poetry, as well as for painting; and in
the latter, his proficiency was so great that some of
his compositions in the historical style were taken for
those of Bottelli. However, growing at last dissatisfied
with the manner of that master, he chose the manner
of Santi di Tito, who was excellent both in design and
invention, and appeared to have more of simple nature
and truth in his compositions than any other artist of
that time. At Florence Lippi painted many grand
designs for the chapels and convents, by which he larged his reputation; and at the court of Inpruck,
he painted a great number of portraits of the first no­
bility, which were deservedly admired. Yet, altho’
he was fond of imitating simple nature without any
embellishments from invention, his works are held in
the highest esteem for the graceful airs of the heads,
for the correctness of his outlines, and for the
elegant disposition of the figures. He died in 1664.

LIPIUS (Johus), a learned critic, was born at
Iech, a small village near Bruges, in 1547. After
having distinguished himself in polite literature, he
became secretary to cardinal de Granvelian at Rome,
where the best libraries were open to him; and he spent much labour in collating the MSS. of ancient
authors. He lived 13 years at Leyden; during which
he composed and published what he effects his best
works; but resided at Louvain, where he taught pol­
ite literature with great reputation. He was re­
markable for unfeathinf in religion, fluctuating often
between the Protestants and Papists; but he became
finally a bigot Catholic. He died at Louvain in
1609; and his works are collected in six volumes folio.

LIQEFACATION, an operation by which a fo­
lid body is reduced into a liquid; or the action of fire
or heat on fat and other fusible bodies, which puts
their parts into a mutual interminable motion. The lique­
faction of wax, &c. is performed by a moderate heat;
that of salt tartari, by the mere moisture of the air.
All fats liquify; sand, mixed with alkalies, becomes
liquefied by a reverberatory fire, in the making of
glass. In speaking of metals, instead of liquefaction,
we ordinarily use the word fusion.

LIQUID, a body which has the property of fluidi­
ty; and besides that, a peculiar quality of wetting
other bodies immersed in it, arising from some con­
figuration of its particles, which dispaces them to ad­
hire to the surfaces of bodies contiguous to them. See Fluid.

LIQUID, among grammarians, is a name applied to
certain consonants opposed to mutes. Thus l, m, n,
and r, are liquids.

LIQUIDAMBAR, SWEET-GUM-TREE, in botany:
A genus of the polyandria order, belonging to the
monocera class of plants: and in the natural method
ranking with those of which the order is doubtful.
The male calyx is common, and triphylous; there is
no corolla, but numerous filamenta; the female calyces
are collected into a spherical form, and tetraphylous;
there is no corolla, but seven styles; and many bi­
valved and monopensorous capsules collected into a
sphæra. There are only two species, both decidu­
os, viz. 1. The Hyracida, or the Virginian or
maple-leaved liquidambar; a native of the rich moift
parts of Virginia and Mexico. It will shoot in a regu­
lar manner to thirty or forty feet high, having its
young twigs covered with a smooth, light-brown bark,
while those of the older are of a darker colour. The
leaves are of a lucid green, and grow irregularly on
the young branches, on long footstalks: They resemble
those of the common maple in figure; the lobes are all
ferrated: and from the base of the leaf a strong mid­
The flowers are of a kind of saffron colour: They are produced at the ends of the branches the beginning of April, and sometimes sooner; and are succeeded by large round brown fruit, which looks singular, but is thought by many to be no ornament to the tree. 2. The peregrinum, Canada liquidambar, or spleenwort-leaved gale, is a native of Canada and Pennsylvania. The young branches of this species are slender, rough, and hardy. The leaves are obovate, of a deep green colour, hairy underneath, and have indistinct edges on their edges alternately very deep. The flowers come out from the sides of the branches, like the former; and they are succeeded by small roundish fruit, which seldom ripens in England.

Propagation. This may be performed either by seeds or layers; but the first method is the best. 1. They receive the seeds from America in the spring. Against their arrival, a fine bed, in a warm well sheltered place, should be prepared. If the soil is not naturally good, and inclined to be sandy, it should be wholly taken out near a foot deep, and the vacancy filled up with earth taken up a year before from a fresh pasture with the sward, and all well rotted and mixed by being often turned, and afterwards mixed with a fifth part of drift or sea-fand. A dry day being made choice of, early in March, let the seeds be sown, and the finest of this compost riddled over them a quarter of an inch deep. When the hot weather in the spring comes on, the beds should be shaded, and waterings given often, but in very small quantities, often affording them a gentle, nay, a very small sprinkling, at a time. Miller says the seeds of these plants never come up under two years. But, continues Hanbury, with this easy management, I hardly ever knew it longer than the end of May before the young plants made their appearance. The plants being come up, shading should still be afforded them in the parishing summer, and a watering every other night; and this will promote their growth, and cause them to become stronger plants by the autumn. In the autumn, the beds should be hooped to be covered with mats in the severe frosts. These mats, however, should always be taken off in open weather; and this is all the management they will require during the first winter. The succedaneum sower they will require no other trouble than weeding; though, if it should prove a dry one, they will find benefit from a little water now and ever knew it longer than the end of May before the young plants made their appearance. The plants being come up, shading should still be afforded them in the parishing summer, and a watering every other night; and this will promote their growth, and cause them to become stronger plants by the autumn. The two are found to take freely enough. By this method good plants may be obtained; though it is not so eligible as the other, if we have the convenience of procuring the seeds.

Properties. The leaves emit their odoriferous particles in such plenty as to perfume the circumambient air; nay, the whole tree exudes such a fragrant transparent resin, as to have given occasion to its being taken for the sweet florent. Thee trees, therefore, are very proper to be planted singly in large open, that they may amply display their fine pyramidal growth, or to be set in places near seats, pavilions, &c. The resin was formerly of great use as a perfume, but is at present a stranger in the shops.

LIQUOR, a name for any fluid substance of the aqueous or spirituous kind.

The principal beverage among the Jews, as well as the Greeks and Romans, in their early state, was water, milk, and the juices of various plants infused therein. For a long time, under the commonwealth of Rome, wine was so scarce, that in their sacrifices to the gods the libations were made with milk only. Wine did not become common there till A. U. C. 600, when vines began to be planted.

LIQUOR OF PLANTS. See CHEMISTRY, No. 1069.

Smoking Liquor of Liquor. See CHEMISTRY, No. 810.

Mineral Analyze Liquor of Hoffman. This is a composition of highly rectified spirit of wine, vitriolic ether, and a little of the dulcedoil of vitriol. It is made by mixing an ounce of the spirit of wine, which distills first in the distillation of ether, with as much of the liquor which is to be distilled, and afterwards by dissolving in the mixture which rises next, and which contains the ether, 12 drops of the oil which rises after the ether is passed. This has the same virtues with the ether, and is now generally distilled, the pure ether being sublimated in its place.

LIQUORICE. See GLYCERHIGA.

LIROIDENDRON, the Tulip-Tree, in botany: A genus of the polygina order, belonging to the polyandria class of plants; and in the natural method ranking under the 52d order, Gaudanata. The calyx is triphyllous; there are nine petals; and the seeds imbibed in such a manner as to form a cone. — There are but one species, viz., the tulip-sela, a deciduous tree, native of most parts of America. It rises with a large upright trunk, branching 40 or 50 feet high. The trunk, which often attains to a circumference of 30 feet, is covered with a grey bark. The branches, which are not very numerous, of the two-years-old wood, are smooth and brown; while the bark of the summer’s shoots is smoother and shining, and of a bluish colour. They are very pithy. Their young wood is green, and when broken emits a strong scent. The leaves grow irregularly on the branches, on long footstalks. They are of a particular structure, being composed of three lobes, the middle one of which is shortened in such a manner that it appears as if it had been cut off and hollowed at the middle: The two others are rounded off. They are about four or five inches long, and as many broad. They are of two colours: their upper surface is smooth, and of a stronger green than the lower. They fall off pretty early in autumn.
Lis [96]

The tulip-tree, in those parts of America where it grows common, affords excellent timber for many uses: particularly, the trunk is frequently hollowed, and made into a canoe sufficient to carry many people; and for this purpose no tree is thought more proper by the natives of those parts. In Europe, it may be stationed among trees of forty-feet growth.

LIS, or LyS (John Vander), painter of history, landscapes, and conversations, was born at Oldenburg in 1570, but went to Haarlem to place himself as a disciple under Henry Goltzius; and as he was endowed with great natural talents, he soon distinguished himself in that school, and imitated the manner of his master with great success. He adhered to the same style till he went to Italy; where, having visited Venice and Rome, he studied the works of Titian, Tintoretto, Paolo, Veronese, and Domenico Fetti, so effectually, than he improved his taste and judgment, and altered his manner entirely. He soon received marks of public approbation; and his compositions became universally admired for their good expression, for their lively and natural colouring, and the sweetness and delicacy of his pencil: although it must be acknowledged that he could never totally divest himself of the ideas and taste peculiar to the Flemings. His subjects usually were histories taken from the sacred writings, or the representation of rural sports, marriages, balls, and villagers dancing, dressed in Venetian habits; all which subjects he painted in a small as well as a large size, with a number of figures, well designed, and touched with a great deal of delicacy. He was likewise accounted to paint naked figures admirably, with natural and elegant attitudes, and a very agreeable turn of the limbs.

A capital picture of this master is, Adam and Eve lamenting the death of Abel; which is extremely admired, not only for the expression, but also for the beauty of the landscape: and in the church of St Nicholas at Venice is another of his paintings, representing St Jerome in the desert, with a pen in his hand, and his head turned to look at an angel, who is supposed to be foundling the last trumpet. The colouring of this picture is rather too red; but it is designed in a fine style, and charmingly pencilled. The paintings of this master are very rarely to be purchased. He died in 1629.

LIS (John Vander) of Breda, historical painter, was born at Breda about the year 1601, and became a disciple of Cornelis Poelburg, whose manner he imitated with extraordinary exactness, in the raiment, his neatness of pencilling, and the choice of his subjects. There are some paintings of this master's hand, which, tho' they appear to have somewhat less freedom and lightness of touch, are nearly equal to those of Poelburg, and are frequently taken to be his. At Rotterdam, in the possession of Mr Biffchop, there is a delicate painting representing Diana in the Bath, attended by her nymphs; and his most capital performance, in England, is said to be in the possession of the Viscount Middleton. The portrait of Vander Lis, painted by himself, is in the collection of Horace Walpole, Esq., which is described by him as ingeniously gentle, as being worked up equal to the smoothest of cameo.

LISBON, the capital of the kingdom of Portugal, situated in the province of Estremadura, on the banks of the river Tagus, in W. Long. 9° 25'. N. Lat. 38° 25'. It was anciently called Olisipo, Olijipo, and Usippe, which are supposed to be derived from the Phoenician Ulisaba or Olisipa, signifying in that tongue a pleasant bay, such as that on which this city stands. It first became considerable in the reign of king Emmanuel; from that king it hath been the capital of the kingdom, the residence of its monarchs, the seat of the chief tribunals, and offices of the metropolitan, a noble university, and the receptacle of the richest merchandise of the East and West-Indies. Its air is excellent; being refreshed by the delightful sea-breezes, and those of the Tagus. The city extends for about two miles along the Tagus; but its breadth is incomparable. Like old Rome, it stands on seven hills: but the streets in general are narrow and dirty, and some of them are very steep; neither are they lighted at night. The churches in general, are very fine; but the magnificence of the chapel-royal is amazing. Here is one of the finest harbours in the world; and there was a great number not
not only of fine churches and convents here, but also of other public buildings, and particularly of royal palaces, and others belonging to the grandees; but the greatest part of them, and of the city, were destroyed by a most dreadful earthquake, on Nov. 1, 1755, from which it required a long time to recover. The inhabitants, before the earthquake, did not at most exceed 150,000. The government of it is lodged in a council, consisting of a president, six councillors, and other inferior officers. The harbour has water enough for the largest ships, and room enough for 10,000 sail without being crowded. For its security, there is a fort at the mouth of the river, on each side, and a bar that runs across it, and is very dangerous to pass without pilots. Higher up, at a place where the river is considerably contracted, there is a fort called Torre de Belém, or the Tower of Belém, under whose guns all ships must pass in their way to the city; and on the other side are several more forts. Before the earthquake most of the private houses were old and unhappily, with lattice-windows; and the number of convents and colleges amounted to 50, namely, 22 for monks and 18 for nuns. The king’s principal palace stands on the river, and is large and commodious. Of the hospitals, that called the Great is obliged to receive all persons, of what degree, nation, or religion, forever, without exception. At the village of Belém, near Lisburn, is a noble hospital for decayed gentlemen who have served the king, and have not wherewithal to maintain themselves. That called the house of mercy is also a noble charity. In the centre of the city, upon one of the highest hills, is the castle, which commands the whole, being large and ancient, and having always a garrison of four regiments of foot. The cathedral is a vast edifice of the Gothic kind, but heavy and clumsy; it contains, however, great riches, and is finely adorned within. The square called Raffe is large, and surrounded with magnificent buildings. The whole city is under the ecclesiastical jurisdiction of the patriarch, who was appointed in the year 1717. Here is also an archbishop, who has, or at least had before the erection of the patriarchate, a revenue of 40,000 crowns, or 2000 l. sterling. The university, which was removed for some time to Coimbra, but afterwards re-founded to its ancient seat, makes a considerable figure, though much inferior to that of Coimbra.

LISBURN, a town of Ireland, in the county of Antrim and province of Ulster, 73 miles from Dublin. It was burnt down about 50 years ago; but is now rebuilt in a neat and handsome manner, and has a large linen manufactory. It is seated on the river Lagan, in W. Long. 6. 20. N. Lat. 54. 31. It gives title of earl to the family of Vaughan, and it returns two members to parliament; one half of the patronage of this borough being in the earl of Hertford. Fairs held 21st of July and 3rd of October.

LISLEUX, a considerable town of France, in Upper Normandy, with a bishop’s see. The churches and religious houses, and the bishop’s palace, are all very handsome structures. It is a trading place; and is seated at the confluence of the rivers Arbeek and Gaffe, in E. Long. 0. 20. N. Lat. 49. 11.

LISLE, a large, rich, handsome, and strong town of French Flanders, of which it is the capital, with a strong castle, and a citadel built by Vauban, and said to be the finest in Europe, as well as the best fortified. The large square, and the public buildings, are very handsome; and they have manufactures of silks, cambrics, and cambelets, as well as other fluffs, which have been brought to great perfection. It was taken by the duke of Marlborough, after three months siege, and the loss of many thousands of men, in 1708; but restored to the French by the treaty of Utrecht, in consideration of their demolishing the fortifications of Dunkirk. It is seated on the river Duele, 14 miles west of Tournay, 32 south-west of Ghent, 37 northwest of Mons, and 150 north of Paris, E. Long. 3. 9. N. Lat. 50. 38.

LISLE (Clauvius de), a learned historian, born at Vantoulers, in 1644. He Studied among the Jesuits at Pont a Mousson; took his degrees in law, and afterwards applied himself entirely to the study of history and geography; and to perfect himself in those sciences went to Paris, where the principal lords of the court became his scholars, and among the rest the duke of Orleans, afterwards regent of the kingdom. He wrote, 1. An historical account of the kingdom of Siam. 2. A genealogical and historical Atlas. 3. An abridgment of universal history. He died at Paris in 1720.

LISLE (William de), son of the farmer, and the most learned geographer France has produced, was born at Paris in 1675. He became first geographer to the king, royal censor, and member of the academy of sciences. He died in 1726. He published a great number of excellent maps, and wrote many pieces in the memoirs of the academy of sciences.

LISLE (Sir John), a brave loyalist in the time of the civil wars, was the son of a bookbeller in London, and received his education in the Netherlands. He signalized himself upon many occasions in the civil war, particularly in the last battle of Newbury; where, in the dusk of the evening, he led his men to the charge in his shirt, that his peron might be more conspicuous. The king, who was an eye-witness of his bravery, knighted him in the field of battle. In 1648, he rose for his majesty in Eilex; and was one of the royalists who, to obstinately defended Colchester, and who died for the defence of it. This brave man having tenderly embraced the corps of Sir Charles Lucas, his departed friend, immediately presented himself to the soldiers who flood ready for his execution. Thinking that they stood at too great a distance, he desired them to come nearer: one of them said, “I warrant you, Sir, we shall hit you.” He replied with a smile, “Friends, I have been nearer you when you have miffed me.” He was executed August 28th 1648.

LISMORE, one of the Welter islands of Scotland, seated at the mouth of Loch Linne, a capacious lake in Argyleshire, navigable for the largest ships to Fort William, which stands in the country called Lochaber. This island is above seven miles in length by one in breadth; and contains 1500 inhabitants. It abounds in limestone; from which, however, it has hitherto derived little advantage, owing to the want of good peat, the neglect of timber, and still more the duty upon coals. Thus, with the advantages of navigation in every direction, and of a foil lying upon the richest manure the people are indigent, and frequently obliged to import meal for their subsistence. Many of them...
LISMORE, a borough, market, fair, and post town of Ireland, in the county of Waterford, and province of Munster, 100 miles from Dublin; N. Lat. 52° 5' W. Long. 7° 50'. It was anciently called Lismore or Lóis-more, i.e. the great enclosure, or habitation; it is now a bishopric, and formerly had an university. St Carthagh of Mochuda, in the beginning of the seventeenth century founded an abbey and school in this place, which in a short time was much restored, to not only by the natives, but also by the Britons and Saxons, during the middle ages. According to an ancient writer of the life of St Carthagh, Lismore was in general inhabited by monks, half of it being an asylum into which no woman dared to enter; consisting entirely of cells and monasteries, the ruins of which, with seven churches, are yet visible. A castle was built here by King John. The fire of Lismore was in early ages denominated nugh flain, or the "chosen fluid," being the situation of a dun or fort of the ancient chieftains of the Decies, one of whom granted it to St Carthagh on his expulsion from the abbey of Ratheny in Wexford. On becoming an university, Math Sgiath obtained the name of Dunlignan, or the "fort of the Saxons," from the number of Saxons which removed thence: but soon after, it was called Lóis-na Rwor or Lóismore, and now Lismore; the bishopric of which was united to that of Waterford in 1663, being 730 years after its foundation. The public road to Cork was formerly through this place, and at that time it had a better face of buildings. St Carthagh, who retired to this place with some of his religious in 636, to avoid the fury of the then Irish monarch, tied his disciples to a most strict rule of life; they never were allowed the use of flesh, fish, or fowl; only the vegetables that the ground produced at the expense of their own labour. Father Daniel, in his Histoire Monastique, mentions one on the same foundation in France. The castle here, which as we have formerly mentioned, was built by King John, was erected in 1195 on the ruins of the abbey of St Carthagh; it belonged to the Duke of Devonshire, and gave birth to that great philosopher Robert Boyle. In 1269 it was demolished by the Irish, who took it by surprise. Being afterwards re-edified, it was for many years an episcopal residence, till Myler McGrath, archbishop of Cashel, and bishop of this see, granted the manor of Lismore to that noted scholar and soldier Sir Walter Raleigh, in the reign of Queen Elizabeth, at the yearly rent of L. 13 6s 8d; but that estate was lopped off with his head in the reign of King James I. After which it fell into the hands of Sir Richard Boyle, who purchased all Sir Walter's lands; he beautified the whole, and added many buildings to it, most of which were burned down in the Irish rebellion; at the breaking out of which, it was closely besieged by 5000 Irish, commanded by Sir Richard Beling, and was well defended by the young Lord Broghill, third son of the earl of Cork, who obliged them to raise the siege. The castle is boldly seated on the verge of a rocky hill, rising almost perpendicular to a considerable height over the river Blackwater. The entrance is by an ancient and venerable avenue of trees. Over the gate are the venerable arms of the first earl of Cork. Opposite to the entrance is a modern portrait of Bath flour, of the Doric order, designed by Inigo Jones. Most of the buildings have remained in ruins since the era of the rebellion; but the several offices that make up two sides of the square are kept in repair. At each angle is a tower, the chief remains of its former magnificence. In October 1785, the late duke of Rutland, then lord-lieutenant of Ireland, whilst on a visit in Munster, held a council in, and issued proclamations from this castle. The cathedral is still pretty well kept in repair. Here is a fine bridge over the river Blackwater, erected at a very great expence by the duke of Devonshire; this bridge is remarkable for the extent of the principal arch, the span of it being 102 feet. Below the town is a rich fishery for salmon, which is the greatest branch of trade here. Though this place is at present much reduced, yet Cambrensis informs us, that, not many years after the conquest, this was a very rich city, and held out some time against the English, who took it at last by storm, and gained rich plunder here, enough to load 16 sail of ships. It returns two members to parliament; patron, the duke of Devonshire, but the electors are called petuvalopera. Fairs held on 25th May and September, and 12th November.

LISSA, an island in the Gulph of Venice, on the coast of Dalmatia, belonging to the Venetians, where they have a fishery of eardines and anchovies. It produces excellent wine, and is 70 miles west of Ragusa. E. Long. 17° 0'. N. Lat. 43° 22'. LISSA, a town of Poland, in the palatinate of Posen, of which it is the capital. E. Long. 16° 0'. N. Lat. 52° 15'. LISSA, a village of Sileia, 16 miles from Breslau, remarkable for a battle fought between the Prussians and the Austrians on the 13th of December 1757, when the latter were entirely defeated.

LISSUS, (anc. geog.), the last town of Illyricum, towards Macedonia, situated on the Drilo. It had a capacious port, the work of Dionysius the Tyrant, who led the colony thither, enlarged and walled it round, (Diodorus Siculus,) now called Alfeo, in Albania, on the Dino, near the Gulph of Venice. E. Long. 20°. N. Lat. 42°.

LIST, in commerce, the border of cloth or stuff; serving not only to show their quality, but to preserve them from being torn in the operations of falling, dyeing, &c.—List is used on various occasions; but chiefly by gardeners for securing their wall-trees.

LIST, in architecture, a little square moulding, otherwise called a fillet, fillet, &c. See Plate XXXVIII. fig. 1.

List, is also used, to signify the inclosed field or ground whereon the ancient knights held their jousts and combats. It was so called, as being hemmed round with pales, barriers, or stakes, as with a list. Some of these were double, one for each cavalier; which kept them apart, so that they could not come nearer each other than a spear's length. See Joust, Tournament, Duel, &c.

Civil List, in the British polity. The expences defrayed by the civil list are those that in any shape relate to civil government; as, the expences of the household; all salaries to officers of state, the judges, and every one of the king's servants, the appontments to foreign
The civil list is indeed properly the whole of the king's revenue in his own distinct capacity; the rest being rather the revenue of the public, or its creditors, though collected and distributed again in the name and by the officers of the crown: it now standing in the same place, as the hereditary income did formerly; and as that has gradually diminished, the parliamentary appointments have increased. The whole revenue of queen Elizabeth did not amount to more than 600,000 a-year; that of king Char. I. was 800,000, and the revenue voted for king Charles II. was 1,200,000 l., though complaints were made (in the first years at least) that it did not amount to so much. But it must be observed, that under these sums were included all manner of public expenses; among which Lord Clarendon, in his speech to the parliament, computed, that the charge of the navy and land-forces amounted annually to 800,000 l., which was ten times more than before the former troubles. The same revenue, subject to the same charges, was settled on king James II.; but by the incease of trade, and more frugal management, it amounted on an average to 1,500,000 l. per annum, besides other additional customs granted by parliament, which produced an annual revenue of 400,000 l. out of which his fleet and army were maintained at the yearly expense of 1,100,000 l. After the revolution, when the parliament took into its own hands the annual support of the forces both maritime and military, a civil-list revenue was settled on the new king and queen, amounting, with the hereditary duties, to 700,000 l. per annum; and the same was continued to queen Anne and king George I. That of king Geo. II. was nominally augmented to 800,000 l. and in fact was considerably more; but that of his present majesty is expressly limited to that sum; tho' 100,000 l. hath been since added. And upon the whole, it is doubtless much better for the crown, and also for the people, to have the revenue settled upon the modern footing rather than the ancient. For the crown because it is most certain, and collected with greater ease: for the people; because they are now delivered from the feudal hardships, and other odious branches of the prerogative. And though complaints have sometimes been made of the incease of the civil list, yet if we consider the sums that have been formerly granted, the limited extent under which it is now establisht, the revenues and prerogatives given up in lieu of it by the crown, the numerous branches of the present royal family, and (above all) the diminution of the value of money compared with what it was worth in the last century, we must acknowledge these complaints to be void of any rational foundation; and that it is impossible to support that dignity, which a king of Great Britain should maintain, with an income in any degree less than what is now established by parliament. See Revenue.

To List, or enlist, Soldiers, to retain and enroll men as soldiers, either as volunteers, or by a kind of compulsion. Persons lifted must be carried within four days, but no sooner than 24 hours after, before the next justice of peace of any county, riding, city, or place, or chief magistrate of any city or town corporate (not being an officer in the army); and if before such justice or magistrate they differ from such enlisting, and return the enlisting-money, and also 20 thalers in lieu of all charges expended on them, they are to be discharged. But persons refusing or neglecting to return and pay such money within 24 hours, shall be deemed as only lifted as if they had silent before the proper magistrate; and they shall, in that case, be obliged to take the oath, or, upon refusal, they shall be confined by the officer who lifted them till they do take it.

LISTER (Dr Martin), an eminent English physician and naturalist, was born in 1658, and educated at Cambridge. He afterwards travelled into France; and at his return practised physic at York, and afterwards at London. In 1683, he was created doctor of physic, and became fellow of the college of physicians in London. In 1698, he attended the earl of Portland in his embassies from king William III. to the court of France; of which journey he published an account at his return, and was afterwards physician to queen Anne. He also published 1. Historia animalium Angiae, quarto. 3. Generis fossilis et fossicarum, folio. 4. Many pieces in the Philosophical Transactions; and other works.

LISTOWEL, a parish, also a post and fair town, of Ireland, in the county of Kerry and province of Munster, 131 miles from Dublin, anciently Lis Tua-thali, i. e. "the fort of Tuathal," who was exiled in the 1st century, but returned; and his life forms a brilliant era in Irish history. Near this are the ruins of a castle, pleasantly situation on the river Feale: it was taken in November 1600, by sir Charles Wilmore, being then held out for the Lord Kerry against queen Elizabeth. Five miles beyond Listowel are the ruins of a church. The fairs are three in a year.

LITANA SILVA (anc. geog.); a wood of the Boii, in the Gallia Togata, or Cil cupidana, where the Romans, under L. Postumius Albinus (whose head the Boii cut off, and carried in triumph into their most sacred temple), had a great defeat, of twenty-five thousand fearless ten echaping (Livy). Poeninus conjectures, that this happened above the springs of the Sculentia, in a part of the Appennine, between Cen feianum and Mutina. Now Selva di Luigi.

LITANY, a solemn form of supplication to God, in which the priest utters some things fit to be prayed for, and the people join in their intercession, saying, we beseech thee to hear us, good Lord, &c. The word comes from the Greek λτανειας, "supplication," of λτανεω, "I beseech." At first the use of litanies was not fixed to any stated time, but were only employed as exigencies required. They were observed in imitation of the Ninevites, with ardent supplications and fastings, to aver the threatening judgments of fire, earthquakes, inundations,
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LITCHFIELD, a city of Staffordshire, in England, 117 miles from London. It stands low, about three miles from the Trent; and its ancient name is said to have been Lichfield, signifying, "a field of carcases," from a great number of Christians having, as it is pretended, suffered martyrdom here in the persecution under Diocletian. In the Saxons time, it was a bishopric for a short space; and is now, together with Coventry, a bishoprick. The city has power of life and death over felons, powder, and a deep dry ditch on all sides except towards the Trent, or fields, and well-paved clean streets. That field is divided into two parts by a rivulet and a kind of shallow lake, over which are two causeways with sluices. It is a long straggling place; but has some very handsome houses, and well-paved clean streets. That part on the south side of the rivulet is called the city, and the other the close. The city is much the largest, and contains several public structures. It was incorporated by Ed. VI. with the name of bailiffs and burgesses; and is both a town and county, governed by two bailiffs chosen yearly out of 24 burgesses, a recorder, a sheriff, a bailward, and other officers. The city has power of life and death within their jurisdiction, a court of record, and a piepowder court. Here is a gaol both for debtors and felons, a free school, and a pretty large well endowed hospital for a master and 12 brethren. The county of the city is 10 or 12 miles in compass, which the sheriff rides yearly on the 8th of September, and then feals the corporation and neighbouring gentry. The close is so called from its being inclosed with a wall and a deep dry ditch on all sides except towards the city, where it is defended by a great lake or marsh formed by its brook. The cathedral, which stands in the close, was originally built by Offa king of Northumberland about 900. It was rebuilt and enlarged by Offa king of Mercia in 766. In 1148 was rebuilt, and greatly enlarged in 1296. At the reformation, Coventry was divided from it. In the civil wars its spire was destroyed, and it converted to a stable. In 1776 a beautiful painted window, by the benefaction of Dr. Adenbrook, has been set up at the western end of the cathedral. In the civil wars it was several times taken and retaken, and thereby suffered much; but was so repaired after the restoration, at the expense of 20,000l. that it was one of the fairest and noblest structures of the kind in England. It is walled in like a castle, and stands so high as to be seen 10 miles round.

It is 450 feet long, of which the choir is 170, and the breadth in the broadest place 80. Its portico is hardly paralleled in England. There were till lately 26 statues of the prophets, apostles, kings of Judah, and some kings of England, in a row above it, as big as the life; and on the top, at each corner of the portico, is a lofty spire, besides a fine high steeple on the middle of the church. The choir is paved in great part with alabaster and channel-coal, in imitation of black and white marble. In 1780 it went under a general repair, when the massive groined arches between the west end of the church and the transept, which had forced the side wall out of its perpendicular, was removed. The prebendaries stalls, which are thought to be the best in England, were most of them re-erected at the charge of the country gentlemen, whose names and arms are painted at the top of the stalls. The north door is extremely rich in sculpture, but much injured by time. The body, which is supported by pillars formed of numbers of slender columns, has lately had its decayed leaden roof replaced by a great domed covering. The church merits attention on account of the elegant sculpture about the windows, and the embattled gallery that runs beneath them; to which the altar-piece of Grecian architecture but ill corresponds; behind which is Mary's chapel, divided from it by a most elegant stone screen of beautiful workmanship. Here stood St. Chad's shrine, which cost 2000l. The charter-house is an octagon-room. In the same clove are the palaces of the bishop and dean, and the prebendaries houses in a court on the hill. Here are three other churches; one of which, St Michael's, has a church-yard of 6 or 7 acres. There was a castle here, long since destroyed; and ancient camps have been discovered in its environs. In the neighbourhood are frequent horse-races. The markets are on Tuesday and Friday, and fair days in the year. By the late inland navigation, this place has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles in the counties of Lincoln, Nottingham, York, Lancaster, Wellmoreland, Chester, Warwick, Leicester, Oxford, Worcesters, &c. Litchfield sends two members to parliament.

LITERARY, any thing belonging to literature.

LITERARY Property or Copy-Right. See Copy-Right.

LITERATI (literato, "lettered"), an epithet given to such persons among the Chinese as are able to read and write their language. The literati alone are capable of being made mandarins.

LITERATI is also the name of a particular sect, either in religion, philosophy, or politics, consisting principally of the learned men of that country; among whom it is called jukai-si, i.e. "learned."

It had its rise in the year of Chirrit 1400, when the emperor, to awaken the native affection of the people for knowledge; which had been quite banished by the preceding civil wars amongst them, and to stir up emulation among the mandarins, chose out 42 of the ablest among their doctors, to whom he gave a commission to compose a body of doctrine agreeable to that of the ancients, which was then become the rule or standard of the learned. The delegates applied themselves to
the business with very great attention; but some fancied them rather to have wrested the doctrine of the ancients, to make it consist with theirs, than to have built up theirs on the model of the ancients. They were pleased with it, because it seemed to subvert all religion; others approved it, because the little religion that it left them could not give them much trouble. And thus was formed the sect of the Literati; which consists of the maintainers and adherents to this doctrine.

The court, the mandarins, and the persons of fortune and quality, &c. are generally retainers to it; but a great part of the common people still hold to their worship of idols.

The literati freely tolerate the Mahometans, because they adore, with them, the king of nature, and author of all things; but they bear a perfect aversion to all sorts of idolaters among them; and it was once resolved to extirpate them. But the disfavour this would have occasioned in the empire prevented it; they now content themselves with condemning them, in general, as heretics; which they do solemnly every year at Pekin.

Literature denotes learning or skill in letters.

Liternum. See L internum.

Litanthrax, or L i t. Coa l, is a black or brown, laminated, bituminous substance; not very easily inflammable; but when once inflamed, burns longer and more intensely than any other substance. Of this substance three kinds are distinguished by authors. The residuum of the first after combustion is black; the residuum of the second is fupgny, and like pumice-stone; and the residuum of the third is whitish ashes. Some foil coal, by long exposure to air, falls into a greyish powder, from which alum may be extracted. Foil coal by distillation yields, 1. a phlegm or water; 2. a very acid liquor; 3. a thin oil like naphtha; 4. a thicker oil, resembling petroleum, which falls to the bottom of the former, and which rises with a violent fire; 5. an acid concrete salt; 6. an unflammable earth remains in the retort. These confluent parts of foil-coal are very similar to those of amber and other bitumens. For the exciting of intense heats, as of furnaces for smelting iron-ore, and for operations where the acid and oily vapours would be detrimental, to the drying of malt, foil-coals are previously charred, or reduced to coals; that is, they are made to undergo an operation similar to that by which charcoal is made. By this operation coals are deprived of their phlegm, their acid liquor, and the greatest part of their fluid oil. Coals therefore consist of the two fixed constituents, the heavy oil and the earth, together with the acid concrete salt, which the volatile is detained by the oil and earth.

Litharge, a preparation of lead, usually in form of soft flakes, of a yellowish reddish colour. If calcined lead be urged with a hand fire it melts into the appearance of oil, and on cooling concretes into litharge. Greatest part of the litharge met with in the shops is produced in the purification of silver from lead, and the refining of gold and silver by means of this metal; according to the degree of fire and other circumstances, it proves of a pale or deep colour; the first has been commonly called litharge of silver, the other litharge of gold. See Chemistry-Index.

Lithgow (William), a Scotian, whose sufferings by imprisonment and torture at Malaga, and whose travels, on foot, over Europe, Asia, and Africa, seem to raise him almost to the rank of a martyr and a hero, published an account of his peregrinations and adventures. Though the author deals much in the marvellous, the horrid account of the strange cruelties of which, he tells us, he was the subject, have however, an air of truth. Soon after, his arrival in England from Malaga, he was carried to Theobald’s on a feather-bed, that King James might be an eye-witness of his martyrdom anatomy, by which he means, his wretched body, mangled and reduced to a skeleton. The whole court crowded to see him; and his Majesty ordered him to be taken care of, and he was twice sent to Bath at his expence. By the king’s command he applied to Gondamor, the Spanish ambassador, for the recovery of the money and other things of value which the governor of Malaga had taken from him, and for L 1000 for his support. He was promised a full reparation for the damage he had sustained; but the pernicious minister never performed his promise.

When he was upon the point of leaving England, Lithgow upbraided him with the breach of his word in the presence-chamber, before several gentlemen of the court. This occasioned their fighting upon the spot; and the ambassador, as the traveller oddly expresses it, had his fistula, (with which disfavour he was afflicted) contrabanded with his fist. The unfortunate Lithgow, who was generally condemned for his spirited behaviour, was sent to the Marshalsea, where he continued a prisoner nine months. At the conclusion of the octavo edition of his Travels he informs us, that in his three voyages, his painful feet have traced over (besides passages of seas and rivers) 56000 and odd miles, which draweth near to twice the circumference of the whole earth.” Here the marvellous seems to rise to the incredible; and to fet him, in point of veracity, below Coryat, whom it is nevertheless certain that he far outwalked. His description of Ireland is whimsical and curious. This, together with the narrative of his sufferings, is reprinted in Morgan’s Phoenix Britannicus.

Lithiasis, or Stone. See Medicine-Index.

Lithomantia, in antiquity, a species of divination performed with stones. Sometimes the stone called siderites was used: this they walked in spring-water.
in the night by candle light; the person that
were purged it was to be purified from all manner of
and to have his face covered; this done he
repeated divine prayers, and placed certain characters
in an appointed order, and then the stone moved of
itself, and in a soft, gentle murmur, or (as some say)
in a voice like that of a child, returned an answer. By
a stone of this nature, Helena is reported to have fore-
told the destruction of Troy.

**LITHONTROPICTUS** (from λιθός, "a stone,"
and τρίπτων, "to break"), a epithet for medicines that
are supposed to break the stone in the bladder. Though the
different stones that are generated in the human
bladder require different solvents when out of the body;
and though art hath not yet afforded a medicine
which, when injected into the bladder, will, without
injury thereto, dissolve the stone therein lodged; it
cannot thence be concluded, that there are no litho-
triptic medicines. It may be here observed, that one
solvent affects one subject, and hath no effect on an-
other; so a solvent may yet be met with that will de-
solve the stone, and not hurt the human body. The
water into which the boiled white of egg dissolves will
liquify myrrh, but may be put into the human eye
without causing any uneasiness.

Soap taken at first in small doses in broth that
is freed from all its fat, succeeds in most cases which
require an alkaline solvent. The patient may begin
with 20 drops, and gradually increase the dose as he
is able; and by repeating it three times a-day for six,
eight, or twelve months, the wished for effects often
follow.

**LITHOPYTA**, the name of Linnaeus’s third
order of vermes. See Zoology.

**LITHOSPERMUM, GROMWELL**, A genus of
the monogyne order, belonging to the pentandria clafs
of plants; and in the natural method ranking under
the 41st order, Superficies. The corolla is funnel-
shaped, with the throat perforated and naked; the cal-
yx quinquepartite. There are several species; but the
only remarkable one appears officinal in common
gromwell, and the arvenne or bastard alkanet. Both
these are natives of Britain; the former growing in
dry gravelly soil, the latter in corn-fields. The seeds
of the first are reputed to be of service in calculous
cafes. Dr. Grew says, that they have so much earth
in their composition, that they effervesc with acids;
but if this is the case, it must be attributed rather to
an alkaline than an earthy quality.

**LITHOSTROTION**, in natural history, the name
of a species of fossil coral, composed of a great num-
ber of long and slender columns, sometimes round,
sometimes angular, jointed nicely to one another, and
of a flary or radiated surface at their tops. These are
found in considerable quantities in the northern and
western parts of Britain, sometimes in sandle, some-
times in complex specimens. See Plate CC.

**LITHOSTRON** , among the Romans, was a
pavement of Mosaic work, consisting of small pieces
of cut marble of different kinds and colours. The li-
thofrosta began to be used in the time of Sylla, who
made one at Præneste in the temple of Fortune. At
last they were used in private houses; and were brought
so much perfection, that they exhibited most lively re-
prestation of nature, with all the exactness of the
finest painting.

**LITHOTOMY**, in surgery, the operation of cut-
ting for the stone. See Surgery.

**LITHUANIA**, an extensive province of Poland.

By the natives it is called Létwe, and has Great
Poland and Russia on the east; Lithuania, the Baltic Sea,
and part of Russia, on the north; Red Russia, Volhiniis, and Podolia
on the south; and the Ukraine on the south-east. Its
length is said to be about 360, and its breadth 340
miles; but it is much indented both ways. Lithuania
was anciently over-run with wood; and there are still
many forests in it, which yield a great deal of honey,
wax, pitch, tar, and timber; and abound with wild
boars, buffaloes, elk, wild horses, wild asses, we, and
woodcocks. The lakes are also numerous, and well-
stored with fish, burthe air, by reason of these forests
and lakes, is said to be thick and foggy. The country
produces a great deal of buck-wheat and other corn,
the pastures are luxuriant, and the flocks and herds nu-
merous; so that, notwithstanding agriculture is much
neglected, provisions are exceedingly cheap, but money
is scarce, that to per cent, is the common intereft. The
principal nobility have large estates, and live in
great pomp and splendor, generally retaining some hundreds
of those that are poor, in quality of domestics. The
estabhshed religion is Popery; but Lutherans, Calvi-
nists, Jews, Turks, Greeks, and Socinians, are very
numerous. Lithuania was governed by its own dukes
till it was united to Poland, towards the end of the
14th century, when the great Duke Jagello married
Hedwig, the dowager of Louis king of Poland and
Hungary. It had even dukes after that, but they
were subordinate to the king; and at this day, tho’
one diet serves for both countries, yet each has its
peculiar laws, customs, dialect, and privileges. In a
diet held at Lublin in 1569, it was more closely uni-
ted to Poland than it had been before; and it was en-
cored, that both countries, for the future, shoule form
but one state under the same prince. As to their
courts of justice, the tenth part of what is adjudged
is tried in England; and immediately paid in court;
and in personal actions he claims half the damages
given. A nobleman is only fined for murder, as in Poland. The common
people here, excepting the burghers in the royal towns,
and the Germans, are fables; and, in many places,
the ignorant vulgar still retain some remains of idola-
try. The poor people have only Mondays to them-
sefes; and if their lords have occasion for them even
on that day, the peasant must work for himself on
Sunday. If any of them is condemned to death by
his lord, he must execute himself, or suffer greater
cruelly. The dialect is a language of the Slavonic;
and they speak here, as in Poland, a barbarous kind of Latin. Lithuania is divided into nine palatines.
Another division is into Lithuania properly so call-
ed, and Lithuanian Russia. Some also comprehend
under it Samogitia and Courland, which is a fief of
Poland.

**LITUS, or LACUS**, in the arts, is a blue pig-
ment, formed from arche. It is brought from Hol-
land at a cheap rate; but may be prepared by adding
quick
Litter (letter), a kind of vehicle borne upon shafts; also by the ancients drawn by four horses. Du Cange derives the word from the barbarous Latin lettera + draw or bedding for beasts.' Others will rather have it from lether or bed; there being ordinarily a quilt and a pillow to a litter in the same manner as to a bed.

Pliny calls the litter the traveller's chamber; it was much in use among the Romans, among whom it was borne by slaves kept for that purpose; as it still continues to be in the east, where it is called a pothaxm. —The Roman lector, made to be borne by four men, was called terebrum; that borne by six, xepbrum; and that borne by eight, sprobrum.

The invention of litters, according to Cicero, was made as a kind of vehicle borne upon shafts; also by the ancients drawn by four horses. Du Cange derives the word from the barbarous Latin lettera + draw or bedding for beasts.' Others will rather have it from lether or bed; there being ordinarily a quilt and a pillow to a litter in the same manner as to a bed.

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ledges to be the common law of the church; intimating, that the use of several services in the same province, which was the case in England, was not to be warranted but by long custom. The liturgy of the church of England was composed in the year 1547, and established in the second year of King Edward VI. Stat. 2. and 3. Edward VI. cap. 1.

In the fifth year of this king it was reviewed; because some things were contained in that liturgy which showed a compliance with the superstition of those times, and some exceptions were taken against it by some learned men at home, and by Calvin abroad. Some alterations were made in it, which consisted in adding the general confession and absolution, and the communion to begin with the ten commandments. The use of oil in confirmation and extreme unction were left out, and also prayers for souls departed, and what tended to a belief of Christ's real presence in the eucharist. This liturgy, so reformed, was established by the act of 5 and 6 Ed. VI. cap. 1. However, it was abolished by Queen Mary, who enquired, that the service should stand as it was most commonly used in the last year of the reign of King Henry VIII. The liturgy of 5 and 6 Ed. VI. was re-established with some few alterations and additions, by 1 Eliz. cap. 2. Some further alterations were introduced, in consequence of the review of the common prayer-book, by order of King James, in the first year of his reign; particularly in the office of private baptism, in several rubrics and other passages, with the addition of five or six new prayers and thanksgivings, and all that part of the catechism which contains the doctrine of the sacraments. The book of common prayer, so altered, remained in force from the first year of King James to the fourteenth of Charles II. But the last review of the liturgy was in the year 1669, and the last act of uniformity enjoining the observance of it is 13 and 14 Car. II. cap. 4. See Common Prayer. Many applications have been since made for a review, but hitherto without success.

LITUUS, among the Romans, was the staff made use of by the augurs in quartering the heavens. It bore a great resemblance to the crozier of a bishop, but was shorter. It was crooked at one end, and thickest in the curved part, according to A. Gellius. We frequently meet with a representation of it upon medals, amongst other pontifical instruments. It was called Litus Quirinalis, from Quirinus, a name of Romulus, who was skilled in all the mysteries of augury.

LITUUS, was also an instrument of music in use in the Roman army. It was straight, excepting that it had a little bending at the upper end like a limus or flared staff of the augurs; and from the similitude it derived its name. The litus, as an instrument of martial music, was of a middle kind, between the cornu and tuba.

LIVADIA,anciently Achaia and Hellas, or Greece, properly so called; a province of Turkey in Europe, bounded on the north by Epirus and Thessaly, from which it is separated by mount Oeta, now Banina, and by the Euripus, now the river of Negropont; on the east by the Archipelago; on the south, by the gulf of Egin or Egina, the isthmus of Corinth, and the gulf of Lepanto; and on the west, by the Ionian sea and part of Epirus. Its extent is about 130 miles from north-west to south-east; but its greatest breadth is not above 36 miles. It is in general a mountainous country; but neither unpleasant nor unfruitful. The principal mountains are, mount Oeta in Boetia, where is the famous pass of Thermopylae, not above 25 feet broad; and Parnassus, Helicon, and Cytheraon in Phocis, which were sacred to Apollo and the Muses, and consequently much celebrated by the poets. The rivers of most note are, the Stymphalus, anciently the Achebes, the Cephisus, the Himus, and the Alpus. The province is at present divided into Livadia proper, Strainulippa, and the duchy of Athens. The principal places are, Lepanto, anciently Nallpactus; Livadia, anciently Libadia or Libadla; the celebrated city of Athens, now Sestines; Thebes, now Sibbes; Lepeina, anciently Eleusis; Caltri, formerly Delphi; and Megara.

LIVADIA, an ancient town of Turkey in Europe, and capital of a province of the same name in Greece. It is a large and populous place, seated on the gulf of Lepanto, about 25 miles from the city of that name. It has a considerable trade in woollen stuffs and rice. Anciently it was celebrated for the oracle of Trophonius, which was in a cavern in a hill above the town. E. Long. 23° 29'. N. Lat. 38° 40'.

LIVER, in anatomy. See there. Plato, and other of the ancients, fix the principle of love in the liver; whence the Latin proverb, Cogni amor secures: and in this sense Horace frequently uses the word, as when he says, Si torrere jecur quodris iho.

The Greeks, from its concave figure, called it Wlap, "vaulted, suspended; the Latins call it juxta cur, q. d. juxta cor, as being near the heart." The French call it joye, from foyer, jocu!, "or fire-place;" agreeable to the doctrine of the ancients, who believed the blood to be boiled and prepared in it. E. Livi. at first, called it parenchyma, i. e. mass of blood; and Hippocrates, by way of eminence, frequently calls it the hypochondrium.

LIVER of Arsenic, is a combination of white arsenic with liquid fixed vegetable alkali, or by the humid way. Arsenic has in general a strong disposition to unite with alkalis. Mr Macquer, in his Memoirs upon Arsenic, mentions a singular kind of neutral salt, which results from the union of arsenic with the alkaline basis of nitre, when nitre is decomposed, and its acid is disengaged in close vessels, by means of arsenic. To this salt he has given the name of neutral arsenical salt. The liver of arsenic mentioned above is also called arsenic chemist, although composed, like the neutral arsenical salt, of arsanic and fixed alkali, is nevertheless very different from that salt.

The operation for making liver of arsenic is easy and simple. To a strong and concentrated liquid fixed alkali, previously heated, fine powder of white arsenic must be added. This arsenic easily disappears and duilves, and as much of it is to be added till the alkali is saturated, or has lost its alkaline properties, although it is still capable of dissolving more arsenic for erabundantly. While the alkali dissolves the arsenic in this operation, it
it acquires a brownish colour, and a singular and disagreeable smell; which, however, is not the smell of pure arsenic heated and volatilized. Lastly, this mixture becomes more and more thick, and at length of a gluey consistence. This matter is not crystallizable as the neutral arsenical salt is. It is easily decomposed by the action of fire, which separates the arsenic. This does not happen to the arsenical salt. Any pure acid is capable of separating arsenic from the liver of arsenic, in the same manner as they separate sulphur from liver of sulphur: Whereas the arsenical folid acid cannot be decomposed but by means of the united affinitis of acids and metallic substances.

Thus we see that arsenic may be combined with fixed alkali in two very different manners. The author has given to this combination the name of liver of arsenic, to distinguish it from the neutral arsenical salt, and in imitation of the name of the liver of sulphur, given to the combination of the fixed alkali with sulphur.

Liver of Sulphur. See Chemistry, Index.

Liver-Wort, in Botany. See Marchantia and Lichen.

Liver-Stone, (lapis hepaticus): a genus of inflammable substances, containing, besides its phlogiston, argillaceous, poudery, and siliceous earth, united with vitriolic acid. See Earths, 1. 1. 9. 4.

Mr Bergman, in his Scigraphia, informs us, that 100 parts of this stone contain 33 of siliceous earth, 29 of caustic poudery earth, almost 9 of argillaceous earth, and 3.7 of lime, besides the vitriolic acid and water of crystallization: but Mr Kirwan quotes another analysis of the same author, where it is said that 100 parts of it contain 33 of baro-felenite, 38 of siliceous earth, 22 of alum, 7 of gypsum, and 5 of mineral oil.

Liverpool, a large, flourishing, and populous town of England, in the county of Lancaster, situated at the mouth of the river Mersey into the sea. This town has so much increased in trade since the commencement of the present century, that it is now the greatest sea-port in England except London, having exceeded Bristol considerably of late years: which will appear by the following account of the custom-duities, received in the several ports of London, Liverpool, and Bristol, in the year 1784, taken from the report of the commissioners for inspecting the state of public accounts.

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<td>Liverpool</td>
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<td>Bristol</td>
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Liverpool exceeded Bristol, L 305,774 2 11

The following shows how much the trade has increased since the above period:

Duties received in the port of Liverpool from July 5th 1787, to October 10th 1787. L 298,361 9 104.
The merchants here trade to all parts of the world except Turkey and the East Indies; but the most beneficial trade is to China and the West-Indies, by which many of them have acquired very large fortunes.

Liverpool, during the last war, carried on more foreign trade than any town in England; and such is Liverpool, the seat of it at this time, that there are near three thousand vessels cleared from that port in one year to different parts of the world. Here are several manufactories for China-ware, and pot-houses which make very fine ware, some gilt-works, glass-houses, and upwards of 50 breweries, from some of which large quantities of malt-liquor are sent abroad. Many of the buildings are formed in the most elegant manner; but the old streets are narrow; which defect will soon be removed, as the corporation have lately obtained an act of parliament for the improvement of the town, which they have already begun to put in force with great spirit, having taken down the principal fire-ridges in the centre of the town, and rebuilt them in a spacious and most magnificent manner; so that in a few years it will be one of the handsomest towns in England. This town contains ten churches, namely, St Peter's, St Nicholas's, St George's, St Thomas's, St Paul's, St Ann's, St John's, St James's, St Catherine's, and St Mary's. There are also meetings for independents, anabaptists, quakers, methodists, and prebyterians. The exchange is a noble structure, built of white stone in the form of a square, and round it are piazzas where the merchants assemble to transact business. Above it are the mayor's offices, the town-hall, the council-chamber, and two elegant ball-rooms. The expense of erecting this building amounted to L. 30,000. The custom-house is situated at the head of the old dock, and is a handsome and convenient structure. Here are many charitable foundations, among which is an excellent grammar-school well endowed, and many of the youth taught in it have exhibitions in the universities. The infirmary is a large edifice of brick and stone, situated on a hill in a very pleasant airy situation, at one end of the town.

In the town is a charity-school supported by voluntary subscriptions and contributions for 36 boys and 12 girls, who are not only clothed and educated, but are also provided with food and lodgings: likewise several alm-houses for the widows of seamen, and an excellent poor-house, superior to any in the kingdom, where upwards of 800 men, women, and children, are supported, many of whom are employed in spinning cotton and wool. There are five large wet docks, three dry docks, and several graving docks for the repairing of shipping; which renders it the most commodious sea-port in the world. The quays which bound these docks are covered with warehouses; which is a convenience that enables the merchant to discharge his ship at a very small expense. The new prison lately built is a noble edifice, being built entirely on the plan of the great and benevolent Mr Howard, for solitary confinement; and is the most convenient, airy, magnificent building of the kind in Europe: being upon a very extensive scale.

Liverpool received its charter from King John; it is under the government of a recorder, mayor, and an unlimited number of aldermen, two bailiffs, and a common-council of forty of the principal inhabitants, with a town-clerk and other proper officers. The town has a weekly market on Saturday, and is distant from London 204 miles. The progressive rise of population
I. LIVERY.

In Liverpool, the town is situated, abounds with salmon, cod, Wexford, Severn, Humber, Thames, Avon, &c. which springs from the present numerous evils, at least while he was employed upon the first and earliest ages. He undertook to read parts of his history, while he was composing it, to Mesenas and Augustus, and the latter conceived so high an opinion of him, that he pitched upon him to superintend the education of his grandson Claudius, who was afterwards emperor. After the death of Augustus, Livy returned to the place of his birth, where he was received with all imaginable honour and respect; and there he died, in the fourth year of the reign of Tiberius, aged above seventy. Some say, he died on the same day with Ovid: it is certain that he died the same year.

The Romish church has also her several colours and liveries; white, for confessors and virgins, and in time of rejoicing; black, for the dead; red, for the apostles and martyrs; blue or violet, for penitents; and green, in times of hope.

Formerly, great men gave liveries to several, who were not of their family or servants, to engage them in their quarrels for that year; but this was prohibited by the statues 1 Rich. II. 1. Hen. IV. cap. 27. 2. and 7 Hen. IV. 8 Hen. VI. cap. 4. 8 Ed. IV. cap. 2; and no man, of whatever condition, was allowed to give any livery, but to his domestic officers, and council learned in the law. However, most of the above statues are repealed by 3 Car. I. cap. 4.

LIVERY, in law, signifies delivering the possession of lands, &c. to him who has a right to liverymen them.

LIVERYMEN of London, are a number of men chosen from among the freemen of each company. Out of this body the common council, sheriffs, and other inferior officers for the government of the city, are elected; and they alone have the privilege of giving their votes for members of parliament, from which the rest of the citizens are excluded.

LIVIUS (Titus), the best of the Roman historians, as he is called by Mr Bayle, was born at Patavium, or Padua. Few particulars of his life have been handed down to us. Coming to Rome, he acquired the notice and favour of Augustus, and there he long resided. Some have supposed, (for there is not any proof of it), that he was known to Augustus before, by certain Philosophical Dialogues which he had dedicated to him. Seneca says nothing of the dedication; but mentions the dialogues, which he calls historical and philosophical; and also some books, written purposely on the subject of philosophy. Be this as it will, it is probable that he began his history as soon as he was settled at Rome; and he seems to have devoted himself so entirely to the great work he had undertaken, as to be perfectly regardless of his own advancement. The tumults and dissatisfaction of Rome frequently obliged him to retire to Naples; not only that he might be left interrupted in the pursuit of his defined task, but also enjoy that retirement and tranquility which he could not have at Rome, and which yet he seems to have much sought after: for he was greatly dissatisfied with the manners of his age, and tells us, that he should reap this reward of his labour, in composing the Roman history, that it would take his attention from the present numerous evils, at least while he was employed upon the first and earliest ages. He undertook to read parts of his history, while he was composing it, to Mesenas and Augustus; and the latter conceived so high an opinion of him, that he pitched upon him to superintend the education of his grandson Claudius, who was afterwards emperor. After the death of Augustus, Livy returned to the place of his birth, where he was received with all imaginable honour and respect; and there he died, in the fourth year of the reign of Tiberius, aged above seventy. Some say, he died on the same day with Ovid: it is certain that he died the same year.

Scarcely any man was ever more honoured, alive as well as dead, than this historian. Pliny the younger relates, that a native gentleman travelled from Gades, in the extreme part of Spain, to see Livy: and, though Rome abounded with more stupendous and curious spectacles than any city in the world, yet he immediately returned; as if, after having seen Livy, nothing farther could be worthy of his notice. A monument was erected to this historian in the temple of Juno, where was afterwards founded the monastery of St Juliana. There, in 1413, was discovered the following epitaph upon Livy: Osi Titi Livii Patavini, omnium mortuorum judicio digni, cuius proximo in inselocalum iuisti populi Romanorum res gestae conferendur; that is, "The bones of Titus Livius of Patavium, a man worthy to be approved by all mankind, by whose almost invincible pen the acts and exploits of the invincible Ro

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LIV

Livius's works were written." These books are said to be preserved with high reverence to this day, and are shown by the Paduans as the most precious remains. In 1451, Alphonso, king of Arragon, sent his ambassado-

r, Anthony Panormita, to desire of the citizens of Padua the bone of that arm with which this their fa-
mous countryman had written his history: and, ob-
taining it, caused it to be conveyed to Naples with the greatest ceremony as a most invaluable reli. He is said to have recovered from an ill state of health by the pleasure he found in reading this history: and, therefore, out of gratitude, put upon doing extra-

dinary honours to the memory of the writer. Panor-
mita also, who was a native of Palermo in Sicily, and one of the ablest men of the 13th century, gave an estate to purchase this historian.

The history of Livy, like other great works of ant-
tiquity, is transmitted down to us exceedingly mutilated and imperfect. Its books were originally an hundred and forty-two, of which are extant thirty-five. The epitomes of it, from which we learn their number, all remain, except those of the 136th and 137th books. Livy's books have been divided into decades, some of which will have to be done by Livy himself, because there is a preface to every decade; while others suppose it to be a modern contrivance, since nothing about it can be gathered from the ancients. The first decade, beginning with the foundation of Rome, is extant, and treats of the affairs of 450 years. The second decade is lost, but the second part of it is extant and contains the first forty years. The third decade is extant and contains the second Punic war, including eighteen years. It is reckoned the most excellent part of the history, as giving an account of a very long and sharp war, in which the Romans gained so many advantages, that no arms could afterwards withstand them. The fourth decade contains the Macedonian war against Philip, and the Asiatic war against Antiochus which takes up the space of about 23 years. The five books of the fifth decade were found at Worms, by Simon Grynaeus, in 1451, but are very defective; and the remainder of Livy's history, which reaches to the death of Drusus in Germany in 746, together with the second and third decades, are lost.

Never man perhaps was furnished with greater ad-

vantages for writing a history than Livy. Besides his own great genius, which was in every respect admirably formed for the purpose, he was trained as it were in a city, at that time the empress of the world, and in the politest reign that ever was; having scarcely had any other school than the court of Augustus. He had access to the very best materials, such as the Memoirs of Sylla, Cæsar, Labienus, Pollio, Augustus, and others, written by themselves. "What writers of me-

morials (says Lord Bolinbrooke), what compilers of the Materia Historica, were the best! What genius was ne-

cessary to finish up the pictures that such masters had sketched! Rome afforded men that were equal to the task. Let the remain. the precious remains, of Sal-

louf, of Livy, and of Tacitus, witness this truth. — What a school of public and private virtue had been opened to us at the resurrection of learning, if the lat-
ter historians of the Roman commonwealth, and the first of the succeeding monarchy, had come down to us entire! The few that are come down, though broken and imperfect, compose the best body of history that we have; nay, the only body of ancient history that deserves to be an object of study. It fails us indeed most at that remarkable and fatal period, where our reasonable curiosity is raised the highest. Livy em-
ployed forty-five books to bring his history down to the end of the sixth century, and the breaking out of the third Punic war; but he employed ninety-five to bring it down from thence to the death of Drusus; that is, through the course of 120 or 130 years. Appian, Dion Cassius, and others, nay, even Plutarch included, make us but poor amends for what is lost of Livy."

Speaking then of Tully's orations and letters, as the best adnventitious helps to supply this loss, he says, that "the age in which Livy flourished, was far more constructed with such materials as these: they were freeth, they were authentic, it was easy to procure them; it was safe to employ them. How he did employ them in executing the second part of his design, in may judge from his execution of the first; and, I own, I should be glad to exchange, if it were possible, what we have of this history for what we have not. Would you not be glad, my lord, to see, in one stupendous draught, the whole progres of that government from liberty to servitude; the whole series of causes and effects, apparent and real, public and private?" &c.

The encomiums bestowed upon Livy, by both an-
cients and moderns, are great and numerous. He not
only entertains like Herodotus; he also instructs and interests in the deepest manner. But the great probity, accurac, and impartiality of Livy, are what have dillinguish
ed Livy above all historians; for neither complaisance to the times, nor his particular connections with the emperor, could restrain him from speaking well of Pom-
pey; so well, as to make Augustus call him a Pome-
pelian. This we learn from Cremnus Cordus, in Ta-
citus; who relates also, much to the emperor's hon-
nour, that this gave no interruption to their friend-
sip. But whatever ologies Livy may have received
as an historian, he has not escaped cenfure as a writer. In the age wherein he lived, Alinus Pollio charged him with Patavinitv; which Patavinitv has been variously explained by various writers, but is generally supposed to relate to his style. All that it is, that this noble Roman, accustomed to the delicacy of the language spoken in the court of Augustus, could not bear with certain provincial idioms, which Livy, as a Paduan, used in divers places of his history. Pignorius is of another mind, and believes that this Patavinitv regarded the orthography of certain words, wherein Livy used one letter for another, according to the custom of his county, writing fibe and guafi for fibi and guasti; which he attempts to prove by fe-
veral ancient inscriptions. The expressness, however, or the orthography of words, are not loaded with ob-
curity, and the perfect classic is as familiarly acquainted with those suppos'd provin. salins as with the purest Latinity. — Livy has been cenfured to be too just, perhaps with justice, for being too cedulous, and burdening his history with vulgar notions and superflitious tales. He may disquiet when he mentions that milk and blood were rained from heaven, or that an ox spoke or a wo-

man changed her fex; yet he calmly confesses that he recorded only what made an indelible impression upon the minds of a cedulous age.

Is it worth while to mention here the capricious

and
and tyrannic humour of the Emperor Caligula, who accused Livy of being a negligent and wordy writer, and resolved therefore to remove his works and statues out of all libraries, where he knew they were curiously preferred? Or the same humour in Domitian, another prodigy of nature, who put to death Metius Pompeianus, because he made a collection of some orations of kings and generals out of Livy’s history? Pope Gregory the Great, also, would not suffer Livy in any Christian library, because of the Pagan superstition wherewith he abounded: but the same reason held good against all ancient authors; and indeed Gregory’s zeal was far from being levelled at Livy in particular, the pontiff having declared war against all human learning.

Though we know nothing of Livy’s family, yet we learn from Quintilian, that he had a son, to whom he addressed some excellent precepts in rhetoric. An ancient inscription speaks also of one of his daughters, named Livia Quarta: the same, perhaps, that confounded the orator Lucius Magius, whom Seneca mentions; and we know that the inscription of Livy’s harangues, not from the public in his harangues, were not so much on his own account, as for the sake of his father in law.

Our author’s history has been often published with and without the supplemen of Frienhemius. The best editions are, that of Gronovius, cum notis variorum & suis, Lugd. Bat. 1679, 3 vol. 8vo; that of Le Clerc, at Amsterdam, 1709, 10 vol. 12mo; and that of Crevier, at Paris, 1735, 6 vol. 4to. These have the supplemen.—Learning perhaps never furnished a greater loss, in any single author, than by the destruction of the latter and more interesting part of Livy. Several eminent moderns have indulged the pleasing expectation that the entire work of this noble historian might yet be recovered. It has been said to exist in an Arabic version: and even a complete copy of the original is supposed to have been extant as late as the year 1631, and to have perished at that time in the plunder of Magdeburg. The munificent patron of learning, Leo X. exerted the most generous zeal to rescue from oblivion the valuable treasure, one of whose most bigoted predececers, above mentioned, had expelled from every Christian library. Boyle has preferred, under the article Leo, two curious original letters, of that pontiff, concerning his hopes of recovering Livy; which afford most honourable proofs of his liberality in the cause of letters. —A lately discovered fragment of Livy’s history was published in 1773 by Dr Bruns.

Livyos (Andronicus), a comic poet who flourished at Rome about 240 years before the Christian era. He was the first who turned the personal satires and fescene verses, so long the admiration of the Romans, into the form of a proper dialogue and regular play. Though the character of a player, so valued and applauded in Greece, was reckoned vile and despicable among the Romans, Andronicus added a part in his dramatical compositions, and engaged the attention of his audience, by repeating what they had laboured after in the name of the Greeks. Andronicus was the freedman of M. Livius Salinator, whose children he educated. His poetry was grown obsolete in the age of Cicero, whose nicey and judgment would not even recommend the reading of it.

LIVONIA, a large province of the Russian empire, with the title of a duchy. It is bounded on the north by the gulf of Finland, on the west by that of Riga, on the south by Courland, and on the east, partly by Pletnow, and partly by Novgorod. It is about 350 miles from north to south, and 150 from east to west. The land is so fertile in corn, that it is called the granary of the north; and would produce a great deal more, if it was not so full of lakes. The fish that abound here are salmons, carps, pikes, flat-fish, and many others. In the forests there are wolves, bears, elks, rein-deer, flags and hares. The domestic animals are very numerous; but the sheep bear very bad wool. Here are a great number of forests, which consist of birch-trees, pines, and oaks; and all the houses of the inhabitants are built with wood. The merchandizes which they find abroad are flax, hemp, honey, wax, leather skins, and potashes. The Swedes were formerly powerful in this province, but were obliged to cede it to the Russias after the battle of Pultowa; and it was ceded to them by the peace of the North, concluded in 1722, which was confirmed by another treaty in 1742. It is divided into two provinces, viz. Letonia and Estonia; and two islands called Osfl and Dagbo, which are again subdivided into several districts.

LIVONICA-TERRA, a kind of fine bole used in the shops of Germany and Italy. It is found in Livonia, from whence it takes its name, and also in some other parts of the world. It is generally brought to us in little cakes, sealed with the impression of a church and chalice, with two cross keys.

LIVRE, a French money of account, containing 20 sols. See Moni-Table.

LIXA, or LIXUS (anc. geog.) a town on the Atlantic near the river Lixus; made a Roman colony by Claudius Caesar; famous in mythology for the palace of Anteus and his encounter with Hercules, (Pliny). Now Larache, sixty-five leagues to the south of the straits of Gibraltar.

LIXIVIUS, an appellation given to salts obtained from burnt vegetables by pouring water on their ashes.

LIXIVIUM; in pharmacy, &c. a ley obtained by pouring some liquor upon the ashes of plants; which is more or less powerful, as it has imbibed the fixed salts contained in the ashes.

LIXNAW, a barony in the county of Kerry and province of Munster in Ireland, which gives title of Baron to the earls of Kerry; the village here of this name being their ancient seat, where the castle was erected. This seat stands agreeably on the river Brick, which is here cut into several pleasant canals, that adorn their plantations and gardens; the improvements are extensive, most of the viofes and avenues terminating by different buildings, seats, and farm-houses. The tide flows up to the gardens, whereby boats of a considerable burden may bring up goods to the bridge near the house; here are two stone-bridges over the Brick, the eldest of which was built by Nicholas the third baron Lixnaw, who was the first person that made caufeways to this place, the land being naturally wet.
Lizard, in zoology. See Lacerta.

Lizard, in geography, a cape or promontory of Cornwall, situated, according to the most common computation, in W. Long. 5° 47'. N. Lat. 49° 50'.

Llandaff. See Landaff.

Lloyd (Nicholas), a learned English writer in the 17th century, was born in Flintshire in England, and educated at Wadham college, in Oxford. He was rector of Newington St Mary near Lambeth in Surry, till his death, which happened in 1680. His Dictionarium Historicum is a valuable work, to which Hoffman and Moreri, are greatly indebted.

Lloyd (William), a most learned English writer and bishop, was born in Berkshire in England in 1627. He was educated under his father, rector of Sonning, and vicar of Tylbury in Berkshire; then went to Oxford, and took orders. In 1660 he was made prebendary of Rippon; and in 1666 chaplain to the king. In 1667 he took the degree of doctor of divinity; in 1672 he was installed dean of Bangor; and in 1680 was consecrated bishop of St Asaph. He was one of the six bishops who, with archbishop Sancroft, were committed prisoners to the Tower of London, for subscribing a petition to the king against distributing and publishing his declaration for liberty of conscience. Soon after the revolution he was made almoner to King William and queen Mary: in 1692 he was translated to the bishopric of Lichfield and Coventry; and in 1699, to the see of Worcester, where he fat till his death, which happened in 1717, the 91st year of his age. Dr Burnet gives him an exalted character.

Loa. See Landa.

load, any thing given to another, on condition of return or payment.

Public Loans. See Funds, and National Debt.

Loanda, a province of the kingdom of Angola in Africa. It is an island about 15 miles in length, and three in breadth; remarkable chiefly for the capital of Angola situated upon it, in E. long. 12° 25'. S. lat. 8° 45'. This town was built by the Portuguese, in 1578, under the direction of the first Portuguese governor in these parts. It is large, populous, and pleasantly seated on the declivity of a hill near the sea-coast, and facing the south west. The island is supplied with fresh water from wells dug in it; and which are not sunk below the depth of three feet when they are filled with excellent water. It is remarkable, however, that the water of these wells continues good only during the time of high-tide; for, as that subsides, the water becomes more and more brackish, till at last it is quite salt, almost as much as the sea itself. On the coast of this island are filled the zimbis, or shells used in several parts of Africa instead of money; and with these shells, instead of coin, is carried on a great part of the traffic of this country.

Loango, a kingdom of Africa, extending itself about 180 geographical miles in length from south to north; that is, from Cape St Catherine under the second degree of south latitude, to a small river called Lovanda Louisa, on the 5th degree of the same. From west to east it extends from Cape Negro on the coast of Ethiopia towards the Bouchornese mountains, so called on account of their vault quantity of ivory and great droves of elephants, about 500 miles. It is divided into four principal provinces, viz. those of Loanguru, Loango-manga, Chilongo, and Piri.

The inhabitants are very black, well-shaped, and of a mild temper. The men wear long petticoats, from the waist downwards, and have round their waist a piece of a vein of earth or flone, or some other metallic substance; in which case it generally happens, that one part of the load is moved to a considerable distance on one side. The transient load is, by the miners, termed a finking; and the part of the load which is moved, is by them said to be heaved. This fracture or heave of a load, according to Mr Price, is produced by a subsidence of the strata from their primary positions, which he supposes to have been horizontal or parallel to the surface of the earth, and therefore should more properly be called a depression than a heave. This heaving of the load would be an inexpressible loss to the miner, did not experience teach him, that as the loads always run on the fides of the hills, so the part heaved is always moved toward the defcent of the hill; so that the miner, working towards the acent of the hill, and meeting a finking, considers himself as working in the heaved part; whereas, cutting through the finking, he works upon its back up the acent of the hill, till he recovers the load, and sic vera.

Load is also used for nine dishes of ore, each dish being about half a hundred weight.

Loadstone. See Magnet.

Loams, in natural history, are defined to be earths composed of difmilar particles, stiff, dense, hard, and rough to the touch; not easily broke while moist, readily diffusible in water, and composed of sand and a tough viscous clay. Of these loams some are whitish and others brown and yellow.

Loan, any thing given to another, on condition of return or payment.

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which they wear the of ivory on their cover their privities, quite bare, except that on their legs they wear little string of beads made of shells, and small bracelets of ivory on their arms. They anoint themselves with palm-oil, mixed with a kind of red wood reduced to powder.

This country abounds with poultry, oxen, cows, sheep, goats, elephants, tigers, leopards, civer-cats, and other animals; so that here are great quantities of elephants teeth, and fine furs, to be traded for.

The capital city where the king resides, is called Luogo, or Benson-Loungeri, and, in the language of the negroes, Boxiti. This city is situated in South lat. 4° degrees, a league and a half from the sea-coast. It is a pretty large city, shaded and adorned with bananas, palm, and other trees. The king, who resides in a large palace in the middle of it, has about 1,500 concubines. If any of them is surprised in adultery, she and her paramour are instantly conveyed to the top of a very high hill, whence they are hurled headlong from the portico or vestibule, and the length or dimensions will not allow it to be considered as a vestibule or an antechamber. See Antichamber.

The king's revenue consists in elephants teeth, copper, a kind of petticoats made of palm-tree leaves, and called lavogu: he has whole store-houses full of these lavogus; but his greatest riches consist in slaves of both sexes.

LOBE, in anatomy, any flabby protuberant part, as the lobes of the lungs, the lobes of the ears, &c.

LOBELIA, CARDINAL-FLOWER: a genus of the monogamia order, belonging to the fyngecia clafs of plants; and in the natural method ranking under the 90th order, Campanaceae. The calyx is quinquefid; the corolla monopetalous, and irregular; the capsule inferior, bilocular, or trilocular. There is a great number of species, but only four of them are cultivated in British gardens; two of which are hardy herbaceous plants for the open ground, and two shrubby plants for the ftove. They are all fibrous rooted perennials, rising with erect flaks from two to five or six feet high, ornamented with oblong, oval, spear-shaped, simple leaves and spikes of beautiful monopetalous, somewhat ringent, five-parted flowers, of scarlet, blue, and violet colours. They are easily propagated by seeds, offsets, and cuttings of their flaks. The tender kinds require the common treatment of other exotics. They are natives of America; from which their seeds must be procured.

The root of a species called the fiphitica is an article of the materia medica. This species grows in moist places in Virginia, and bears the winters. It is perennial, has an erect flalk three or four feet high, blue flowers, a milky juice, and a rank smell. The root consists of white fibres about two inches long, resembles tobacco in taste, which remains on the tongue, and is apt to excite vomiting. It is used by the North-American Indians as a specifie in the venereal disease. The form is that of decoction; the dose of which is ordered to be gradually increased till it bring on very confiderable purging, then to be intermitted for a little, and again used in a more moderate degree till the cure be completed. The ulcers are also washed with the decoction, and the Indians are said to sprinkle them with the powder of the inner bark of the spruce tree. The fame strictness of regimen is ordered as during a falivation or mercurial course. The benefit to be derived from this article has not, as far as we know, been confirmed either in Britain or by the practitioners in Virginia: for there, as well as in Britain, recourse is almost universally had to the use of mercury; and it is probably from this reason that the London college have not received it in their list. It, however, seems to be an article which, in some cafes at least, deserves a trial.

LOBETUM, anciently a town of the Hither Spain: said to have been built by the Libyan Hercules, (Pliny,) now Albarazin, a town of Arragon on the confines of New Castile, on the river Guadalavi. L. long. 40. Lat. 40.

LOBINEAU (Guy Alexis), a Benedictine monk, born at Rennes in 1666, spent his whole life in the study of history, and the writing of several works; the principle of which are, The history of Brittan, 2 vols folio; and A continuation of Felibien's history of Paris, 3 vols folio. He died in 1727.

LOBO (Rodriguez Francis), a celebrated Portuguefe poet, was born at Leiria, a small town of Etruriae. He wrote an heroic poem, some elegies, and a piece intituled Euphrasine, which is the favourite comedy of the Portuguefe. His works were collected and printed together in Portuguefe in 1721, in folio. He flourished about 1610.

LOBO (Jerome), a famous Portuguefe Jesuit, born at Lisbon, went into Ethiopia, and dwelt there for a long time. At his return he was made rector of the college of Coimbra, where he died in 1678. He wrote An historical account of Abyssinia, which is by some esteemed a very accurate performance.

LOBSTER, in zoology, a species of cancer. See Cancer.

LOCAL, in law, something fixed to the freehold, or tied to a certain place; thus, real actions are local, since they must be brought in the country where they lie; and local causes are those peculiar to certain countries and places.

Local Medicines, those defined to act upon particular parts; as fomentations, epithems, vesicatories, &c.

LOCARNO, a town of Switzerland, capital of a bailiwick of the same name, seated at the north and of
LOCATELLUS's BALSAM. See Pharmacy-Index.

LOCHABER, a district of the shire of Inverness in Scotland. It is bounded by Moydart on the west, Glengarry on the north, Badenoch on the east, and Lorn on the south. It derives its name from the lake or loch Aber; and extends about 20 miles from east to west, and 30 from north to south. The country is barren, bleak, mountainous and rugged. In one of the most barren parts of this country, near the mouth of the river Aber, in the centre between the Weft and North Highlands, stands Fort-William, built upon a navigable arm of the sea, not far from the foot of a very high mountain, called Ben Nevis. The town, designed as a fort for the garrison, was erected into a borough; and the fort itself was designed as a check upon the clan Cameron, who had been guilty of depredations and other irregularities. It is inhabited mostly by the Macdonalds, Camerons, and Mackintoshes, who are not the most civilized people in Scotland, though their chiefs are generally persons of education, honour, and hospitality. Macdonald of Glengarry, defended in a straight line from the town of Fort-William to the river Garry, and from it to the sea, in this district, which was burnt to the ground, and destroyed in the year 1715, in consequence of his declaring for the Pretender. The elegant house and gardens belonging to Cameron of Lochiel underwent the same fate, for the same reason, after the extinction of the rebellion in the year 1746. The cadets of these families, which have formed a kind of inferior gentry, are lazy, indigent, and un cleanly; proud, ferocious, and vindictive. The common people, though celebrated for their bravery, fidelity, and attachment to their chiefs, are counted very savage, and much addicted to rapine. They speak the Erse language, and conform to the matter to the requisite perfection, and that every one may reft assured of the security of his property when under the protection of a lock of his invention. He begins with observing, that the principle on which all locks depend, is the application of a lever to an interior bolt, by means of a communication from within; so that, by means of the latter, the lever acts upon the bolt, and moves it in such a manner as to secure the lid or door from being opened by any pull or push from without. The security of locks in general therefore depends on the number of impediments we can interpose between the lever (the key) and the bolt which secures the door; and these impediments are well known by the name of wards, the number and intricacy of which alone are supposed to distinguish a good lock from a bad one. If these wards, however, do not in an effectual manner preclude the access of all other instruments besides the proper key, it is still possible for a mechanic of equal skill with the lock-maker to open it without the key, and thus to elude the labour of the other.

"Locks (says our author) have been constructed, and are at present much used and held in great esteem, from which the picklock is excluded: but the admission of life keys is an imperfection for which no smith has ever found a corrective; nor can this imperfection be remedied whilst the protection of the bolt is wholly confined to fixed wards." This position is proved by a remark, that the wards, let them be as intricate as we please, must all be expressed on what is called the bit or web of the key; and therefore, when all the varieties that can be expressed on this bit or web have been run through, every succeeding lock must be the counterpart of some other; and consequently the
same key which opens one will open the other also. This is evident from the locks usually put upon drawers; and which, tho’ they should be made to resist the picklock, are still liable to be opened by ten thousand other keys besides that appropriated to each of them. But though the variety of wards could be augmented even to infinity, still there could be no security against false keys for as every one of the wards must be expressed on the web of the key, if another key with a web quite plain be made to fit the key-hole exactly, we have only to cover it over with some colouring substance upon which the wards may make an impression; after which, it is easy to cut out the web in a proper manner for admitting them, when the lock will be as easily opened by the false as by the true key.

The first person, according to our author, who had any claim to merit in the branch of lock-making, is Mr. Baron; whose lock he acknowledges to be far more perfect and secure than any that ever appeared before; though he still considers it as unfit for giving that absolute security which is to be wished for. In the improvement consisted in the proper application of what are called tumblers. "These (says Mr. Bramah) are a kind of grapple; by which the bolt is confined, as well in its active as in its passive situation, and rendered immovable till set at liberty by the key. One of these instruments is commonly introduced into all locks that are of any use or value; it is lodged behind the bolt, and is governed by a spring which acts upon the tumbler as the tumbler acts upon the bolt: The application therefore of any force to the tumbler, which is superior to the force of the spring, will cause it to quit its hold, and set the bolt at liberty." In the common method of applying these machines, however, it matters nothing how far the tumbler is lifted above the point at which it ceases to control the bolt; but it is otherwise in those of Mr. Baron's construction. The action of his tumblers is circumcribed by a certain space cut in the centre of the bolt, of dimensions sufficient only to answer the purpose intended. The space in which the tumbler moves is an oblong square; and is not only furnished with niches on the under side into which the hooks of the tumblers are forced by the spring as in other locks, but is provided with corresponding niches on the other side, into which the hooks are driven, if any greater force be applied to the tumblers than what is just sufficient to disengage them from the bolt. Hence it becomes absolutely necessary, in the making of a false key, to construct it in such a manner, that it may with the greatest exactness give the requisite degree of pretense, and no more.

Mr. Bramah allows that this is a very great improvement, but objects that it is still possible to frame a key which will open it as well as its own; nor will the addition of any number of tumblers preclude the possibility of opening it. "By giving (says he) an uniform motion to the tumblers, and preventing them with a face which exactly tallies with the key, they will partake, in a very great degree, of the nature of fixed wards; and the security of his lock is thereby restored in a proportionable degree defective. Thus, suppose the false key to have passed the wards, and to be in contact with the most prominent of the tumblers, the impression, which the slightest touch will leave on the key, will direct the application of the file till sufficient force is prepared to give a free passage. The key will then bear upon a more remote tumbler; which difficulty being in like manner got over, the lock will be as easily opened by the false as by the true key."

This seemingly insuperable objection to the perfection of lock-making, however, our author removes with the greatest ease imaginable, by causing the tumblers which project unequally to present a plane surface: whence they would require a separate and unequal motion to disengage them; of consequence, no distinct impression could be made by them upon the plane surface of the web that would give any idea of their positions with regard to one another, and the construction of a false key would be altogether impossible. But though the principal difficulty with regard to Mr. Baron's lock be now overcome, others still occur, viz. the difficulty of making locks which are constructed with tumblers sufficiently durable. The tumblers themselves, he observes must be but slightly made; and being exposed to perpetual friction by the key and their own proper motion, they must soon decay; and the keys of Mr. Baron's locks, he also observes, are much less durable than those of any other locks he ever saw.

With regard to the lock which Mr. Bramah presents to the public as absolutely perfect, he informs us, that the idea of contriving it was first suggested by the alarming increase of house-breakers, which may reasonably be supposed to be perpetrated in a great measure by pernicious servants, or accomplished by their connivance. Thus it is evident, that if there were any wards which might exclude ordinary house-breakers, it would be no security against faithful servants, who, having constant access to the locks might easily get false keys fabricated at their leisure. In considering the subject, our author was convinced, that his hope of success depended entirely upon his using means as diffimilar as possible to those by which the old locks were constructed; as these, however varied, had been found insufficient for the purpose. "As nothing, (says he) can be more opposite in principle to fixed wards than a lock which derives its properties from the motion of all its parts, I determined that the construction of such a lock should be the subject of my experiment." In the prosecution of this experiment he had the satisfaction to find, that the least perfect of all his models, fully ascertained the truth and certainty of his principle. The exclusion of wards made it necessary to cut off all communication between the key and the bolt; as the same passage, which (in a lock simply constructed) would admit the key, might give admission likewise to other instruments. The office, therefore, which in other locks is performed by the extreme point of the key, is here allotted to a lever, which cannot approach the bolt till every part of the lock has undergone a change of position. The necessity of this change to the purposes of the lock, and the absolute impossibility of effecting it otherwise than with the proper key, are the points to be adhered to; and this our author does in the following manner.

Fig. 1. Shows Mr. Bramah's first attempt to construct a lock upon this principle: which, to his surprise, turned out complete and perfect. A represents a common axis on which the six levers, crossing the face
Lock. [113] Lock.

The face of the lock, are united as on a joint. Each of these rests upon a separate spring sufficiently strong to bear its weight: or, if depressed by a superior force, to restore it to its proper position when that force is removed. B represents a frame through which the levers pass by separate grooves, exactly fitted to their width, but of sufficient depth to allow them a free motion in a perpendicular direction. The part which projects from the opposite side of the joint A, and is inserted in the bolt C, is a lever to which two offices are assigned; one to keep the bolt in a fixed position, in the absence of the key; the other, to give it its proper motion upon the application of the key. D is a circular platform turning upon a centre. On this the joint or carriage of the levers, and the springs on which they rest, are fixed; and the motion of this platform impels the bolt, in either direction, by means of the lever which is projected from the joint A. The inviolable restraint upon this lock, by which means it is subjected only to the action of the key, is lodged in the part E, which is a thin plate, bearing at each extremity on a block, and having of course a vacant space beneath, equal in height to the thickness of the blocks on which it rests. By this plate the motion of the machine is checked or guided in the following manner: On the edge of the plate which faces the movement there are six notches, which receive the ends of the levers projecting beyond the frame B; and while they are confined in this manner, the motion of the machine is to totally suspended as to defy every power of art to overcome.

To understand in what manner the proper key of this lock overcomes these obstacles, it must be observed, that each lever has a notch on its extremity, and that those notches are disposed as irregularly as possible. To give the machine a capacity of motion, these notches, must be brought parallel to each other, and by a distinct but unequal pressure upon the levers, be formed into a groove in a direct line with the edge of the plate E, which the notches are exactly fitted to receive. The least motion of the machine, while the levers are in this position, will introduce the edge of the plate into the groove; which, controlling the power of the springs, will give liberty to the levers to move in a horizontal direction as far as the space between the blocks which support the plate E will admit, and which is sufficient to give the machine a power of acting on the bolt. The impossibility of thus bringing the notches on the points of the levers into a direct line, so as to tally with the edge of the plate E by any other means than the motion and impulse of the key, is that which constitutes the principal excellency of this lock.

The key (fig. 2.) exhibits six different surfaces, against which the levers are progressively admitted in the operation of opening the lock: the irregularity of these surfaces shows the unequal and distinct degree of pressure which each lever requires to bring them to their proper bearings, in order to put the machine in motion. Hence it appears, that unless the various heights of the surfaces expressed on the bit of the key are exactly proportioned to the several distances necessary to bring the notches into a straight line with each other, they must remain immovable; "and (says our author) as one stroke of a file is sufficient to cause such disproportion as will prove an unformidable impediment to their motion, I may safely assert, that it is not in art to produce a key or other instrument, by which a lock, constructed upon this principle, can be opened."

On this principle it would even be a matter of great difficulty for any workman, however skilful, to construct a key for the lock when open to his inspection: for the levers being raised, by the subjacent springs, to an equal height in the frame B, present a plane surface; and consequently convey no direction that can be of any use in forming a tally to the irregular surface which they present when acting in subjection to the key. Unless therefore we can contrive a method to bring the notches on the points of the levers in a direct line with each other, and to retain them in that position till an exact impression of the irregular surface, which the levers will then exhibit, can be taken; the workman will be unable to fit a key to the lock, or to move the bolt. This process must be rendered extremely troublesome by means of the springs; and if such difficulties occur, even when the lock is open to the inspection of a skilful workman, much more must we suppose it out of the power of one who has not access to the internal parts to make a false key to a lock of this kind.

These difficulties render it necessary in making locks of this kind not to fit the key to the lock, as is usual in other locks, but to fit the lock to the key. In this kind of lock, therefore, the key must be made first; and the inequalities upon the surface of the bit worked as chance or fancy may direct, without any reference to the lock. The key being thus completed, and applied to the surface of the levers, will, by a gentle pressure, force them to unequal distances from their common station in the frame B, and sink their points to unequal depths into the space beneath the plate E. While the levers are in this position, the edge of the plate E will mark the precise point at which the notch on each lever must be expressed. The notches being cut by this direction, the irregularity which appears when the levers resume their station in the frame B, and the inequality of the recesses on the bit of the key, will appear as a seal and its corresponding impression.

The following is a lock contrived upon the same principle, but more curious; and, in our author’s opinion, more extensively useful. Fig. 3. represents a circular block of metal divided from the centre into eight compartments, each containing a cell which forms a passage through the block, as is represented by the small circles described on the flat surface A. In each of these cells two grooves are cut at opposite points, which open a communication with the centre at one point, and with the spherical surface of the block or barrel at the other. The small circle, which marks the centre of the flat surface A, is the key-hole; which likewise forms a passage through the barrel in a parallel line with the cells which surround it. This figure represents the frame in which the active parts of the lock are deposited.

Fig. 4. shows a spiral spring lodged in the bottom of each cell, and occupying one half of the space, the other being filled with a slider resting upon the spring, and represented by fig. 5. the office of these sliders extending...
n already described. Thus, when lodged in their respective cells, they are sustained, like the levers, by the elasticity of the springs upon which they rest, till a superior power be applied; and they are again restored to their stations by the reaction of the springs when the weight is removed. The side B of each slider is projected beyond the circular surface, as represented in fig. 6, in a manner similar to the projection of the levers in the former lock beyond the curved frame in which they move. The point C is projected through the interior groove into the space which forms the centre or key-hole, expressed on the flat surface A. Fig. 7 represents the key. When this is applied, it must of course encounter these interior projections; and when pressed forward, the indented spaces on its point being unequal, will force the slides to unequal distances from their bearings; bringing the notches expressed on their exterior projections in a direct line with each other, in a manner similar to that by which the effect is produced upon the levers in the former lock. When the key is withdrawn, and the slides resume their stations by the pressure of the springs, the disposition of the notches must be irregular in the same proportion that the indentations on the point of the key are unequal; and they must necessarily fall again into a straight line when acted upon by the key.

Fig. 6 shows the barrel completely fitted for action. Its interior end is capped with a plate, which unites its compartments, and confines the springs and sliders within the cell to which they belong. From that plate proceeds the point A, which represents the lever by which the bolt is projected or withdrawn, according to the direction in which the machine performs its revolution.

Fig. 8 shows the flat surface of a thin plate, corresponding in its office with the part C of the former lock. The space cut in its centre is exactly fitted to the spherical surface of the barrel; the circle describing its circumference; and the notches cut on its edge, coinciding with the projections of the sliders. The barrel, when enclosed with this plate at the middle of its spherical surface, has its motion totally suspended till the notches on the projections of the sliders are forced, by the pressure of the key, into a line with each other: a groove being thus formed on the spherical surface of the barrel parallel to, and coinciding with, the edge of the plate, the machine is at liberty to perform a revolution in any direction, but returns to its confined state when the key is withdrawn.

The parts of the movement being thus united, the interior end of the barrel is deposited in a bed represented in fig. 9. To this it is fastened at the angles of the plate represented fig. 8, by which the barrel is encircled. The station of the bolt is at A; the lever which acts upon it being projected on the other side. Fig. 10 is a cap or mask which covers the face of the movement, and completes the lock.

On this lock our author observes, that it is excellent for street-doors: "for no method of robbery (says he) is more practised, than gaining admittance into houses by those keys, which, as is well known, may be procured at the old iron shops to fit almost any lock in use. Such robberies are generally committed where the servants are allowed to take the key with them when sent on errands, it being impracticable while the key is fixed in the lock. The various, by which the production of correspondent keys is avoided, have two sources: the first deriving from the disposition of the levers; the other, from the number of points contained in the projected surface of each lever: by which the position of its notch may, in the smallest degree, be varied.

"The variations, producible in the dispositions of six figures only, are 720: these, being progressively multiplied by additional figures, will increase by astonishing degrees; and eventually show, that a lock containing twelve levers will admit of 7\,900,500 changes: which, with the addition of another lever, will increase to 6,229,019,500. These being again multiplied by the number of changes which the projected surface of the levers will admit in the disposition of the notches, their amount will exceed enumeration, and may therefore be properly said to be infinite. The flighted impression will at once show, that their construction precludes all possibility of obtaining an impression of their internal parts, which is necessary for the fabrication of a false key; for it will be easily seen, that the positions into which the levers are forced by the pressure of the key in opening the lock, can no more be ascertained when the key is withdrawn, than the seal can be copied from its impression on a fluid, or the course of a ship be discovered by tracing it on the surface of the waves. But invariable security is not the only excellence they possess; the simplicity of their principle gives them likewise a great advantage over those that are more complicated in point of duration; for their essential parts being subject to no friction, nor exposed to any possible accident from without, they will be less affected by use, and less liable to stand in need of repair."

Lock, or weir, in inland navigations, the general name for all those works of wood or stone made to confine and raise the water of a river: the banks also which are made to divert the course of a river, are called by these names in some places. But the term lock is more particularly appropriated to express a kind of canal enclosed between two gates; the upper called by workmen the sluice-gate, and the lower called the flood-gate. These serve in artificial navigations to confine the water, and render the passage of boats easy in passing up and down the stream. Sec canal.

Locke (John), a most eminent English philosopher and writer in the latter end of the 17th century, was son of Mr John Locke of Pensford in Somersetshire, and born at Wrington near Bristol in 1632. He was sent to Christ-church in Oxford; but was highly dissatisfied with the common course of studies then pursued in the university, where nothing was taught but the Aristotelian philosophy; and had a great aversion to the disputes of the schools then in use. The first books which gave him a relish for philosophy, were the writings of Des Cartes: for though he did not always approve of his notions, yet he thought he wrote with great perfection. He applied himself with vigour to his studies, particularly to physic in which he gained a considerable knowledge, though he never practised it. In 1694, he went to Germany as secretary to Sir William Swan, envoy from the English court to the elector of Brandenburgh and some others.
other German princes. In less than a year, he returned to England; where, among other studies, he applied himself to that of natural philosophy, as appears from a register of the changes of the air which he kept at Oxford from June 24. 1666, to March 28. 1667. There he became acquainted with the Lord Ashley, afterwards Earl of Shaftesbury, who introduced him into the conversation of some of the most eminent persons of that time. In 1670, he began to form the plan of his Essay on Human Understanding; but his employments and avocations prevented him from finishing it then. About this time he became a member of the Royal Society. In 1672, his patron, now Earl of Shaftesbury, and Lord Chancellor of England, appointed him secretary of the presentations, which place he held till the earl refigned the great seal. In 1673, he was made secretary to a commission of trade, worth 500l. a year; but that commission was dissolved in 1674. The Earl of Shaftesbury being restored to favour, and made President of the council in 1675, sent for Mr. Locke to London: but that nobleman did not continue long in his post, being sent prisoner to the tower; and after his discharge retired to Holland in 1682.

Mr. Locke followed his patron thither. He had not been absent from England a year, when he was accused at court of having written certaintracts against the government, which were afterwards discovered to be written by another person; and in November 1684, he was deprived of his place of student in Christ-Church. In 1685, the English envoy at the Hague demanded him and 83 other persons to be delivered up by the States General; upon which he lay concealed till the year following; and during this time formed a weekly assembly with Mr. Limouch, Mr. Le Clerc, and other learned men at Amsterdam. In 1689 he returned to England in the fleet which conveyed the princes of Orange; and endeavoured to procure his restoration to his place of student in Christ-Church, that it might appear from hence that he had been unjustly deprived of it: but when he found the college would admit him only as a supernumerary student, he defisted from his claim.

Being esteemed a sufferer for revolution-principles, he might easily have obtained a more profitable post; but he contented himself with that of commissioner of appeals, worth 200l. a year, which was procured for him by the Lord Mordaunt, afterwards Earl of Monmouth, and next of Peterborough. About the same time he was offered to go abroad in a public character; and it was left to his choice whether he would be envoy at the court of the emperor, that of the Elector of Brandenburgh, or any other where he thought the air most suitable to him: but he waved all these, on account of the infirm state of his health; which disenabled him gladly to accept another offer that was made by Sir Francis Masham and his lady, of an apartment in their country-seat at Oates in Essex, about 25 miles from London.

This place proved to agreeable to him in every respect, that it is no wonder he spent the greatest part of the remainder of his life at it. The air restored him almost to a miracle, in a few hours after his return at any time from the town quite spent and unable to support himself. Besides this happiness here, he found in lady Masham a friend and companion exactly to his heart's wishes; a lady of contemplative and studious complexion, and particularly inured, from her infancy, to deep and refined speculation in theology, metaphysics, and morality. In this family Mr. Locke lived with as much ease as if the whole house had been his own; and he had the additional satisfaction of seeing this lady breed up her only son exactly upon the plan which he had laid down for the best method of education; the success of which was such as seemed to give a foundation to his judgment in the choice of that method. In effect, it is to the advantage of this situation that he derived so much strength as to continue exerting those talents which the earl of Shaftesbury had observed to be in him for political subjects. Hence we find him writing in defence of the revolution in one piece; and considering the great national concern at that time, the ill state of the silver coin, and proposing remedies for it in others. Hence he was made a commissioner of trade and plantations in 1695, which engaged him in the immediate business of the state; and with regard to the church, he published a treatise the same year, to promote the scheme which King William had much at heart, of a comprehension with the dissenters. This, however, drew him into one controversy; which was fiercely ended, when he entered into another in defence of his essay, which held till 1698: soon after which the aethia, his constitutional disorder, increasing with his years, began to subdue him; and he became so infirm, that in 1700 he resigned his seat at the board of trade, because he could no longer bear the air of London sufficient for a regular attendance upon it. After this resignation he continued altogether at Oates; in which retirement he employed the remaining last years of his life entirely in the study of the holy Scriptures.

He died in 1704, aged 71. His writings will immortalize his name. The earl of Shaftesbury, author of the Characteristics, though in one place he speaks of Mr. Locke's philosophy with severity; yet observes, concerning his Essay on the Human Understanding, in general, "that it may qualify men as well for business and the world, as for the sciences and the university." Whoever is acquainted with the barbarous state of the philosophy of the human mind, when Mr. Locke undertook to pave the way to a clear notion of knowledge, and the proper methods of purifying and advancing it, will be surprized at this great man's abilities; and plainly discover how much we are beholden to him for any considerable improvements that have been made since. His Discourses on Government, Letters on Toleration, and his Commentaries on some of St. Paul's Epistles, are justly held in the highest esteem.

LOCKED JAW. See (the Index subjoined to) MEDICINE.

LOCKMAN, an officer in the Isle of Man, who executes the orders of government, much like our under-sheriff.

LOCKMAN, an eastern philosopher. See LOCKMAN.

LOCÉ, a small town in a district of the same name in Switzerland, adjacent to Neuchâtel and Olten, and united with another named La Chaux de Fond. Both these districts occupy some valleys formed by the mountains of Jura; the greatest part of which P 2
Locri, a county of Achaea in Greece; twofold, and divided by mount Parnassus. The site was occupied by the Locri Ozole, called also Zephyrium, or Western, contained between Aiolia and Phocis, beginning at Naupactus, and running in a narrow slip of land, scarce 200 stadia, along the sea to the borders of the Phocenses. The farther Locris lay beyond Parnassus, running out towards Thermopylae, and reaching to the Euriped of Euboea; occupied by the Locri Optuittii, who dwelt on the Eubean sea; and the Epicenimi, who occupied mount Cenis (Syrac.); and these two were the Eastern Locri.

Loc. 51.16

LOG, in the Jewish antiquities, a measure which held a quarter of a cab, and consequently five-sixths of a pint. There is mention of a log, 2 Kings vi. 25.
L O G

Log, under the name of a fourth part of a cab. But in Leu-"vivieae the word log is often met with, and signifies that measure of oil which lepers were to offer at the temple after they were cured of their disease. Dr. Arbuthnot says, that the log was a measure of liquids, the seventy-second part of the bush or ephah, and twelfth part of the tun, according to all the accounts of the Jewish writers.

Log, a sea term, signifying a small piece of timber, or a triangular, sextant, or quadrant figure, on board a ship, generally about a quarter of an inch thick, and five or six inches from the angular point to the circumference. It is balanced by a thin plate of lead, nailed upon the arch, or circular side, so as to swim perpendicularly in the water, with about two thirds immersed under the surface.

Log-line, a little cord, or line, about a hundred and fifty fathoms long, fastened to the log by means of two legs ab (fig. 4), one of which passes through a hole at the corner, and is knotted on the opposite side, while the other leg is attached to the arch by a pin fixed into another hole, so as to draw out occasionally. By these legs the log is hung in equilibrio; and the line thus annexed to it is wound round a reel fixed for that purpose in the gallery of the ship.

This line, from the distance of about ten, twelve, or fifteen fathoms off the log, has certain knots or divisions, which ought to be at least fifty feet from each other; though it was the common practice at sea not to have them above forty two feet asunder.

The length of each knot ought to be the same part of a sea-mile as half a minute is of an hour; and admitting the measurement of Mr. Norwood, who makes a degree on a great circle of the earth to contain 367,200 English feet, or about 69; English statute miles, and, therefore, 3rd part of it, or a nautical mile, will be 6120 feet; 1/3 of 6120, or 51 feet, should be the length of each knot. But because it is safer to have the reckoning rather before the ship than after, it therefore fifty feet may be taken as the proper length of each knot. The knots are sometimes made to confit only of forty-two feet each, even in the present practice; and this method of dividing the log-line was founded on the supposition that sixty miles, each of 5000 English feet made a degree; for 1/3 of 5000 is 417, or, in round numbers, 42 feet. Mariners, rather than quit the old way, though known to be erroneous, use glasses for half minute ones, that run but 24 or 25 seconds. They have also used a line of 45 feet to 30 seconds, or a glass of 28 seconds to 42 feet. When this is the case, the distance between the knots should be corrected by the following proportion: 30 is to 50: 50 is the number of seconds of the glass to the distance between the knots upon the line. The heat or moisture of the weather has often a considerable effect upon the glass, so as to make it run slower or faster; it should, therefore, be frequently tried by the pendulum in the following manner. On a round nail hang a string that has a mucket-ball fixed to one end, carefully measuring between the centre of the ball and the string's loop over the peg 39 inches, being the length of a second pendulum; then swing it, and count one for every time it passes under the peg, beginning at the second time it passes; and the number of swings made during the time the glass is running out shows the seconds it contains. The line also is liable to relax and shrink, and should therefore be occasionally measured.

The use of the log and line is to keep account and make an estimate of the ship's way or distance run; which is done by observing the length of the line unwound in half a minute's time, told by a half-minute glass; for so many knots as run out in that time, so many miles the ship fails in an hour. Thus, if there be four knots veered out in half a minute, the ship is computed to run four miles an hour.

The author of this device for measuring the ship's way is not known; and no mention of it occurs till the year 1607, in the East-India voyage published by Purchas; but from that time its name occurs in other voyages among his collections; and henceforward it became famous, being taken notice of both by British authors and by others; as by Gunter in 1623; Snellius in 1624; Mercator in 1631; Oughtred in 1633; Herigone in 1634; Salomonfall in 1636; Norwood in 1637; Pournier in 1643; and almost by all the succeeding writers of navigation in every country.

To have the Log, as they call it, they throw it into the water on the lee-side, letting it run till it comes without the eddy of the ship's wake; then one holding a half-minute glass, turns it up just as the first knot, or the mark from which the knots begin to be reckoned, turns off the next log, 2, 3, 4, &c. over the stern. As soon as the glass is out, the reel is stopped, and the knots run off are told; and their parts estimated.

It is usual to have the log once every hour in ships of war and East-India men, and in all other vessels once in two hours; and at any time of the watch, the wind has increased or abated in the intervals, so as to affect the ship's velocity, the officer generally makes a suitable allowance for it at the close of the watch.

The log is a very precarious way of computing, and must always be corrected by experience and good fene; there being a great deal of uncertainty in the yawing of the ship going with the wind astern, or upon the quarter in the heaving of it, by its coming home or being drawn after the ship, on account of the friction of the reel and lightness of the log in the course of the current, and in the strength of the wind, which seldom keeps the same tenor for two hours together; which is the interval between the times of using the log in short voyages, though in longer ones they heave it every hour. Yet this is a much more exact way of computing than any other in use; much preferable certainly to that of the Spaniards and Portugal who guessed at the ship's way by the running of the froth or water by the ship's side; or to that of the Dutch, who used to have a chip-over-board, and to number the paces they walk on the deck while the ship swims between any two marks, or bulk-heads on the side.

Compound Log. The abovementioned errors, and particularly the log's being subject to drive with the motion which the water may have at its surface, whereas the experiment requires it to be fixed in the place where it is when the mark commencing the knots goes off the reel, have been considered by writers, and many methods have been proposed to remove, or at least to lessen them.

The
The late M. Bouguer proposed a method, which has been long thought deserving of particular attention, in the Mem. Acad. Sci. 1747; afterwards in his Treatise on Navigation published at Paris in 1752, and since reprinted in 1760, by the abbe de la Caille. For this purpose, take for the log a conical piece of wood, which fix to the log-line passed through or along its axis, at about 40, 50, or 60, or more feet, from one end; and to this end fix the diver, which is a body formed of two equal square pieces of tin, or of thin iron plate, fixed at right angles to one another along their diagonals and its size so fitted to that of the cone, that the whole may float. A cone of three inches diameter in the base, and of six inches in the slant height, is proposed by M. Bouguer to suit a diver made of plates about 64 inches square; the intersection of the diagonals is joined to the log-line, and the loop and peg fixed as in the common log. However, it has been found, that no kind of wood used in British dock-yards, when formed into a cone of the above dimensions, will float a diver made of brass or copper, and of the same thickness of the former, such a diver would weigh, with its folder about 20 ounces, and can be floated by a light fir cone of four inches diameter in the base, and ten inches in the slant height or length, and such a compound log might perhaps be found on trial to be affected by about as much again as that proposed by M. Bouguer; and consequently the difference between the numbers given by the common log and compound log, must be augmented by two-thirds of itself for the necessary correction, as below. When the compound log of Bouguer, above described, is hove overboard, the diver will sink too deep to be much affected by the current or motion of water at the surface, and the log will thereby keep more steady in the place where it first fell; and consequently the knots run off the reel will show more accurately the ship's rate of failing. As the common log is affected by the whole motion of the current, so this compound log will feel only a part thereof, viz., such a part nearly as the resistance of the cone is to the resistance of the diver; then the resistances of the above cone and diver are about as 1 to 5; and consequently this log will drive but one-fifth part of what the common log would do; and so the ship's true run will be affected by one-fifth only of the motion of the water. To obtain the true rate of failing, it will be proper to have alternately, hour and hour, the common log and this compound log; then the difference of their knots run off augmented by its one-fourth part, is the correction; which applied to the knots of the common log, will give the ship's true rate of failing at the middle time between the hours when these logs were hove. The correction is additive when the compound log's run is the greatest, otherwise it is subtractive. To find the course made good increase the observed angle between the log-lines by one fourth part; and this gives the correction to be applied to the apparent course, or the opposite of that shown by the common log; the correction is to be applied to the left 3 of the apparent course, when the bearing of the common log is to the right of the compound log. Or thus: the lengths run off both logs, together with their bearings, being known; in a card or compass, apply the knots run off, taken from a scale of equal parts along their respective bearings, from the centre; join the ends; and in this line produced, on the side next the compound log's length, take one-fourth of the interval; then a line drawn from the end, thus produced, to the centre of the card, will show the true course and distance made good. When a current, such as a tide, runs to any depth, the velocity of that current may be much better ascertained by the compound log than by the common one, provided the diver does not descend lower than the run of the current; for as those ships which are deepest immersed drive fastest with the tide; so the diver, by being fixed on below, as well as the log on the surface, their joint motion will give the total effect of the current's motion better than what could be derived from the motion at the surface only. Also, by such a compound log, the depth to which any current runs may be easily tried.

**Other Logs.** We have an account in the voyage to the North Pole, p. 67, of two other logs, which were tried by captain Phillips: one invented by Mr Raffles, the other by Foxon; both constructed upon this principle, that a spiral, in proceeding its own length in the direction of its axis through a resisting medium makes one revolution round the axis; if, therefore, the revolutions of the spiral are registered, the number of times it has gone its own length through the water will be known. In both these the motion of the spiral in the water is communicated to the clock-work within board by means of a small line fastened at one end to the spiral, which passes after the ship, and at the other to a spindle which feeds the clock-work in motion. That invented by Mr Raffles has a half spiral of two threads made of copper, and a small dial with clock-work, to register the number of turns of the spiral. The other log has a whole spiral of wood with one thread, and a larger piece of clock-work with three dials two of them to mark the distance, and the other divided into knots and fathoms, to show the rate by the half-minute glials, for the convenience of comparing it with the log. This kind of log will have the advantage of every other in smooth water and moderate weather; and it will be useful in finding the trim of a ship when alone, in surveying a coast in a single ship, or in measuring distances in a boat between head-lands and shoals; but it is subject to other inconveniences, which will not render it a proper substitute for the common log.

**Perpetual Log** A machine so called by its inventor, Mr Gottlieb of Hundsfich, London. It is intended by it to keep a constant and regular account of the rate of the ship's velocity through the water; whereas the common log hitherto used does not indicate the variation in her velocity in the interval of heaving the log, and consequently does not ascertain the true distance that the ship has run in any given length of time.
LOG-Board, CELLiULL, progression, progression, limitations, divisions, reliance of the water path, y'rrant L.
at the copper grating, placed to obstruct the entrance of any dirt, &c. into the machine. 1, is section of a water-wheel, made from 6 to 12 inches in diameter, as may be necessary, with float-boards upon its circumference, like a common water-wheel, that turn by the resistance of the water passing through the channel LK. It turns upon a shouldered axis, represented by the vertical line at K. When the ship is in motion, the resistance of the water through the channel LK turns round the wheel I. This wheel, by means of a pinion, is connected with and turns the rod contained in the long copper tube N. This rod, by a pinion fixed at its upper extremity, is connected with and turns upon the whole cyletem of wheels contained in the dial of the case A B C D. This dial, by means of the copper tube N, may be fixed to any convenient place aboard the ship. In the front of the dial are several useful circular graduations, as follow: The reference by the dotted line A has an hand which is moved by the wheels within, which points out the motion of the ship in fathoms of 6 feet each. The circle at B has an hand showing the knots, at the rate of 48 feet for each knot; and is to be observed with the half minute glafs at any time. The circle C has a short and long hand; the former of which points out the miles in land-measure, and the latter or longer the number of knots contained in each mile, viz. 128, which is in the same proportion to a mile as 60 minutes to the hour in the reckoning. At e, a small portion of a circle is seen through the front-plate called the regifter; which shows, in the course of 24 hours (if the ship is upon one tack), the distance in miles that the ship has run; and in the 24 hours the mariner need take but one observation, as this register serves as an useful check upon the fathoms, knots, and miles, shown upon the two other circles.

f, Is a plate showing 300 degrees or 6000 miles, and also acts as another register or check; and is useful in case of any mistake being made in observing the distance run by the other circles. The reckoning by these circles, without fear of mistake, may therefore be continued to nearly 12,000 miles.

A communication from this machine may easily be made to the captain's bed-side, where by touching a spring only, a bell in the head ABCD will sound as many times in an half minute as the ship sails miles in an hour.

Mr Gottlieb has applied this machine to the Carpenter and Welford land packets. He is very sanguine in the hopes of its success and utility; and conceives that the mariner will, by this contrivance, be better enabled than heretofore to keep the vessel and his reckoning together; it being well known that the most experienced navigator is too frequently erroneous in this respect, the ship being sometimes ahead, or sometimes astern, of the reckoning.

He also observes, that the construction of the log is such, that if the vessel was to be aground, strike a rock, or ship off her false keel, the parts would not be disarranged: and further, should she be laid up for repairs, &c. six months, in half an hour after coming again into the water, the lower immersed part of the log would clear itself, and be in proper action.

Log-Board, a sort of table, divided into several columns, containing the hours of the day and night, the direction of the winds, the course of the ship, and all the material occurrences that happen during the 24 hours, or from noon to noon; together with the latitude by observation. From this table the different officers of the ship are furnished with materials to compile their journals, wherein they likewise insert whatever may have been omitted, or reject what may appear superfluous in the log-board.

Log-Book, a book into which the contents of the log-board is daily copied at noon, together with every circumstance deserving notice that may happen to the ship, or within her cognizance, either at sea or in a harbour, &c. The intermediate divisions or watches of the log-book, containing four hours each, are usually signed by the commanding officer in ships of war or East India men. See NAVIGATION.

LOGARITHMS.

LOGARITHMS, (from log, ratio, and arithmetical number), the indices of the ratios of numbers to one another; being a series of numbers in arithmetical progression, corresponding to others in geometrical progression; by means of which, arithmetical calculations can be made with much more ease and expedition than otherwise.

SECT. I. History of Logarithms.

The invention of logarithms first occurred to those yeveant in the construction of trigonometrical tables, in which immense labour was required by large multiplications, divisions, and extraction of roots. The aim proposed was, to reduce as much as possible the multiplications and divisions to additions and subtractions: and for his purpose, a method was invented by Nicholas Raymer Ulfus Dithmarius, which serves for one cafe of the fines, viz. when the radius is the first term in proportion, and the fines of two arcs the second and third terms. In this case the fourth term is found by only taking half the sum or difference of the fines of the other two arcs, and the complement of the greater. This method was first published in 1588, and a few years afterward was greatly improved by Clavius, who used it in all proportions in the solution of spherical triangles; adapting it to fines, tangents, versed sines, and secants; and this, whether the radius was the first term in the proportion or not. This method, however, though now become much more
more generally useful than before, was still found attended with trouble in some cases; and as it depended upon certain properties of lines belonging to the circle, was rather of a geometrical than arithmetical nature; on which account the calculators about the end of the 16th and beginning of the 17th century, finding the solution of astronomical problems extremely troublesome by reason of the tedious multiplications and divisions they required, continued their endeavours to lighten that labour, by searching for a method of reducing their operations to addition and subtraction. The first step towards this was, the consideration, that as in multiplication the ratio of the multiplier to unity is the same as that of the product to the multiplicand, it will follow, that the ratio of the product to unity must be equal to the sum of the two ratios of the multiplier to unity, and of the multiplicand to unity. Could a set of numbers therefore be found, which would represent the ratios of all other numbers to unity, the addition of two of the former set of numbers would be equivalent to the multiplication of the two numbers together, the ratios of which they denoted; and the sum arising from this addition would denote the ratio of their product to unity; whence the product itself might be found by looking for the corresponding natural number in the table.

The next thing was to fall upon a method of calculating such a table as was wanted, which indeed appeared an herculean labour. The first observation was, that whatever numbers might be made use of to represent the ratios of others, the ratio of equality, or that of unity to unity must be 0; for that ratio has properly no magnitude, neither increasing nor diminishing any other ratio to which it is adapted, or from which it is subtracted.

2. The second observation was, that though any number might be chosen at pleasure to represent the ratio of any other number to unity, yet when once this choice was made, all the other numbers representing the different ratios must be determined by it. Thus, if the ratio of 10 to 1 be represented by 1, then the ratio of 100 to 1 must be 2, and that of 1000 to 1 must be 3, &c.; or if 2 was chosen to represent the ratio of 10 to 1, then that of 100 to 1 must be 4, that of 1000 to 1 must be 6, &c.; and no other numbers could possibly be used.

3. As these artificial numbers represented, or were proportional to, the ratios of the natural numbers to unity, they must be expressions of the numbers of some smaller equal ratios contained in the former and larger ones. Thus, if we take the representative of the ratio of 1000 to 1; then 3, which represents the ratio of 1000 to 1, will likewise express the number of ratios of 100 to 1, which are contained in that of 1000 to 1. If instead of 1, we make 1000 to be the ratio of 10 to 1; then 300 will express the ratio of 1000 to 1, and a number of 10000 will express the number of all ratios of the 1000th root of 10 to 1 contained in the ratio of 1000 to 1; and so on for any larger number, as 10,000, 100,000, or 1,000,000, &c. Thus, if instead of 1000 we make 10,000,000 the representative of the ratio of 10 to 1, then the unit will represent a very small ratio, of which there are 10,000,000 contained between 1 and 10, and which ratio could not really be had without extracting a root which involved in itself, 10,000,000 of times would only make up 10; which root may perhaps be most intelligibly expressed thus, \( \sqrt[10]{10000000} \).

If the ratio of 10 to 1 contained 10,000,000 of these roots, it is evident that the ratio of 100 to 1 must contain 20,000,000, that of 1000 would have 30,000,000, &c.; of consequence the ratio of 100 to 1 will be expressed by 20,000,000, of 1000 to 1 by 30,000,000, &c. Hence, as these artificial numbers represent the ratios of natural numbers to unity, or are proportional to them, they are very properly called the logarithms of these numbers, or the numbers of their ratios; because they really do express this number of ratios.

The relation of logarithms to natural numbers may perhaps more intelligibly be explained by two series of numbers, one in an arithmetical, and the other in geometrical progress.]
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Here let it be required to multiply 4 by 16; the
number 3 standing over 4, added to 5, which stands over
16, gives 8, which stands over 128; but this is
not just ; for that we must diminish the logarithm by 1,
and then the number 7 standing over 64 shows the
true product. In like manner it appears, that as we
defend below unity in a logarithmic table, the loga-
rithms themselves must begin in a negative series with
respect to the former; and thus the logarithm of
will always be infinite; negative, if the logarithms
increase with the natural numbers; but positive, if
they decrease. For as the geometrical series must
diminilh by infinite divisons by the common ratio, the
arithmetical one must decrease by infinite subtractions,
or increase by infinite additions of the common dif-
ference.

This property of numbers was not unknown to the
ancient mathematicians. It is mentioned in the works
of Euclid; and Archimedes made great use of it in his
Areomartis, or treatise on the number of the lands; and
it is probable that logarithms would have been much
sooner invented, had the real necessity for them been
sooner felt; but this did not take place till the end of
the 16th century, when the construction of trigono-
metrical tables, and solution of perplexed astronomic
problems, rendered them absolutely indispensible.

About this time it is probable that many people
wished to see such tables of numbers, and were
making attempts to construct them; but the inven-
tion is certainly due to Lord John, Baron of
Merchiston in Scotland. The invention is by some
indeed ascribed to Longomontanus; but with very
little probability, as he never published anything of
the kind, nor laid claim to the invention, though
he lived to see the publication of Baron Napier's ta-
bles, and could give no farther account of it than that it was
found already in use about the work; and by the
time that Dr Craig returned to call upon him, he had
prepared a rude draught of it, which he called Canon
mirabilis Logarithmorum; and this draught, with
some alterations, was printed in 1614.

According to Kepler, one Juthe Byrge, assistant
astronomer to the landgrave of Hesse, either invented
or projected logarithms long before Baron Napier,
and composed a table of sines for every two seconds
of the quadrant; though, by reason of his natu-
ral refervedness, he never published anything to the
world. But whatever might have been in this, it is
certain that the world is indebted for logarithms to
Baron Napier, who died in the year 1618. This noble-
man, his wife made considerable improvements in tri-
igonometry, and the frequent numerical compu-
tations he had occasion for in this branch, undoubtedly
contributed to his invention of the logarithms, that
he might have part of the trouble in these calculations.
His book published in 1614 was intitled Mirifici Loga-
rithmorum Canonis definitio. At this time he did not
publish his method of constructing the numbers until
the sense of the learned should be known. In other
respects the work is complete, containing all the lo-
garithms of the natural numbers to the usual extent
of logarithmic tables, with the logarithmic sines, tan-
gents, and secants, for every minute of the quadrant,
directions for using the tables, &c.

This work was published in Latin; but was after-
wards translated into English by Mr Edward Wright,
inventor of the principles of what has been falsely call-
ed Mercator's Sailing. The translation was feft to
the Baron, at Edinburgh, and returned with his appro-
bation and some few additions. It was published in
1616, after Mr Wright's death, with a dedication to
the Earl of India Company, by his son Samuel Wright,
and a preface by Mr Briggs, who afterwards dis-
tinguished himself so much in bringing logarithms to
perfection. In this translation Mr Briggs also gave
the description and draught of a scale invented by Mr
Wright, as well as other methods invented by him-
self, for finding the intermediate proportional num-
bers; the logarithms already found having been only
printed for such numbers as were the natural sines of
each minute.

Mr Wright's translation was reprinted in 1618, with
a new title-page, and the addition of 16 pages of new
matter, showing the method of calculating triangles,
as well as a method of finding such sines and lo-
garithms as are not to be found in the canons."

Next year John Speckell published his New Loga-
rithms, in which were some remedies for the incon-
veniences attending Baron Napier's method. The same
year also Robert Napier, the Baron's son, published
a new edition of his father's book, intituled Canonici
Logarithmorum Descriptio; with another concerning
the method of constructing them, which the Baron had
promised; together with some other miscellanoeous pieces,
which his father had likewise composed along with Mr
Briggs. In 1620 also, a copy of these works was print-
ed at Lyons in one volume, by Bartholomew Vincent a
bookfeller there; but this publication seems to have
been but little known, as Winge, who carried loga-
rithms to France four years after, is said to have been
the first who introduced them into that country.

The Carus Mathematicus published at Cologne in
1618 or 1619 by Benjamin Ursinus, minister and
a preacher of Brandenburg, contains a copy of Na-
ipier's logarithms, together with some tables of propor-
tional parts. In 1624 he published his Trigonometria,
with tables of natural sines and their logarithms,
according to Baron Napier's method, to every ten seconds
in the quadrant. The same year a book on logarithms
was published at Marburg by the celebrated Kepler,
of the same kind with those of Napier. Both of these
begin at 90° or the end of the quadrant; and, while
the sines decrease, the logarithms gradually increase;
till at the beginning of the quadrant, or 0, the loga-
rithm is infinite. The only difference between the loga-
rithms of Napier and Kepler is, that in the former the
arc is divided into equal parts, differing by one minute
each; and consequently their sines to which the loga-
rithms are adapted are intermediate numbers represent-
ed only by approximating decimals; but in Kepler's
table, the radius is divided into equal parts; which
are considered as perfect and terminate sines, having
equal differences, and to which the logarithms are here
adapted.
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adapted. A treatise of some extent was prefixed to the work; in which the construction and use of logarithms is pretty largely treated of. In the year 1627 the same author introduced logarithms into his Rudolphine Tables, together with several others, viz. 1. A table similar to that already mentioned; only that the column of sines or absolute numbers is omitted, and another added in its stead, showing what part of the quadrant each arc is equal to; viz. the quotients arising from the division of the whole quadrant by each given arc, and expressed in integers, and sexagesimal parts. 2. Napier's table of logarithmic sines to every minute of the quadrant; as also two other smaller tables adapted for the calculation of eclipses and the latitude of planets. In this work Julius Byrgius is mentioned as having invented logarithms before Napier.

The kind of logarithms now in use were invented by Mr Henry Briggs professor of geometry in Gresham college, London, at the time they were first discovered by Napier. As soon as the logarithms of Napier were published, Mr Briggs directed his attention to the study and improvement of them; and in consequence of the Baron's advice, Mr Briggs made some alteration in the method of constructing his tables from that which he had begun. A correspondence also took place between the Baron and Mr Briggs, which continued during the lifetime of the former. It appears, however, that, whether Mr Briggs thought of this alteration before Baron Napier or not, he certainly was the person who first published it to the world; and some reflections have been thrown upon the Baron for not making any mention of the share which Mr Briggs had in it.

In 1617 Mr Briggs published his first thousand logarithms under the title of Logarithmorum Chilias Prima, and in 1620 Mr Edward Gunter published his Canon of Triangles, containing the artificial or logarithmic sines and tangents for every minute, to seven places of figures besides the index; the logarithm of the radius being 10,000. These were the first tables of logarithmic sines, tangents, &c. which made their appearance upon the present plan; and in 1623 they were reprinted in his book De Sphaere et Radiis, along with the Chilias Prima of Mr Briggs. The same year Mr Gunter applied these logarithms of numbers, sines, and tangents, to straight lines drawn on a ruler; and with these the proportions in common numbers as well as in trigonometry, were solved by the mere application of a pair of compases: a method founded upon this property, that the logarithms of the terms of equal ratios are equally different. The instrument is now well known by the name of the two-feet Gunter's Scale. By the same method he also greatly improved the sectors. He was also the first who used the word sines for the sines of the complement of an arc; and he introduced the ufe of arithmetical complements into the logarithmic arithmetic. He is said also to have first suggested the idea of the logarithmic curve, so called because the segments of its axis are the logarithms of the corresponding ordinates.

The logarithmic lines were afterwards drawn in many other ways. Wingate, in 1627, drew them upon two separate rulers sliding by each other, in order to fave the ufe of compases in resolving proportions. In 1627 also, they were applied by Mr Oughtred to concentric circles; about 1650, in a spiral form, by one Mr Milburne of Yorkshire; and in 1657, they were applied on the present sliding rule by Mr Seth Partridge.

The knowledge of logarithms was diffused in France by Mr Edmund Wingate, as already related, though not carried originally thither by him. Two small tracts were publifhed by him in French, and afterwards an edition in English, all printed in London. In the first of these he mentions the ufe of Gunter's Ruler; and in the other that of Briggs's Logarithms, with the ufe of compases in resolving proportions. There are likewise tables of these sines, tangents, and logarithms, copied from Gunter.

From the time that Mr Briggs first began to study the nature of logarithms, he applied to the construction of tables with such avidity, that by the year 1624 he published his Arithmetica Logarithmica, containing the logarithms of 30,000 natural numbers to 14 places of figures besides the index; viz. from 1 to 20,000, and from 90,000 to 100,000, together with the differences of the logarithms. According to some there was another Chilias, viz. from 100,000 to 101,000, but this does not seem to be well authenticated. In the preface to this work, he gives an account of the alteration made in the scale by Baron Napier and himself; and earnestly solicits other person to undertake the task of filling up the intermediate numbers; offering to give instructions, and to afford paper ready ruled for the purpose. He gives also instructions at large in the preface for the construction of logarithmic tables. Thus he hoped to get the logarithms of the other 70,000 natural numbers completed; while he himself, being now pretty far advanced in years, might be at liberty to apply to the canon of logarithmic lines, &c. which was as much wanted by mathematicians as the others. His wishes were accomplished by Adrian Vlacq or Flack of Gouda in Holland, who completed the number from 20 to 90,000; and thus the world was furnished with the logarithms of all natural numbers from 1 to 100,000. But those of Vlacq were only done to 10 places of figures. To these was added a table of artificial sines, tangents, and secants, to every minute of the quadrant. Besides the great work already mentioned, Mr Briggs completed a table of logarithmic sines and tangents for the 100th part of every degree, to 14 places of figures besides the index; and a table of natural sines for the same parts to 15 places, with the tangents and secants to 10 places, and the methods of constructing them. He designed also to have published a treatise concerning the ufe and application of them, but died before this could be accomplished. On his death-bed he recommended this work to Henry Gellibrand professor of astronomy.
astronomy in Gresham college, in which office he had succeeded Mr Gunter. Mr Briggs's tables abovementioned were printed at Gouda, and published in 1624; and the same year Mr Pellissier added a preface with the application of logarithms to plane and spherical trigonometry, the whole being denominated *Trigonometria Britannica*. It includes the area in degrees and hundred parts, has another table containing the minutes and seconds answering to the several hundred parts in the first column.

The *Trigonometria Artificialis* of Vlacq contains the logarithmic sines and tangents to 10 places of figures, to which is added Briggs's first table of logarithms from 1 to 20,000, besides the index. The whole preceded by a description of the table, and the application of them to plane and spherical trigonometry, Chiefly extracted from Briggs's *Trigonometria Britannica* already mentioned. In 1632, Mr Pellissier also published a work intitled, *An Institution Trigonometrical*, containing the logarithms of the first 10,000 numbers, with the natural sines, tangents, and secants; and the logarithmic sines and tangents for degrees and minutes, all to seven places of figures besides the index; likewise other tables proper for navigation, with the uses of the whole. Mr Pellissier died in 1636, in the 46th year of his age.

A number of other people have published books on logarithms, which we cannot now particularly enumerate. Some of the principal are:

1. A treatise concerning Briggs's logarithms of common numbers from 1 to 20,000, to 11 places of figures, with the logarithmic sines and tangents but only to eight places. By D. Henrion at Paris, 1626.

2. Briggs's logarithms, with their differences to 10 places of figures, besides the index for all numbers to 100,000; as also the logarithmic sines, tangents, and secants, for every minute of the quadrant, with the explanation and uses in English. By George Miller, Lond. 1631.

3. *Trigonometria*, by Richard Norwood, 1631; containing Briggs's logarithms from 1 to 10,000, as well as for the sines, tangents, and secants to every minute, both to several places of figures besides the index. The author complains very much of the unfair practices of both the former authors.

4. *Dierictorium Generalis Uranometriae*, by Francis Bonaventure Cavaliere. Bologna, 1632. In this are Mr Briggs's tables of logarithmic sines, tangents, secants, and verified sines each to eight places of figures for every second of the first 5 minutes, for every 5 seconds from 5 to 10 minutes, for every 20 seconds from 20 to 30 minutes, for every 50 seconds from 30 minutes to 1 degree, and for every minute in the rest of the quadrant. It contains also the logarithms of natural numbers from 1 to 10,000, with the first table of verified sines that ever was published. The author likewise gives the first intimation of the method of finding the area of spherical surface contained by various arcs described on the surface of a sphere.

5. In 1643 appeared the *Trigonometria* of the same author, containing the logarithms of the natural numbers from 1 to 10,000, with their differences to eight places of figures, likewise a table of natural and logarithmic sines, tangents, and secants; the former to seven, the latter to eight, places of figures.

6. *Tabula Logarithmica*; by Mr Nathaniel Rowe, pastor of Benaire in Suffolk: Lond. 1633. In this work are contained Mr Briggs's logarithms of natural numbers from 1 to 100,000, to eight places of figures; likewise the logarithmic sines and tangents to every hundredth part of degrees to ten places.

7. *Clavis Universae Trigonometriae*: Hamburg, 1634; containing tables of Briggs's logarithms from 1 to 2000; and of sines, tangents, and secants, for every minute, both for seven places.

8. *Trigonometria Britannica*, by John Newton, London, 1638. In this the logarithmic tables of natural numbers were reduced to their most convenient form; the author having availed himself of the labours of Wingate and Rowe, uniting their several methods, and dispoising of the whole as in the best logarithmic tables used at present. It contains likewise the logarithmic sines and tangents to eight figures besides the index; for every hundredth part of a degree, with the differences, and for thousandth parts in the first three degrees. He censures the unfair practices of some former publishers of logarithms; particularly of Vlacq already mentioned.

9. *Mathesis Nova*, by John Caramuel, 1670. This contained 1000 logarithms, both of the forms of Napier and Briggs, as well as 1000 of what he calls perfect logarithms, viz. those of Briggs's first method of construction; which differs from the last only in this, that the last increases, whilst the first decreases; the radix or logarithm of the ratio of 10 to 1 being the very same in both.

10. Sherwin's *Mathematical Tables*, published in 8vo, form the most complete collection of any; containing, besides the logarithms of all numbers to 101,000, the sines, tangents, secants, verified sines both natural and logarithmic, to every minute of the quadrant. The first edition was printed in 1706; but the third, published in 1742 and revised by Gardiner, is looked upon to be superior to any other. The fifth and last edition, published in 1771, is so incorrect, that no dependence can be placed upon it.

11. Tables of logarithms from 1 to 101,100, and for the sines and tangents to every 10 seconds of each degree in the quadrant; as also for the sines of the first 72 minutes to every single second, with other useful and necessary tables. By Gardiner, London, 1712. This work contains a table of logarithmic logarithms, and three smaller tables to be used for finding the logarithms of numbers to 20 places of figures. Only a small number of these tables was printed, and that by subscription; and they are now in the highest esteem for accuracy and usefulness. An edition of these tables was printed at Avignon in France in 1770, with the addition of sines and tangents for every single second in the first four degrees, and a small table of hyperbolic logarithms, taken from a treatise upon fluxions by the late Mr Thomas Simpson. The tables are to seven places of figures, but somewhat less correct than those published by Gardiner himself.

12. An Antilogarithmic Canon for readily finding the number corresponding to any logarithm, was begun by
LOGARITHMS.

Sect. II. Different methods of constructing Logarithms.

§ 1. Napier's method.

The logarithms first thought of by Baron Napier were not adapted to the natural series of arithmetical numbers 1, 2, 3, &c. because he did not then intend to adapt them to every kind of arithmetical calculation, but only to that particular operation which had called for their immediate construction, viz. the shortening of trigonometrical operations: he explained the generation of logarithms, therefore, in a geometrical way. Both logarithms, and the quantities to which they correspond, in his way, may be supposed to proceed from the motion of a point; which, if it moves over equal spaces in equal times, will produce a line increasing equally: but if, instead of moving over equal spaces in equal times, the point describes spaces proportional to its distances from a certain term, the line produced by it will then increase proportionally.

Again, if the point moves over such spaces in equal times, as are always in the same ratio to the lines from which they are subducted, or to the distance of that point at the beginning of the lines, from a given term in that line, the line so produced will decrease proportionally. Thus, let $ac$ be to $oa$, $cd$ to $oa$, $ef$ to $oa$, and $fg$ to $oa$, always in a certain ratio, viz. that of $QR$ to $QS$, and let us suppose the point $P$ to let $f$ out from $oa$, describing the distances $ac$, $cd$, $de$, &c. in equal spaces of time, then will the line $ao$ decrease proportionally.

In like manner, the line $oa$, (fig. 12.) increases proportionally, if the point $p$, in equal times, describes the spaces $ac$, $cd$, $de$, &c. so that $ac$ is to $oa$, $cd$ to $oa$, and $de$ to $oa$, and so on; and if we now suppose a point $P$ describing the line $AG$ (fig. 4.) with an uniform motion, while the point $p$ describes a line increasing or decreasing proportionally, the line AP, described by $P$, with this uniform motion, in the same time that $oa$, by increasing or decreasing proportionally, becomes equal to $op$, is the logarithm of $op$. Thus $AC$, $AD$, $AE$, &c. are the logarithms of $oa$, $od$, $oe$, &c. respectively: and $oa$ is the quantity whose logarithm is supposed equal to nothing.

We have here abstracted from numbers, that the doctrine may be the more general; but it is plain, that if $AC$, $AD$, $AE$, &c. be supposed $1$, $2$, $3$, &c. in arithmetic progression; $oa$, $od$, $oe$, &c. will be in geometric progression; and that the logarithm of $oa$, which may be taken for unity, is nothing.

Baron Napier, in his first scheme of logarithms, suppose that, while $op$ increases or decreases proportionally, the uniform motion of the point $P$, by which the logarithm of $op$ is generated, is equal to the velocity of $p$ at $a$; that is, at the term of time when the logarithms begin to be generated. Hence logarithms, formed after this model, are called Napier's Logarithms, and sometimes Natural Logarithms.

When a ratio is given, the point $p$ describes the difference of the terms of the ratio at the same time.

When a ratio is duplicate of another ratio, the point $p$ describes the difference of the terms of that ratio in a time equal to the sum of times in which it describes the differences of the terms of the simple ratios of which it is compounded. And what is here said of the times of the motion of $p$ when $op$ increases proportionally, is to be applied to the spaces described by $P$, in those times, with its uniform motion.

Hence the chief properties of logarithms are deduced. They are the measures of ratios. The excess of the logarithm of the antecedent above the logarithm of the consequent, measures the ratio of those terms: The measure of the ratio of a greater quantity to a lesser is positive; as this ratio, compounded with any other ratio, increases it. The ratio of equality, compounded with any other ratio, neither increases nor diminishes it; and its measure is nothing. The measure of the ratio of a lesser quantity to a greater is negative; as this ratio, compounded with any other ratio, diminishes it. The ratio of any quantity $A$ to unity, compounded with the ratio of unity to $A$, produces the ratio of $A$ to $A$, or the ratio of equality; and the measures of those two ratios destroy each other when added together; so that when the one is considered as positive, the other is to be considered as negative. By supposing the logarithms of quantities greater than $oa$ (which is supposed to represent unity) to be positive, and the logarithms of quantities less than it to be negative, the same rules serve for the operations by logarithms, whether the quantities be greater or less than $oa$. When $op$ increases proportionally, the motion of $p$ is perpetually accelerated; for the spaces $ac$, $cd$, $de$, &c. that are described by it in any equal times that continually succeed after each other, perpetually increase in the same proportion as the ratio of $oa$ to $oa$, and $od$, $oe$, &c. When the point $p$ moves from $a$ towards $oa$, and $op$ decreases proportionally, the motion of $p$ is perpetually retarded, for the spaces described by it in any equal times that con-
continually succeed after each other, decrease in this case in the same proportion as \( \phi \) decreases.

If the velocity of the point \( p \) be always as the distance \( \phi \), then will this line increase or decrease in the manner supposed by Baron Napier, and the velocity of the point \( p \) being the fluxion of the line \( \phi \), will always vary in the same ratio as this quantity itself.

This, we presume, will give a clear idea of the genesis or nature of logarithms; but for more of this doctrine, see Maclaurin's Fluxions.

The construction of his tables of logarithms was first published in his posthumous work of 1619. The construction of his canon was chiefly effected by generating, in an easy manner, a series of proportional numbers, and their arithmeticals or logarithms; and then finding by proportion the logarithms of the natural lines from those of the nearest numbers among the original proportionals. Beginning then at the radius 10,000,000, he first constructs several descending geometrical series, of such a nature that they are quickly formed by an easy addition or substraction, or division by 2, 10, 100, &c. His first table consists of proportionals in the ratio of 10,000,000 to 9,999,999; the method of doing which may be easily understood from the following example: Suppose it were required to find a series of descending proportionals in the ratio of 100 to 99; it may be done by adding two cyphers to each of the two first terms, and continually adding 1 to the decimal place farthest to the right hand. Thus the first term will be 100.00, the second 99.00, the third 98.01, the fourth 97.03, &c. His first table contained 100 terms of a series, as we already mentioned, in the proportion of 10,000,000 to 9,999,999. The first term of which series was 10,000,000.0000000; the second 9,999,999.9999999; the third was 9,999,998.9999990, and so on till the 100th term, which was 9,999,900.0000000.

The second table consisted of 50 numbers nearly in the proportion of 100,000 to 99,999, and this was formed by substituting the units 1, 3, &c. in the third decimal place instead of the last place towards the right hand. Thus the second term of this series was, that he might have a series in the proportion of his first term of the former to the last term of it, viz. of 100,000 to 99,999; and the last of the second series was 999,999.0000001. In all these series the method of finding the terms is exactly the same. Thus in the first example, where we begin with 100, each term decreases by the 100th part of the former, and this 100th part is found by removing the number two places of figures lower, and subtracting them from the former terms. Thus 99 is less than 100 by unity, which is the 100th part of the latter; the next term is less than 99 by the 100th part of 99, and is therefore 98.01. But the division by 10 can be performed without any trouble, only letting the decimal point two places farther forward as by 10 is performed by letting it one place farther forward; thus 99 = 100 = 99. Now by subtracting 99 from 100, we have 98.01 for the third term of the series. To find the fourth term then, remove the decimal point two figures farther to the right hand and subtract it from the former; and we have then 97.0299 for the fourth term of the series. Thus we see, that the number of decimal places must continually increase; but as in this series we want no more than two decimal places instead of 97,0299, the term is made 97.03, as the nearest number which has only two decimal places, and differs from the truth only by one thousandth part. In like manner, in the long firing of ciphers, the fourth term of the series differs somewhat, but very little from the truth: and this must always be the case while the radius is supposed to consist of any finite number of parts; though, by going on for a very long time in this way, the error, by being continually repeated and augmented at every term, would at last become perceptible: and therefore none of these series are carried on to a very great length.

His next step was to construct a third table consisting of 69 columns, and each column of 21 numbers or terms in the continual proportion of 10,000 to 9995; that is, nearly as the first term of the second table is to its last term. As this proportion is the 200th of the whole, the method of finding the terms will be by dividing each upper number by 2, and removing the figures of the quotien three places lower, and then subtracting them. In this way, however, it is proper to collect only the first column of 21 numbers, the last of which will be 999,047,3780; but the first, second, and third, &c. numbers in all the other columns are in the continual proportion of 100 to 99, or nearly of the first to the last in the first column; whence these are to be found by removing the figures two places lower, and then subtracting them, as has already been explained.

By these three tables, the Baron was furnished with about 1600 proportionals, nearly coinciding with all the natural series from 90 to 30 degrees. To obtain the logarithms of those proportionals, he demonstrated and applied some of the properties and relations of the numbers and logarithms; the principal of which are

1. That the logarithm of any line is greater than the difference between that line and the radius, but less than that difference when increased in the proportion of the line to the radius. 2. That the difference between the logarithms of two lines is less than the difference of the lines increased in the proportion of the lesser line to the radius, but greater than the difference of the lines increased in the proportion of the greater line to the radius. These properties now served him as theorems for finding the logarithms themselves in an easy manner. From the first of them it appeared, that the radius being 10,000,000, the first term of the table, the logarithm of 9,999,999, the second term, must be greater than the difference between the first and the radius, which is 1, but less than the difference when increased in the proportion of the line to the radius; but this proportion is only one tenth millionth part, for 9,999,999 x 1.0000000 = 10,000,000; whence the logarithm of the radius or 10,000,000 being 0, the logarithm of 9,999,999, the second term will be between 1 and 1.000000, or very nearly 1.000000, this being the mean between 1 and 1.000000. This will also be the common difference between every two succeeding terms in the first table; because all the terms there are in the same proportion of 10,000,000 to 9,999,999. Hence by the continual addition of this logarithm we have the logarithms of the whole series, and therefore that of the last term of the series, viz. 99999999.00004950 will be 100.00005.
L O G A R I T H M S.


This was founded on principles nearly similar to that of Napier. He first of all erects a system of proportions, and the measures of proportion, founded upon principles purely mathematical; after which he applies these principles to the construction of his table, containing only the logarithms of 1000 numbers. The propositions on which his method is founded are in substance the following.

1. All equal proportions equal among themselves are expressed by the same quantity, be the terms many or few; as the proportion of 2, 4, 8, &c. in geometrical progression is expressed by 2; and of 2, 6, 18, 54, &c. by 3.

2. Hence the proportion of the extremes is composed of all the proportions of the intermediate terms; thus the proportion of 2 to 8 is compounded of that of 2 to 4, and of 4 to 8.

3. The mean proportional between two terms divides that proportion into two equal ones. Thus the proportion between 2 and 32 is divided by the mean proportion 8 into two equal proportions of 4; for 2 is to 8, as 8 is to 32.

4. In any number of proportions regularly increasing, the means divide the proportion of the extremes into one more than their own number. Thus, in the series 2, 4, 8, 16, the proportion of the extremes 2 and 16 is by the two means 4 and 8, divided into three proportions, viz. that between 2 and 4, 4 and 8, and 8 and 16. In like manner, in the series 3, 6, 18, 54, 162, 486, the proportion between 3 and 486 is divided by the four means into the five proportions of 3 to 6; 6 to 18; 18 to 54; 54 to 162; and 162 to 486.

5. The proportion between any two terms is divisible into any number of parts, until these become less than any assignable quantity. Thus the proportion of 2 to 8 is divisible, by multiplying the two together and extracting the square root, into two parts by the number 4; by multiplying two and 4 together, and extracting the square root; and doing the same with 4 and 8, the proportion would be divided into four parts, viz. \(2:4:4\sqrt{2}:8\); or in numbers, 2: 2.813, &c.: 4: 5.635, &c.: 8.

6. By dividing the ratios in this manner, the elementary part will become at last so small, that it may be denominated by the mere difference of terms of that element. This is evident from the diminution of the ratios or proportions already instanced: for the proportion between 2 and 2.813 is only 1.406, &c. and if we were to find a mean proportional between 2 and 2.813, the ratio between that proportional and 2 would be much less. But it must always be remembered, that such evanescent quantities, as they are called, cannot give us any conclusion with absolute exactness, however they may answer every useful purpose to us: for it is evident that neither mean proportional nor ratio can ever be found exactly; and therefore the error accumulated in all the operations must become very considerable, if any circumstance shall happen to make it appear.

7. In three continued proportionals, the difference of
Logarithms.

of the two first has to the difference between the two last the same proportion that the first term has to the second, or the second to the third. Thus, in the three terms 4, 8, 16, the difference between the two first terms 4 and 8, viz. 4, is in proportion to 8; and the difference between the two last, as 4 is to 8, or 8 to 16.

9. In continued proportionals, the greatest terms have the greatest differences, and vice versa. Thus, the difference between 8 and 16 is evidently greater than between 2 and 4 or 4 and 8.

10. In any series of proportionals, if the difference between the greatest term and one not immediately next to it, be taken as the measure of the proportion, the true measure of the proportion will be less than that of the terms of the proportion; but the proportion which is between the greatest term and any one less than that first taken, will be greater than their difference. As proportionals of this kind do not readily occur, we shall, in order to avoid obscurity, shew once for all, that there is a possibility of finding geometrical proportionals of such a nature, that the ratio may be equal to the difference between the greatest and third, or any other term distant from it. Thus let us begin with any two numbers we please; suppose 9 and 10; though these are in the natural arithmetical proportion, yet if we make the ratio $\frac{1}{11}$, they will also be geometrically proportionals, and the series will run thus:

1st 2d 3d 4th 5th 6th term term term term term


Here the difference between the first and third terms is 9001, which is greater than the ratio; but the difference between the second and fourth, viz. 1.711, is still greater, but nearer to it than the former; the difference between the third and fifth terms, viz. 1.539, is still smaller, as does that between the fourth and sixth, viz. 1.385: and indeed by continuing this series only for two terms longer, the difference will become smaller than the ratio. It is not worth while, however, to seek for fericies of this kind, as the present proposition will now be sufficiently intelligible without any farther illustration.

11. If quantities be arranged according to the order of their magnitudes, and if any two successive proportions of these be equal, the three successive terms which constitute them will also be equal. Thus, if the two quantities 12 and 8 constitute the proportion $\frac{4}{3}$, and each of them be increased by 6, the half of 12, we have the proportion $\frac{2}{3}$; which is more than double the original proportion; for $\frac{1}{3} \times 4 = \frac{1}{2}$.

12. When quantities are placed in the order of their magnitudes, if the intermediate magnitudes lying between any two terms be not among the mean proportionals which can interpose between these two terms, then these intermediates will not divide the proportion of those two terms into commensurable proportions. Thus in the magnitudes $343 : 216 : 125 : 64 : 27 : 8$, neither of the two intermediate terms 125 and 64 are mean proportionals between 27 and 216, nor do they divide the proportion between these into commensurable parts.

13. All the proportions taken in order, which are between commensurable terms that are in arithmetical proportion, are incommensurable to one another; as between 8, 13, and 18.

14. When quantities are placed in the order of their magnitudes, if the difference between the two greatest be made the measure of their proportion, the difference between any two others will be less than the measure of their proportion, and if the difference between the two least terms be made the measure of their proportion, the differences of the rest will be greater than the measure of the proportion between their terms.

15. If the measure of proportion between the greatest exceed their difference, then the proportion of the greater to the difference will be less than that of a following measure to the difference in its terms; because proportionals have the same ratio.

16. If three equidifferent quantities are taken in order, the proportion between the extremes is more than double that between the two greatest terms. Hence it follows, that half the proportion of the extremes is greater than the proportion between the greatest terms, but less than the proportion of the two least.

17. If two quantities constitute a proportion, and each be increased by half the greater, the remainder will constitute a proportion more than double the former.

18. If 1000 numbers follow one another in the natural order, 1000, 999, 998, &c. and by continual multiplication and extraction of the square root we find mean proportionals, and thus $\sqrt{2} \sqrt{3} \sqrt{4}$, as it is called, the ratio between the two greatest, so that the parts into which the ratio is divided become ultimately smaller than the excess of proportion betwixt the next two over the former (for 998 bears a greater proportion to 999 than 999 bears to 1000); the measure of this very small part or element of the proportion may be supposed to be the difference between 1000 and that mean proportional which is the other term of the element. Thus, for the sake of an easy explanation, let us suppose the numbers to be 10, 9, 8, &c. the ratio of 9 to 10 is $\frac{9}{10}$, 11, that of 9 to 8 is $\frac{11}{12}$, the difference between which is $\frac{1}{120}$, which we may call the elementary part of the ratios. By six extractions of the square root we have the mean proportional 9.985, &c. differing from 16 by no more than $\frac{1}{5}$, which is near the element just mentioned. The number of parts into which the ratio is thus divided is expressed by the 6th power of 5 to 64. Dividing, therefore the ratio between 10 and 11 by 64, we have $\frac{1}{64}$ for the elementary part thus obtained; which near coincidence with the real element, and the difference between 10 and the mean proportional itself, shows that in large numbers we may take the difference between the mean proportional and greatest term for the elementary power without any sensible error.
and 998 be divided into twice the number of parts that the former was, it will be equally plain that the difference between 1000 and the next mean proportional will be the measure of that element. Proceeding in like manner with the other numbers 1000 and 997, 1000 and 996, &c. It is evident, that by dividing into a proper number of parts, all the elements will be reduced to an equal degree of fineness, if we may so call it, and in calculations may be made use of without any fear of error.

19. The number of elementary parts being thus known which are contained in any proportion, it will be easy to find the ratios between those numbers which are in continued proportion to the first term of the series. Thus, having found the proportion between 1000 and 900,

we know also that of 1000 to 810, and 739; And from 1000 to 800, also 1000 to 640, and to 512; And from 1000 to 700, also 1000 to 490, and to 343; And from 1000 to 600, also 1000 to 360, and to 216; And from 1000 to 500, also 1000 to 250, and to 125.

Corol. Hence arises the precept for squaring, cubing, &c.; also for extracting the square root, cube root, &c. out of the first figures of numbers. For it will be, as the greatest number of the chilid as a denominator, is to the number proposed as numerator, so is this to the square of the fraction, and so is this to the cube.

20. Prop. The proportion of a number to the first, or 1000, being known; if there be two other numbers in the proportion to each other, then the proportion of one of these to 1000 being known, there will also be known the proportion of the other to 1000.

Corol. 1. Hence from the 15 proportions mentioned in prop. 18, will be known 120 others below 1000, to the same 1000.

For so many are the proportions, equal to some one or other of the said 15, that are among the other integer numbers which are less than 1000.

Corol. 2. Hence arises the method of treating the Rule of Three, when 1000 is one of the given terms. For this is effected by adding to, or subtracting from, each other, the measures of the two proportions of 1000 to each of the other two given numbers, according as 1000 is, or is not, the first term in the Rule of Three.

21. Prop. When four numbers are proportional, the first to the second as the third to the fourth, and the proportions of 1000 to each of the three former are known, there will also be known the proportion of 1000 to the fourth number.

Corol. 1. By this means other chilidads are added to the former.

Corol. 2. Hence arises the method of performing the Rule of Three, when 1000 is not one of the terms. Namely, from the sum of the measures of the proportions of 1000 to the second and third, take that of 1000 to the first, and the remainder is the measure of the proportion of 1000 to the fourth term.

Definition. The measure of the proportion between 1000 and any less number, as before described, and expressed by a number, is set opposite to that less number in the chilad, and is called its logarithm, that is, the number (999700.000) indicating the proportion (149) which 1000 bears to that number, to which the logarithm is annexed.

22. Prop. If the first or greatest number be made the radius of a circle, or radix tarsus; every less number considered as the cofine of some arc, has a logarithm greater than the verfed sine of that arc, but less than the difference between the radius and cofant of the arc; except only in the term next after the radius, or greatest term, the logarithm of which by the hypothesis is made equal to the verfed sine.

That is, if CD be made the logarithm of AC, or the measure of the proportion of AC to AD; then the measure of the proportion of AB to AD, that is, the logarithm of AB, will be greater than BD, but less than EF. And this is the same as Napier's first rule in page 44.

23. Prop. The same things being supposed; the sum of the verfed sine and excess of the cofant over the radius, is greater than double the logarithm of the cofine of an arc.

Corol. The logarithm cofine is less than the arithmetical mean between the verfed sine and the excess of the cofant.

Precept 1. Any sine being found in the canon of sines, and its defect below radius to the excess of the cofant above radius; then shall the logarithm of the sine be less than half that sum, but greater than the said defect or covered sine.

Precept 2. The logarithm of the sine being found, you will also find nearly the logarithm of the round or integer number which is next less than your sine with a fraction, by adding that fractional excess to the logarithm of the said sine.

Thus the logarithm of the sine 99970.149 is found to be about 29.854; if now the logarithm of the round number 99970,000 be required, add 149 the fractional part of the sine to its logarithm, observing the point, thus, 29.854.

The sum 30.003

Therefore the logarithm is between 29.850 and 29.855.

The logarithms of the round numbers 99970,000, be required, add 149 the fractional part of the sine to its logarithm, observing the point, thus, 29.854.

24. Prop. Of three equidifferent quantities, the measure for
Let the proportion between the two greater terms, with the measure of the proportion between the two least terms, will constitute a proportion which will be greater than the proportion of the two greater terms, but less than the proportion of the two least.

Thus if $AB, AC, AD$, be three quantities having the equal differences $BC, CD$; and if the measure of the proportion of $AD, AC$ be $cd$, and that of $AC, AB$, be $cd$, then the proportion of $cd$ to $cb$ will be greater than the proportion of $AC$ to $AD$, but less than the proportion of $AB$ to $AC$.

25. Prop. The said proportion between the two measures is less than half the proportion between the extreme terms: that is, the proportion between $bc$, is less than half the proportion between $AB, AD$.

Corol. Since therefore the arithmetical mean divides the proportion into unequal parts, of which the one is greater and the other less than the whole; if it be enquired what proportion is between these proportions, the answer is, that it is a little less than the said half.

An example of finding nearly the limits greater and less, to the measure of any proposed proportion.—It being known that the measure of the proportion between 1000 and 900 is 10536.05, required the measure of the proportion 900 to 800, where the terms 1000, 900, 800, have equal differences. Therefore as 9 to 10, so 10536.05 to 11770.72, which is less than 11778.30, the measure of the proportion 9 to 8.

Again, as the mean proportion between 8 and 10 (which is 8.444719) is to 10, so is 10536.05 to 11779.66, which is greater than the measure of the proportion between 9 and 8.

Axiom. Every number denotes an expressible quantity.

26. Prop. If the 1000 numbers, differing by 1, follow one another in the natural order, and there be taken any two adjacent numbers, as the terms of some proportion; the measure of the proportion will be to the measure of this proportion between the two greatest terms of the chiliad, in a proportion greater than that in which the greatest term 1000 bears to the greater of the two terms first taken, but less than the proportion of 1000 to the least of the said two selected terms.

So of the 1000 numbers taking any two successive terms, as 501 and 500, the logarithm of the former being 69114.92, and of the latter 69314.72, the difference of which is 199.80. Wherefore by the definition, the measure of the proportion between 501 and 500 is 199.80. In like manner, because the logarithm of the greatest term 1000 is 0, and of the next 999 is 100.05, the difference of these logarithms, and the measure of the proportion between 1000 and 999, is 100.05. Couple now the greatest term 1000 with each of the selected terms 501 and 500; couple also the measure 199.80 with the measure 100.05; so shall the proportion between 199.80 and 100.05 be greater than the proportion between 1000 and 501, but less than the proportion between 1000 and 500.

Corol. 1. Any number below the first 1000 being proposed, as also its logarithm; the differences of any logarithms antecedent to that proposed, towards the beginning of the chiliad, are to the first logarithm (viz. that which is assigned to 999) in a greater proportion than 1000 to the number proposed; but of those which follow towards the last logarithm, they are to the same in a less proportion.

Corol. 2. By this means the places of the chiliad may easily be filled up, which have not yet had logarithms adapted to them by the former propositions.

27. Prop. The difference of two logarithms, adapted to two adjacent numbers, is to the difference of these numbers in a proportion greater than 1000 bears to the greater of those numbers, but less than that of 1000 to the less of the two numbers.

This 27th proposition is the same as Napier’s second rule.

28. Prop. Having given two adjacent numbers of the 1000 natural numbers, with their logarithmic indices, or the measures of the proportions which those absolute or round numbers constitute with 1000 the greatest; the increments or differences of these logarithms will be to the logarithm of the small element of the proportion as the secants of the arch whose confines are the two absolute numbers is to the greatest number, or the radius of the circle; so that, however, of the said two secants, the least will have to the radius a less proportion than the proposed difference has to the first of all, but the greater will have a greater proportion, and so also will the mean proportional between the said secants have a greater proportion.

Thus if $BC, CD$ be equal, also $bd$ the logarithm of $AB$, and $ed$ the logarithm of $AC$; then the proportion of $be$ to $ed$ will be greater than the proportion of $AG$ to $AD$, but less than that of $AF$ to $AD$, and also less than that of the mean proportional between $AF$ and $AG$ to $AD$.

Corol. 1. The same obtains also when the two terms differ, not only by the unit of the small element, but by another unit which may be ten fold, a hundred fold, or a thousand fold of that.

Corol. 2. Hence the differences will be obtained sufficiently exact, especially when the absolute numbers are pretty large, by taking the arithmetical mean between two small secants, or (if you will be at the labour) by taking the geometrical mean between two larger secants, and then by continually adding the differences, the logarithms will be produced.

Corol. 3. Precepts. Divide the radius by each term of the assigned proportion, and the arithmetical mean (or still nearer the geometrical mean) between the quotients will be the required increment, which being added to the logarithm of the greater term, will give the logarithm of the less term.
LOGARITHMS.

Example.
Let there be given the logarithm of 100, viz. 230258.514J, to find the logarithm to 669.
Here radius divided by 700 gives 1428571, &c.
and divided by 699 gives 1430672, &c.
The arithmetic mean is 142962 which added to 230258.514J gives the logarithm to 669 33810.4368

Coral. 4. Precept for the logarithms of sines.
The increment between the logarithms of two sines is thus found: find the geometrical means between the coefficients, and divide it by the difference of the sines, the quotient will be the difference of the logarithms.

Example.

\[
\begin{array}{c|c}
\text{dip.} & \text{of 900} \\
\text{1 line} & 34377482 \\
\text{2 line} & 58181712 \\
\end{array}
\]

Appendix. Nearly in the same manner it may be shown that the second differences are in the duplicate proportion of the first, and the third in the duplicate of the second. Thus, for instance, in the beginning of the logarithms, the first difference is 100.0000, viz. equal to the difference of the numbers 100000.0000 and 99999.9999; the second, or difference of the differences, 1000; the third 20. Again, after arriving at the number 50000.0000, the logarithms have a difference 200.0000, which is to the first difference as the number 100000.0000 to 50000.0000; but the second difference is 4000, in which 10000 is contained four times; and the third 328, in which 20 is contained sixteen times. But since, in treating of new matters, we labour under the want of proper words, wherefore, least we should become too obscure, the demonstration is omitted untill.

20. Prop. No number expresses exactly the measure of the proportion between two of the 1000 numbers contained by the foregoing method.

25. Prop. If the measures of all proportions be expressed by numbers or logarithms, all proportions will not have assigned to them their due portion of measure, to the utmost accuracy.

31. Prop. If to the number 1000, the greatest of the chillid, be referred others that are greater than it, and the logarithm of 1000 be made o, the logarithms belonging to those greater numbers will be negative.

This concludes the first or scientific part of the work; the principles of which Kepler applies, in the second part, to the actual construction of the first 1000 logarithms, which is pretty minutely described. This part is intitled A very compendious method of constructing the Chilid of Logarithms, and it is not improperly so called, the method being very concise and easy. The fundamental principles are briefly these: That at the beginning of the logarithms their increments or differences are equal to those of the natural numbers; that the natural numbers may be considered as the decreasing coines of increasing arcs; and that the cosecants of those arcs at the beginning have the same differences as the coines, and therefore the same differences as the logarithms. Then, since the cosecants are the reciprocals of the coines, by these principles and the third corol. to the twenty-eighth proposition, he establishes the fol-
hence multiplying this logarithm of 100 face to face by 2, 3, 4, 5, 6, and 7, there will be 40 logarithms of the numbers in the decuple proportion as under.

Also if the logarithm of a number is taken from the logarithm of 1, there will remain the logarithm of the number. And from the logarithm of 10 there remains the logarithm of the proportion of 10 to 1; which taken from the logarithm of 1, there remains the logarithm of 5. See the margin.

For the logarithms of other prime numbers, he has recourse to those of some of the first or greatest century of numbers before found, viz. of 999, 998, 997, &c. And first taking 960, whose logarithm is 4.082.200; then by adding to this logarithm the logarithm of duplication, there will arise the several logarithms of all these numbers, which are in duplicate proportion continued from 960, namely 480, 240, 120, 60, 30, 15. Hence the logarithm of 30 taken from the logarithm of 10, leaves the logarithm of the proportion of 3 to 1; which taken from the logarithm of 1, leaves the logarithm of 3, viz. 3.8094.3106. And the double of this diminished by the logarithm of 1, gives 4.719, 5.36790 for the logarithm of 9.

Next, from the logarithm of 900, or 9 x 10 x 11, which is 100.05.0331, he finds the logarithm of 1; namely, subtract the sum of the logarithms of 9 and 10 from the sum of the logarithm of 900, and double the logarithm of 1, there remains 4.5096.0106 the logarithm of 11.

Again, from the logarithm of 980, or 2 x 10 x 7 x 7, which is 2020.2711, he finds 4.96184.5228 for the logarithm of 7.

And from 5129.3303 the logarithm of 950 or 5 x 10 x 19, he finds 3.96331.6323 for the logarithm of 19.

In like manner the logarithm to 998 or 4 x 12 x 19, gives the logarithm of 13; to 969 or 3 x 17 x 19, gives the logarithm of 17; to 986 or 2 x 17 x 29, gives the logarithm of 29; to 966 or 6 x 7 x 23, gives the logarithm of 23; and to 939 or 3 x 10 x 31, gives the logarithm of 31.

And so on for all the primes below 100, and for many of the primes in the other centuries up to 900. After which he directs to find the logarithms of all numbers composed of these, by the proper addition and subtraction of their logarithms, namely, in finding the logarithm of the product of two numbers, from the sum of the logarithms of the two factors; taking the logarithm of 1, the remainder is the logarithm of the product. In this way he shows, that the logarithms of all numbers under 500 may be derived, except those of the following 36 numbers, namely 127, 149, 167, 173, 179, 211, 223, 233, 257, 263, 269, 271, 277, 281, 283, 293, 327, 347, 349, 353, 359, 367, 373, 379, 383, 389, 397, 401, 429, 419, 421, 431, 433, 439, 443, 449. Also, besides the composite numbers, between 500 and 900, made up of the products of some numbers whose logarithms have been before determined, there will be 59 primes not composed of them which with the 36 abovementioned make 95 numbers in all not composed of the products of any before them, and the logarithms of which he directs to be derived in this manner; namely, by considering the differences of the logarithms of the numbers interposed among them; then by that method by which were constituted the differences of the logarithms of the smallest 100 numbers in a continued series, we are to proceed here in the discontinued series, that is, by prop. 28th, corol. 3d, and especially by the appendix to it, if it be rightly used, from whence those differences will be very easily supplied.

§ 3. Mr Briggs's Method.

The methods principally made use of by this gentleman were published in Napier's posthumous work. Having supposed 0 to be the logarithm of 1, and 1 with any number of ciphers annexed, suppose 0 to be the logarithm of 10, this number is to be divided ten times by 5, which in a logarithmic number is equivalent to the extraction of the root of the fifth power; by which means he obtains the following numbers, viz. 2 with nine ciphers to it; 4 with eight ciphers; 8 with seven ciphers, 16 with six ciphers; 32 with five ciphers; 64 with four; 128000, 25600, 5120, and 1024. Dividing this last logarithm ten times by 2, we have a geometrical series of ten numbers; the first of which is 512, and the last 1. Thus 20 logarithms are obtained: but the labour of finding the numbers belonging to them is so excessive, that it is surprising how it could be undergone by any body. To obtain those corresponding to the first ten logarithms, the fifth root must be extracted ten times, and the square root as often, to obtain the numbers corresponding to the others. The power from which these extractions is made, must originally be 1, with a number of ciphers annexed. Other logarithms might be formed from these by adding them, and multiplying their corresponding numbers, but as this method, besides its excessive labour, would produce only an antilogarithmic canon like that of Mr Dodson already mentioned, other more easy and proper methods were thought of.

The next was by finding continually geometrical means, first between 10 and 1, and then between 1 and that mean, and so on, taking the arithmetical means between their corresponding logarithms. The operation is also facilitated by various properties of numbers and their logarithms, as that the products and quotients of numbers correspond to the sums and differences of their logarithms; that the powers and roots of numbers answer to the products and quotients of the logarithms by the index of the power or root. Thus having the logarithm of 2, we can have those of 4, 16, 256, &c. by multiplying the logarithms of 2, and squaring the numbers to as great an extent in that series as we please. If we have also that of 3, we can not only have those of 9, 81, 8361, &c. but of 6, 18, 27, and all possible products of the powers of 2 and 3 into one another, or into the numbers themselves. The following property may also be of use, viz. that if the logarithms of any two numbers are given, and each number be raised to the power denoted by the index of the other, the products will be equal. Thus,

\[
\log \frac{1}{2} = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2 = \log 1 + \log 2
\]

NAT. num. 1 2 4 8 16 32 64

Let the two numbers be 4 and 16; it is plain, that if
LOGARITHMS.

We raise 4 to the fourth power and 16 to the square, the products will be the same; for 16 \times 16 = 256, and 
4 \times 4 \times 4 \times 4 = 256.

Mr. Briggs depends upon this property, that the logarithm of any number in this scale is less than the number of places or figures contained in that power of that number whose exponent is the logarithm of 10, at least as integral numbers; for Mr. Briggs has shown that they really differ by a fraction. To this Mr. Hutton adds the following; viz. that of any two numbers, as the greater is to the less, so is the velocity of the increment or decrement of the logarithms to the greater; "that is (says he), in our modern notation, as \( X : Y = x : y \); where \( x \) and \( y \) are the fractions of \( X \) and \( Y \).

In the treatise written upon the construction of logarithms by Mr. Briggs himself, he observes, that they may be constructed chiefly by the two methods already mentioned, concerning which he premises several lemmata concerning the powers of numbers and their indices, and how many places of figures are in the products of numbers. He observes, that these products will consist of as many figures as there are in both factors, unless the first figures in each factor be expressed in one figure only, which sometimes happens, and then there will commonly be one figure less in the product than in the two factors. He observes also, that if in any series of geometricals, we take two terms, and raise one to the power denoted by the index of the other, or any number raised to the power denoted by the logarithm of the former, then the product raised to the power denoted by the logarithm of the former. Hence, if one of the numbers be 10, whose logarithm is 1 with any number of cyphers, then any number raised to the power whose index is the logarithm of that number, that is, the logarithm of any number in this scale where 1 is the logarithm of 10, is the index of that power of 10, which is equal to the given number. But the index of any integral power of 10 is one less than the number of places of figures it contains. Thus the figure of 10, or 100, contains three places of figures, which is more by one, than the index of the power 1,000, the cube of 10 containing three figures, which is one less than the index of the power of 10. Hence as the number of places of the powers of 10 are always exactly one more than the indices of those powers, it follows that the places of figures in the powers of any other number which is not an integral power of 10, will not always be exactly one less in number than the indices of the powers. From these two properties is deduced the following rule for finding the logarithms of many prime numbers.

Find the 10th, 100th, 1000th, or any other power of a number, suppose 2, with the number of places of figures in it, then that number of figures shall always exceed the logarithm of 2, although the excess will be constantly less than 1; whence by proceeding to very high powers we will at last be able to obtain the logarithm of the number to great exactness.

Thus, the logarithm of 2, found by other methods, is known to be 0.3010299966669. &c. The tenth power of 2 is 1024, which containing four places of figures, gives 4 for the logarithm of 2, which exceeds it, though not quite by 1. The 20th power of 2, consisting of the 10th power multiplied into itself, by its number of places ought to give the logarithm of 4; and according to the rule already laid down, should contain eight places of figures; but by reason of the cypher which stands in the second place, it is easy to see that it must contain only seven 5, which therefore gives seven for the logarithm of four. The logarithm of 16 is then expressed by the number of places of figures in the product of the 20th power of 2 into itself; and is therefore denominated by 12. That of 256 is denoted by the 50th power of 2, containing 25 places of figures. The logarithm of 2, therefore, having been already expressed by the 10th power of 2, will be again expressed by the 100th power. Adding, therefore, the number of places contained in the 80th power, viz. 23 to 7, the number of places contained in the 20th, we have 30 for the next expression of that logarithm.

On account of the cypher which stands in the second place of one of the factors, however, we must deduct one from the number; and thus we have 29 for the logarithm of 2, which is a considerable approximation. Proceeding in this manner, at the 1000th power of 2, we have 301 for the logarithm of 2; at the 10,000th power we have 3011; at the 100,000th power, 30103; at the 1,000,000th, we have 301030; and at the 10,000,000th power, we obtain 30103000; which is as exact as is commonly expressed in the tables of logarithms; but by proceeding in the same manner we may have it to any degree of exactness we please. Thus, at the 100,000,000 power, we have 301030000; and at the 1,000,000,000, the logarithm is 301029996, true to eight places of figures.

The only difficulty in this method is to find the number of places of figures in the different powers without multiplying them; but this may be determined by only multiplying the first five; or even the first three of the products will be sufficient to determine this; and the logarithms may thus be found with very great facility.

When the logarithms, however, are required to a very great degree of exactness, our author thinks that the method of mean proportions is most eligible. This consists in finding a great number of mean proportions between 1 and the number proposed; that is, first extracting the square root of the number itself, then extracting the root of that root, &c. until the last root shall exceed 1 only by a very small decimal. Finding then the logarithm of this number by methods hereafter to be described, he multiplies it by the index of the power of 2, denoted by the number of extractions of the square root; and the result is the required logarithm of the given number.

In this method, the number of decimal places contained in the last root ought to be double the number of true places required in the logarithm itself, and the first half of them ought to be cyphers; the integer being 1. To find out the first small number and its logarithm, our author begins with 10 and its logarithm 1; continually extracting the root of the former, and bisecting the latter, till he comes to the numbers and then finds, that at the 53rd and 54th roots both natural numbers and logarithms bear the same proportion to each other, viz. that of 2 to 1. Thus,

Numbers.

\[ \begin{array}{cccccccc}
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
31 & 10 & 3 & 0 & 0 & 0 & 0 & 0 & 0 \\
\end{array} \]
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If now by continual extraction and bisection we find any other small number it will then be, as 12781, &c. to 5551, &c. so is that other small decimal to the correspondent significant figures of its logarithm. To avoid, however, the excessive labour of such long multiplications and divisions, he reduces this ratio to another, the antecedent of which is \( \sqrt{10} \) Thus, as 12781, &c. is to 5551, &c. so is \( \sqrt{10} \) with another unit annexed to a 4th number, which will be the significant figures of the logarithm of the third term. The proportions then will be \( 12781 : 5551 \). \( \sqrt{10} \) is 1, 100, 1000, 10000, &c. 43429, \( \sqrt{10} \) is 2, 16850, 30102, 40546, &c. this last number, with 17 ciphers prefixed, being the logarithm of the one immediately preceding it. Having therefore found by continual extraction any such small decimal as the above, multiply it by 43429, &c. and the product will be the corresponding logarithm of the last root.

Still, as the labour of so many extractions must be intolerably tedious, it became necessary to fall upon some contrivances to shorten such operations; and of these the following is an example.

Let the number of which we seek the logarithm be involved in such an height that the index of the power may be one, with either one or more ciphers next to it. Divide this power then by 1 with as many ciphers annexed as the power has significant figures after the first; or, supposing all the figures after the first to be decimals, the roots are extracted continually from this power, till the decimal becomes sufficiently small, as when the first 15 places are ciphers; then, multiplying the decimal by 43429, &c. we have the logarithm of this last root; which logarithm multiplied by the like power of the number 2, gives the logarithm of the first number of which the extraction was begun. To this logarithm if we prefix 1, 2, 3, &c. according as this number was found by dividing the power by 10, 100, 1000, &c. and lastly, dividing the result by the index of that power, the quotient will be the required logarithm of the given prime number.

Thus to find by this method the logarithm of 2. Raise it first to the 10th power, which is 1024; then cutting off the three places of decimals is the same as dividing by 1000, we have for the logarithm of 1024, 2.01099566, &c. as above. Lastly, dividing by \( \sqrt{10} \), because 1024 is the 10th power of 2, we have the logarithm of 2 itself; viz. 0.30102, &c.

The involving of any number to a very high power is by no means a matter of such difficulty as might at first sight be imagined. A number multiplied by itself produces the square; the square multiplied by itself produces the biquadrate; the biquadrate multiplied by itself gives the eighth power, and the eighth power multiplied by the square produces the tenth. The tenth power multiplied by itself gives the second, and the 20th multiplied by itself gives the 40th. The eighth power divided by the original number gives the seventh, and the 40th power multiplied by the seventh gives the 47th power required.

The differential method of constructing logarithms was likewise invented by our author, and greatly shortens the labour of finding the mean proportions. Mr Briggs, in the course of his calculations, had observed, that these proportions, found by continual extraction of roots, gradually approach nearer and nearer to the halves of the preceding root; and that as many significant figures as there are ciphers before them, agree exactly in this proportion. Substracting therefore each of these decimal parts, which he called \( A \), or the first differences, from half the next preceding one, and by comparing together the remainders or second differences, called \( B \), he found that the succeeding were always nearly equal to of the next preceding ones; then taking the difference between each second difference and of the preceding one, he found that these third differences, called \( C \), were nearly in the continual ratio of 8 to 1; again taking the difference between each \( C \) and of the next preceding, he found that these third differences, called \( D \), were nearly in the continual ratio of 16 to 1; and so on, the 5th \( (E) \), 6th \( (F) \), &c. differences, being nearly in the continual ratio of 32 to 1, of 64 to 1, &c. these plain observations being made they very naturally and clearly suggested to him the notion and method of constructing all the remaining numbers from the differences of a few of the first, found by extracting the roots in the usual way. This will evidently appear from the annexed specimen of a few of the first numbers in the last example for finding the logarithm of 5; where after the 9th number the rest are supposed to be constructed from the preceding differences of each, as here shown in the 10th and 11th. And it is evident that, in proceeding, the trouble will become always less and less; the differences gradually vanishing, till at last only the first differences remain. And that generally each less difference is shorter than the next greater, by as many places as there are ciphers at the beginning of the decimal in the number to be generated from the differences.

1.00775,96.
He then concludes this chapter with an ingenious, but not obvious, method of finding the differences B, C, D, E, &c. belonging to any number, as suppose the 9th, from that number itself, independent of any of the preceding 8th, 7th, 6th, 5th, &c.

\[ B = \frac{1}{4}A^5, \quad C = \frac{1}{4}A^3 \times \frac{1}{4}A^4, \quad D = \frac{1}{4}A^3 \times \frac{1}{4}A^4 + \frac{1}{4}A^5 + \frac{1}{4}A^7, \quad E = \frac{1}{4}A^5 + 7A^6 + 16A^7 + \frac{1}{4}A^9 + 12A^9 + \frac{1}{4}A^9 + \frac{1}{4}A^9 + \frac{1}{4}A^9 \]

Thus in the 9th number of the foregoing example, omitting the ciphers at the beginning of the decimals, we have

\[ A = 1,51164,65999,05672,45908,8 \]

Consequently

\[ A^2 = 1,14253,77215,0318,3569 \]

The logarithms are given in the following table.

<table>
<thead>
<tr>
<th>Logarithms</th>
<th>Section II</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,00767,96</td>
<td>B</td>
</tr>
<tr>
<td>1,0019,676</td>
<td>A</td>
</tr>
<tr>
<td>1,002,563</td>
<td></td>
</tr>
<tr>
<td>1,00098,342</td>
<td></td>
</tr>
<tr>
<td>1,00031,459</td>
<td>C</td>
</tr>
<tr>
<td>1,00012,093</td>
<td>D</td>
</tr>
<tr>
<td>1,00006,047</td>
<td>E</td>
</tr>
<tr>
<td>1,00003,023</td>
<td>F</td>
</tr>
<tr>
<td>1,00000,779</td>
<td>G</td>
</tr>
<tr>
<td>1,00000,377</td>
<td>H</td>
</tr>
<tr>
<td>1,00000,187</td>
<td>I</td>
</tr>
<tr>
<td>1,00000,027</td>
<td>J</td>
</tr>
<tr>
<td>1,00000,000</td>
<td>K</td>
</tr>
</tbody>
</table>

\[ 2\frac{1}{4}A^5 = 20,71957 \]

2$\frac{1}{4}A^5 + 7A^6 = 20,72040 = E \]

which agree with the like differences in the foregoing specimen.

\[ \frac{1}{2}A^5 = \frac{1}{8}A^5 + 7A^6 \]

### § 4 Of Curves related to Logarithms.

Several other ingenious methods and improvements are laid down by our author in his treatise upon this subject; but as all these were attended with great labour, mathematicians still continued their efforts to facilitate the work; and it was soon perceived that some curves had properties analogous to logarithms. Edmund Gunter, it has been said, first gave the idea of a curve, whose abscissae are in arithmetical progression, while the corresponding ordinates are in geometrical progression, or whose abscissae are the logarithms of their ordinates; but it is not noticed in any part of his writings. The same curve was afterwards considered
Many other learned men have also treated of this property; particularly Le Seur and Jacquier in their comment on Newton's Principia; Dr John Keil in the elegant little tract on logarithms subjoined to his edition of Euclid's Elements; and Frances Maferes, Esq. curator-baron of the Exchequer, in his ingenious treatise on Trigonometry; in which book the doctrine of logarithms is copiously and learnedly treated, and their analogy to the logarithmic curve, &c. fully displayed. It is indeed rather extraordinary that this curve was not sooner announced to the public; since it rebuts immediately from Baron Napier's manner of conceiving the generation of logarithms, by only supposing the lines which represent the natural numbers to be placed at right angles to that upon which the logarithms are taken. This curve greatly facilitates the conception of logarithms to the imagination, and affords an almost intuitive proof of the important property of their fluxions, or very small increments, viz. that the fluxion of the number is to the fluxion of the logarithm, as the number is to the sub tangent; as also of this property, that, if three numbers be taken very nearly equal, so that their ratios to each other may differ but a little from a ratio of equality; as for example, the logarithm is equal to the modulus of the logarithm, of one and the same number or parts of the asymptote. And so also are the hyperbolic factors; any factor bounded by an arc of the hyperbola and two radii being equal to the quadrilateral space bounded by the same arc, the two ordinates to either asymptote from the extremities of the arc and the part of the asymptote intercepted between them. And although Napier's logarithms are commonly paid to be the same as hyperbolic logarithms, it is not to be understood that hyperbolas exhibit Napier's logarithm's only, but indeed all other possible systems of logarithms whatever. For, like as the right angled hyperbola, the side of whose square inscribed at the vertex is 1, gives us Napier's logarithm; to any other system of logarithms is expressed by the hyperbola whose asymptotes form a certain oblique angle, the side of the rhombus inscribed at the vertex of the hyperbola in this case also being filled 1, the same as the side of the square in the right angled hyperbola. But the areas of these squares and rhombus, and consequent- ly the logarithms of any one and the same number or ratio, will differ according to the line of the angle of the asymptotes. And the area of the square or rhombus, or any inscribed parallelogram, is also the same thing as what was by Cotes called the modulus of the system of logarithms; which modulus will therefore be expressed by the numerical measure of the side of the curve formed by the asymptotes, to the radius 1; as that is the same with the number expressing the area of the said square or rhombus, the side being 1: which is another definition of the modulus to be added to those we before remarked above in treating of the logarithmic curve. And the evident reason of this is, that in the beginning of the generation of these areas from the vertex of the hyperbola, the nascent increment of the abscissa drawn into the altitude 1, is to the increment of the area, as radius is to the line of the angle of the ordinate and abscissa of the asymptotes; and at the beginning of the logarithms, the nascent increment of the natural numbers is to the increment of the logarithms as 1 is to the modulus of the system. Hence we easily discover, that the angle formed by the asymptotes of the hyperbola, exhibiting Briggs's System of Logarithms, will be $25^\circ 44' 25^\frac{1}{4}$, this being the angle whose sine is 0.4342944819, &c. the modulus of this system.

Or indeed any one hyperbola, as has been remarked by Mr Baron Maferes, will express all possible systems of logarithms whatever; namely, if the square or rhombus inscribed at the vertex, or, which is the same thing, any parallelogram inscribed between the asymptotes and the curve at any other point, be expanded by the modulus of the system; or which is the same, by expanding the area, intercepted between two ordinates which are to each other in the ratio of 10 to 1, by the logarithm of that ratio in the proposed system.

As to the first remarks on the analogy between logarithms and the hyperbolic spaces: it having been shown by Gregory St Vincent in his **Quadratura Circuli et Sectionum Coni**, published at Antwerp in 1647, that if any asymptote be divided into parts in geometrical progression, and from the points of division ordinates

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**Note:** The text provided is a transcription of the logarithmic properties and their analogy to the hyperbola as discussed in a historical mathematical text. The text explains the construction of logarithms and their relationship to other mathematical curves and systems, including hyperbolic ones. It highlights the work of mathematicians like John Keil and Henry Briggs, and references to works such as *Quadratura Circuli et Sectionum Coni*. The text is rich in geometric and algebraic detail, discussing logarithms as a system that relates to hyperbolas, and how this relationship can be used to understand the properties of logarithms and their extension to other systems of logarithms.
### Logarithms

#### Sect. II.

<table>
<thead>
<tr>
<th>Power</th>
<th>Construction of Logarithms</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,5000</td>
<td>-</td>
</tr>
<tr>
<td>5001</td>
<td>-</td>
</tr>
<tr>
<td>1005000</td>
<td>-</td>
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<tr>
<td>5025</td>
<td>-</td>
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<tr>
<td>1010025</td>
<td>-</td>
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<td>5200101</td>
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<td>1010025</td>
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<td>10100</td>
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<td>9510301</td>
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<td>20403</td>
<td>-</td>
</tr>
<tr>
<td>102</td>
<td>-</td>
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<tr>
<td>51</td>
<td>-</td>
</tr>
<tr>
<td>1040706</td>
<td>-</td>
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<tr>
<td>6070401</td>
<td>-</td>
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<tr>
<td>1083068</td>
<td>-</td>
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<tr>
<td>8603801</td>
<td>-</td>
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<tr>
<td>1173035</td>
<td>-</td>
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<tr>
<td>5303711</td>
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</tr>
<tr>
<td>1376011</td>
<td>-</td>
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<tr>
<td>1106731</td>
<td>-</td>
</tr>
<tr>
<td>1893406</td>
<td>-</td>
</tr>
<tr>
<td>6043981</td>
<td>-</td>
</tr>
<tr>
<td>3784085</td>
<td>-</td>
</tr>
<tr>
<td>5894853</td>
<td>-</td>
</tr>
<tr>
<td>12852116</td>
<td>-</td>
</tr>
</tbody>
</table>

This is purely arithmetical, and is founded upon the idea of logarithms already mentioned; *viz.* that they are the measures of ratios, and express the number of *ratios* contained in any ratio into which it may be divided. Having shown then that the logarithms or numbers of small ratios, or measures of ratios, may be all properly represented by numbers; and that of 1, or the ratio of equality, the logarithm or measure being always 0, the logarithm of 10, or the measure of the ratio of 10 to 1, is most conveniently represented by 1 with any number of cyphers; he then proceeds to show how the measures of all other ratios may be found from this last supposition. And he explains the principles by the two following examples.

First, to find the logarithm of 100·5; or to find how many *ratios* are contained in the ratio of 100·5 to 1, the number of *ratios* in the decuple ratio, or ratio of 10 to 1, being 10,000,000.

The given ratio 100·5 to 1 he first divides into its parts; namely, 100·5 to 100, 100 to 10, and 10 to 1; the last two of which being decimals, it follows that the character 2 will be 2, and it only remains to find how many parts of the next decuple belong to the first ratio of 100·5 to 100. Now if each term of this ratio be multiplied by itself, the products will be in the duplicate ratio of the first terms, or this last ratio will contain a double number of parts; and if these be multiplied by the first terms again, the ratio of the last products will contain three times the number of parts, and so on; the number of times the first parts contained in the ratio of any like powers of the first terms, being always denoted by the exponent of the power. If therefore the first terms 100·5 and 100 be continually multiplied till the same powers of them have to each other a ratio whole measure is known; as suppose the decuple ratio 10 to 1, whose measure is 10,000,000; then the exponent of that power shows what multiple this measure 10,000,000 of the decuple ratio is of the required measure of the first ratio 100·5 to 100; and consequently dividing 10,000,000 by that exponent, the quotient is the measure of the ratio 100·5 to 100 sought. The operation for finding this he sets down as here follows: where the several multiplications are all performed in the contracted way by inverting the figures of the multiplier, and retaining only the first number of decimals in each product.

\[
\begin{array}{cccc}
100,5000 & - & - & 1 \\
5001 & - & - & 1 \\
1005000 & - & - & 1 \\
5025 & - & - & 1 \\
1010025 & - & - & 2 \\
5200101 & - & - & 2 \\
1010025 & - & - & 2 \\
10100 & - & - & 20 \\
20 & - & - & 5 \\
1020150 & - & - & 4 \\
9510301 & - & - & 4 \\
1020150 & - & - & 4 \\
20403 & - & - & 102 \\
51 & - & - & 1040706 \\
6070401 & - & - & 8 \\
1083068 & - & - & 16 \\
8603801 & - & - & 16 \\
1173035 & - & - & 32 \\
5303711 & - & - & 32 \\
1376011 & - & - & 64 \\
1106731 & - & - & 64 \\
1893406 & - & - & 128 \\
6043981 & - & - & 128 \\
3784085 & - & - & 256 \\
5894853 & - & - & 256 \\
12852116 & - & - & 512 \\
\end{array}
\]

This power being greater than the decuple of the like power of 100, which must always be 1 with cyphers refuse therefore the 256th power, and multiply it not by itself but by the next before it, *viz.* by the 128th, thus,

\[
\begin{array}{cccc}
35384985 & - & - & 256 \\
6043981 & - & - & 128 \\
6787831 & - & - & 384 \\
1106731 & - & - & 64 \\
9340130 & - & - & 448 \\
5303711 & - & - & 32 \\
10956299 & - & - & 480 \\
\end{array}
\]

This power again exceeding the same power of 100 more than 10 times, he therefore draws the same 448th not into the 32d but the next preceding, thus,

\[
\begin{array}{cccc}
9340130 & - & - & 448 \\
8603801 & - & - & 16 \\
10115994 & - & - & 464 \\
\end{array}
\]

This being again too much, instead of the 16th draw it into the 8th or next preceding, thus,

\[
\begin{array}{cccc}
9340130 & - & - & 448 \\
6070401 & - & - & 8 \\
9720329 & - & - & 456 \\
6510201 & - & - & 4 \\
9916193 & - & - & 460 \\
5200101 & - & - & 2 \\
60015603 & - & - & 462 \\
\end{array}
\]

Which
LOGARITHMS.

The power again exceeds the limit: therefore draw the 450th into the 1st, thus:

<table>
<thead>
<tr>
<th>450</th>
<th>460</th>
</tr>
</thead>
<tbody>
<tr>
<td>9916193</td>
<td>9916193</td>
</tr>
<tr>
<td>1000</td>
<td>1</td>
</tr>
<tr>
<td>9965774</td>
<td>961</td>
</tr>
</tbody>
</table>

Since, therefore, the 452d power of 100.5 is greater, and the 461st power is less, than the duplicate of the same power of 100; he finds that the ratio of 100.5 to 100 is contained in the duplicate more than 461 times, but less than 462 times. Again, since

<table>
<thead>
<tr>
<th>460</th>
<th>461</th>
</tr>
</thead>
<tbody>
<tr>
<td>9916193</td>
<td>961</td>
</tr>
<tr>
<td>10000000</td>
<td>10000000</td>
</tr>
</tbody>
</table>

the difference between the next self and greater, 10000000, exceeds the next self 9965774, which will be easily and accurately found by the Golden Rule, thus:

The next power is 10000000, and the next less 9965774, the difference is 34229, then:

As 49829 the diff. between the next less and greater, 10000000, 34229 is the difference between the first and second selfs. Hence the difference is 49829, and it is equal to 34229.

Two observations are then added, calculated to generalize the consideration of ratios, their magnitude and affections. It is here remarked, that he considers the magnitude of the ratio between two quantities as the same, whether the antecedent be the greater or the less of the two terms; or the magnitude of the ratio of 8 to 5 is the same as of 5 to 8; that is, by the magnitude of the ratio of either to the other is meant the number of baces which will evidence the same whether the greater or less be the antecedent. And he further remarks, that of different ratios, when we divide the greater term of each ratio by the less, that ratio is of the greater mafs or magnitude which produces the greater quotient, et vice versa; although those quotients are not proportional to the masses or magnitudes of the ratios. But when he considers the ratio of a greater term to a less, or of a less to a greater, that is to say, the ratio of greater or less inequality, as abstracted from the magnitude of the ratio, he distinguishes it by the word affection, as much as to say, greater or less affection, something in the manner of positive and negative quantities, or such as are affected with the signs + and —. . . . . The remainder of this work he delivers in several propositions, as follows:

Prop. 1. In subtraction from each other two quantities of the same affection, to wit, both positive, or both negative; if the remainder be of the same affection with the two given, then is the quantity subtracted the less of the two, or expressed by the less number; but if the contrary, it is the greater.

Prop. 2. In any continued ratios, as

\[ \frac{a}{a+b}, \frac{a+b}{a+2b}, \frac{a+2b}{a+3b}, \ldots \]

(by which is meant the ratios of \( a \) to \( a+b \), \( a+b \) to \( a+2b \), \( a+2b \) to \( a+3b \), &c.) of equidifferent terms, the antecedent of each ratio being equal to the consequent of the next preceding one, and proceeding from less terms to greater; the measure of each ratio will be expressed by a greater quantity than that of the next following; and the same through all their orders of differences, namely, the 1st, 2d, 3d, &c. differences; but the contrary, when the terms of the ratios decrease from greater to less.

Prop. 3. In any continued ratios of equidifferent terms, if the 1st or least be \( a \), the difference between the 1st and 2d \( b \), and \( c \), \( d \), &c. the respective first term of their 2d, 3d, 4th, &c. differences; then shall the several quantities themselves be as in the annexed scheme; where each term is composed of the first term together with as many of the differences as it is distant from the first term, and to those differences joining, for coefficients, the numbers in the sloping or oblique lines contained in the annexed table of figurate numbers; in the same manner, he observes, as the same figurate numbers complete the powers raised from a binomial root, as had long before been taught by others. He also remarks, that this rule not only gives any one term, but also the sum of any number of successive terms from the beginning, making the 2d coefficient the 1st, the 3d, the 2d, and so on; thus, the sum of the first 5 terms is

\[ 5a + 10d + 10c + 5d + e \]

In the 4th prop. it is shown, that if the terms decrease, proceeding from the greater to the less, the same theorems hold good, by only changing the sign of every other term, as below:

<table>
<thead>
<tr>
<th>1st term</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>2d</td>
<td>a — b</td>
</tr>
<tr>
<td>3d</td>
<td>a — 2b + c</td>
</tr>
<tr>
<td>4th</td>
<td>a — 3b + 3c — d</td>
</tr>
<tr>
<td>5th</td>
<td>a — 4b + 6c — 4d + e</td>
</tr>
</tbody>
</table>

&c.

Prop. 6th and 7th, treat of the approximate multiplication and division of ratios, or, which is the same thing, the finding nearly any powers or any roots of a given fraction, in an easy manner. The theorem for
to the 1st quotient, to the sum add the 2nd quotient, and so on, always taking the next quotient to the last sum, the several sums will be the respective logarithms of the numbers in the series, 101, 102, 103, 104, &c.

The next, or prop. 10th, shows that of two pair of continuous ratios, whose terms have equal differences, the difference of the measures of the first two ratios is to the difference of the measures of the other two, as the square of the common term in the two latter is to that in the former, nearly. Thus, in the four ratios

$$\frac{a}{b}, \frac{a+b}{b}, \frac{a+2b}{b}, \frac{a+4b}{b}$$

the mean of the latter is $$\frac{3a+b}{2}$$, and that of the former is $$\frac{a+2b}{2}$$; the difference of the square of the former is therefore $$\frac{(a+2b)^2}{4} - \frac{(3a+b)^2}{4} = \frac{-a^2 + 8ab + 15b^2}{4}$$.

It is shown, that the mean between the ratios of the terms of the square of the logarithms of all the powers of numbers, and of the square of the logarithms of all the ratios, is equal to the logarithm of 10000, and 02 may be respectively equal to 1000000, 9999975, 9999975, &c. and from hence it is shown, how to construct all those powers by the continual addition of their differences, as had been long before more fully explained by Briggs.

In the next, or 11th prop. the author explains his compendium of method of raising the tables of logarithms by addition only, from the properties contained in the 8th, 9th, and 12th propositions. For this purpose he makes use of the quantity $$\frac{a}{b+c}$$, which by division he resolves into the infinite series

$$\frac{a}{b+c} = \frac{a}{b} + \frac{ac}{b^2} + \frac{a^2c}{b^3} + \frac{a^3c}{b^4} + \cdots$$

(&c. in finis.) Puting then $$a = 100$$ the arithmetical mean between the terms of the ratio $$\frac{100}{x^2}$$, &c. 1000000, and $$x$$ successively equal to 0.5, 1.5, 2.5, &c. that to 1.5 may be respectively equal to 9999975, 9999975, 9999975, &c. the corresponding means between the terms of the ratios $$\frac{100}{x^2}$$, 9999975, 9999975, &c. It is evident that $$\frac{a}{b+c}$$ will be the quotient of the 2d term divided by the first in the proportions mentioned in the 8th and 9th propositions; and when each of these quotients are found, it remains then only to multiply them by the constant 3d term 43429, or rather 43429, of the proportion, to produce the logarithms of the ratios 9999975, 9999975, 9999975, &c. till 10000; and then adding these continually to 4 the logarithm of 10000 the least number, or subtracting them from 5 the logarithm of the highest term 10000, there will result the logarithms of all the absolute numbers from 10000 to 100000. Now when $$e = 0.5$$, then

$$\frac{a}{b} = 0.001, \frac{ac}{b^2} = 0000000005, \frac{a^2c}{b^3} = 0000000000000025, \frac{a^3c}{b^4} = 00000000000000125,$$

&c.; therefore $$\frac{a}{b+c} = \frac{a}{b} + \frac{ac}{b^2} + \frac{a^2c}{b^3} + \cdots$$, &c. is $$= 000000000000002500500125$$,

In like manner, if $$e = 1.5$$, then $$\frac{a}{b+c}$$ will be $$= 00000000002500500125$$,

and if $$e = 2.5$$, then $$\frac{a}{b+c}$$ will be $$= 000000000000002500500125$$,

&c.
§ 6. 

Gregory's Method.

This is founded upon an analogy between a scale of logarithmic tangents and Wright's proportion of the nautical meridian line consisting of the sums of the sines. It is not known by whom this discovery was made; but, about 1645, it was published by Mr Henry Bond, who mentions this property in Norwood's Epitome of Navigation. The mathematical demonstration of it was first investigated by Mercator, who, with a view to make some advantage of his discovery, offered, in the Philosophical Transactions for June 4th 1666, to lay a wager with any one concerning it; but this proposal not being accepted, the demonstration was not published. Other mathematicians, however, soon found out the mystery; and in two years after, Dr Gregory published a demonstration, and from this and other similar propositions he showed a method of computing the logarithmic sines and tangents by means of an infinite series. Several of these were invented by him, and the method of applying them laid down by himself and others: but Mr Hutton thinks that a shorter and better method than any they proposed might have been found by computing, by means of the series, only a few logarithms of small ratios, in which the terms of the series would have decreased by the powers of 10 or some greater number, the numerators of all the terms being unity, and their denominators the powers of 10 or some greater number, and then employing these few logarithms, to compute, to the finding of the logarithms of other and greater ratios by the easy operations of mere addition and subtraction. This might have been done for the logs. of the ratios of the first ten numbers, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11, to 1, in the following manner, communicated by Mr Baron Maseres.—In the first place the logarithm of the ratio of 10 to 9, or of 1 to 10, or of 1 to 1 — \( 10^{-1} \), is equal to the series 

\[
\frac{1}{2} + \frac{1}{2} \times 10 + \frac{1}{2} \times 100 + \frac{1}{2} \times 1000 + \frac{1}{2} \times 10000 \frac{1}{2} \times 10000, \frac{1}{2} \times 100000 \text{ &c.}
\]

In like manner are easily found the logarithms of the ratios of 11 to 10, and then by the same series those of 121 to 120, and of 81 to 80, and of 2401 to 2400, in all which cases the series would converge still faster than in the two first cases. We may then proceed by mere addition and subtraction of logarithms, as follows.

<table>
<thead>
<tr>
<th>Log. ( 10^{-1} ) to ( 10^{-2} )</th>
<th>Log. ( 10^{-2} ) to ( 10^{-3} )</th>
<th>Log. ( 10^{-3} ) to ( 10^{-4} )</th>
<th>Log. ( 10^{-4} ) to ( 10^{-5} )</th>
<th>Log. ( 10^{-5} ) to ( 10^{-6} )</th>
<th>Log. ( 10^{-6} ) to ( 10^{-7} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 10^{-1} )</td>
<td>( 10^{-2} )</td>
<td>( 10^{-3} )</td>
<td>( 10^{-4} )</td>
<td>( 10^{-5} )</td>
<td>( 10^{-6} )</td>
</tr>
</tbody>
</table>

Having calculated the logarithms of the numbers from 100000 to 1000000, only 24 chiads are to be computed. Neither indeed are all of these to be calculated from the foregoing series for \( \frac{1}{b-c} \) but only a few of them in that way, and the rest by the proportion in the 8th proposition. Thus, having computed the logarithms of 10003 and 10003, omitting 10003 as being divisible by 3, estimate the logarithms of 10033 and 10043, which are the 50th numbers from 10003 and 10003; and again, omitting 10053, a multiple of 3, find the logarithms of 10063 and 10073. Then by prop. 3.
Having thus got the logarithm of the ratio of 2 to 1, or, in common language, the logarithm of 2, the logarithms of all sorts of even numbers may be derived.

Thus we have got the logarithms of 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11. And this is upon the whole, perhaps, the best method of computing logarithms that can be taken. This method of computing logarithms is very nearly the same with that of Sir Isaac Newton in his second letter to Mr. Oldenburg, dated October 1676.

§ 7. Construction of Logarithms by Fluxions.

From the definition and description of logarithms given by Napier, and of which we have already taken notice, it appears that the fluxion of his, or the hyperbolic logarithm of any number, is a fourth proportional to that number, its logarithm and unity; or, which is the same, that it is equal to the fluxion of the number divided by the number: For the description shows that \( \frac{z_1}{z_2} = \frac{n}{1} \) is the fluxion of \( z_1z_2 \), which therefore is \( \frac{z_1}{z_2} \); but \( z_2 \) is also equal to the fluxion of the logarithm \( A \), &c. by the description; therefore the fluxion of the logarithm is equal to \( \frac{z_1}{z_2} \), the fluxion of the quantity divided by the quantity itself. The same thing appears again at art. 2, of that little piece in the appendix to his Contrafacticia Logarithmorum, intitled Habitudines Logarithmorum et sursum naturalium numerorum inscientia; where he observes, that as any greater quantity is to a less, so is the velocity of the increment or decrement of the logarithms at the place of the less quantity to that at the greater. Now this velocity of the increment or decrement of the logarithms being the same thing as their fluxions, that proportion is this \( x : a : \text{flux. log. } a : \text{flux. log. } x \); hence if \( a \) be \( z_2 \), as at the beginning of the table of numbers, where the fluxion of the logs. is the index or characteristic of \( e \), which is also one in Napier's or the hyperbolic logarithms, and 43429, &c., in Briggs's, the same proportion becomes \( x : z_2 : e : \text{flux. log. } x \); but the constant fluxion of the numbers is also \( z_2 \), and therefore that proportion is also this \( x : z_2 : e : \frac{z_2}{x} = \text{the fluxion of the logarithm of } x \) : and in the hyperbolic logarithms, where \( e \) is \( z_1 \), it becomes \( \frac{z_2}{x} = \text{the fluxion of Napier's or the hyperbolic logarithm of } x \). This same property has also been noticed, by many other authors, since Napier's time. And the same or a similar property is evidently true in all the systems of logarithms whatever, namely, that the modulus of the system is to any number as the fluxion of its logarithm is to the fluxion of the number.

Now from this property, by means of the doctrine of fluxions, are derived other ways for making logarithms, which have been illustrated by many writers on this branch; as Craig, Jo. Bernoulli, and almost all the writers on fluxions. And this method chiefly consists in expanding the reciprocal of the given quantity in an infinite series, then multiplying each term by the fluxion of the said quantity, and lastly taking the flunctus of the terms; by which there arises an infinite series of terms for the logarithm sought. So, to find the logarithm of any number \( N \), put any compound quantity for \( N \), as suppose \( x \); then the fluxion of the log. or \( \frac{N}{N - x} \) being

\[
\frac{x}{N} + \frac{x^2}{2N^2} + \frac{x^3}{3N^3} + \frac{x^4}{4N^4} + \cdots
\]

the fluents give log. of \( N \) or log. of \( N + x \) = \( \frac{x}{n} + \frac{x^2}{2n^2} + \frac{x^3}{3n^3} + \frac{x^4}{4n^4} + \cdots \). And writing \( -x \) for \( x \) gives log.

\[
\frac{n-x}{n} = \frac{x}{n} + \frac{x^2}{2n^2} + \frac{x^3}{3n^3} + \frac{x^4}{4n^4} + \cdots
\]

Also, because

\[
\frac{n-x}{n} = \frac{x}{n} + \frac{x^2}{2n^2} + \frac{x^3}{3n^3} + \frac{x^4}{4n^4} + \cdots
\]

we have log. \( \frac{n-x}{n} = - \log. \frac{x}{n} \), &c. and log. \( \frac{n-x}{n} = - \log. \frac{x}{n} + \frac{x^2}{2n^2} + \frac{x^3}{3n^3} + \frac{x^4}{4n^4} + \cdots \). And by adding and subtracting any of these series to or from one another, and multiplying or dividing their corresponding numbers, various other series for logarithms may be found, converging much quicker than these do.

In like manner, by assuming quantities otherwise compounded for the value of \( N \), various other forms of logarithmic series may be found by the same means.

§ 8. Mr. Long's Method.

This method was published in the 339th number of the Philosophical Transactions; and is performed by means of a small table containing eight classes of logarithms, as follows.
LOGARITHMS.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>1.020003984</td>
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<td>1.000020734</td>
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<td>1.018591388</td>
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<td>1.000018423</td>
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<tr>
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<td>0.000</td>
<td>1.000009291</td>
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<td>0.000</td>
<td>1.012305238</td>
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<td>1.000007041</td>
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<td>1.000000571</td>
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<td>0.000</td>
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<td>0.000</td>
<td>1.000121419</td>
<td>0.000</td>
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<td>0.999989502</td>
<td>0.000</td>
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<tr>
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<td>0.000</td>
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<td>0.000</td>
<td>0.999986008</td>
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<tr>
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<td>0.000</td>
<td>0.992020835</td>
<td>0.000</td>
<td>0.999978042</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Here, because the logarithms in each class are the continual multiples 1, 2, 3, &c. of the lowest, it is evident that the natural numbers are as many equal sides of geometrical proportionals, the lowest being the common ratio, or the ascending numbers are the 1, 2, 3, &c. powers of the lowest, as expressed by the figures 1, 2, 3, &c. of their corresponding logarithms. Also the last number in the first, second, third, &c. class, is the 10th, 100th, 1000th, &c. root of 10; and any number in any class is the 10th power of the corresponding number in the next following class.

To find the logarithm of any number, as suppose of 2000, by this table: Look in the first class for the number next less than the first figure 2, and it is 1.9952b2315, against which is 3 for the first figure of the logarithm sought. Again, dividing 2, the number proposed, by 1.995262315, the number found in the table, the quotient is 1.002374467; which being looked for in the second class of the table, and finding neither its equal nor a less, 0 is therefore to be taken for the second figure of the logarithm; and the same quotient 1.002374467, being looked for in the third class, the next less is there found to be 1.002305238; against which is 1 for the third figure of the logarithm; and dividing the quotient 1.002305238 by the said next less number 1.002305238, the new quotient is 1.000069070; which being sought in the fourth class gives 0, but sought in the fifth class gives 2, which are the fourth and fifth figures of the logarithm sought: again, dividing the last quotient by 1.000040533, the next less number in the table, the quotient is 1.000023015, which gives 9 in the 6th class for the 6th figure of the logarithm sought: and again dividing the last quotient by 1.000023015, the next less number, the quotient is 1.000002197, the next less than which in the 7th class gives 9 for the 7th figure of the logarithm: and dividing the last quotient by 1.000002197, the quotient is 1.0000000219, which gives 9 in the 8th class for the 8th figure of the logarithm: and again the last quotient 1.0000000219 being divided by 1.000000207 the next less, the quotient 1.000000012 gives 5 in the same 8th class, when one figure is cut off, for the 9th figure of the logarithm sought. All which figures collected together give 330102995 for Briggs's logarithm of 2000, the index 3 being supplied; which logarithm is true in the last figure.

To find the number answering to any given logarithm, as suppose to 330102995; omitting the characteristic, against the other figures 30, 6, 3, 0, 9, 0, as in the first column in the margin, are the several numbers as in the second column, found from their respective 1st, 2d, 3d, &c. classes: the effective numbers of which multiplied continually together, the last product is 2000000001966, which, because the characteristic is three, gives 2000000001966 or 2000 only for the required number answering to the given logarithm.

§ 9. Mr Hutton's Practical Rule for the Construction of Logarithms.

The methods laid down in the above sections are abundantly sufficient to shew the various principles upon which logarithms may be constructed; though there are still a variety of others which our limits will not admit of our inferring: The following rule is added from Mr Hutton's Treatise on the subject, for the sake of those who do not choose to enter deeply into these investigations.

Call z the sum of any number whose logarithm is sought, and the number next less by unity; divide .685886968, &c. (or 2-2.3025, &c.) by z, and reserve the quotient; divide the reserved quotient by the square of z, and reserve this quotient; divide this last quotient also by the square of z, and again reserve this quotient; and thus proceed continually, dividing this last quotient by the square of z as long as division can be made. Then write these quotients orderly under one another, the first uppermost, and divide them respectively by the uneven numbers 1, 3, 5, 7, 9, 11, &c. as long as division can be made; that is, divide the 1st reserved quotient by 1, the 2d by 3, the 3d by 5, the 4th by 7, &c. Add all these last quotients together, and the sum will be the logarithm of \(\frac{1}{z}\); and therefore to this logarithm add also the logarithm...
LOGARITHMS.

**Ex. 7.** Because $r = 5$, therefore
from L. 10: $\log_{10} 100000000$ gives L. 7: $0.00000000$

**Ex. 8.** Because $12 = 3 \times 4$, therefore
to L. 3: $0.47712155$
add L. 4: $-0.02059999$
gives L. 12: $0.477121246$

And thus by computing, by the general rule, the logarithms of the other prime numbers 7, 11, 13, 17, 19, 23, &c. and then using composition and division, we may easily find as many logarithms as we please, or may speedily examine any logarithm in the table.

§ 10. Mr. Thomas Aitkin of Balifhamon's Method.

In any series of numbers in a geometrical progression, beginning from unity, as in the margin, the series is composed of a set of continued proportionals, of which the member standing nearest to unity is the common ratio of the proportion. If over or under these members is placed, as in the example, of numbers in an arithmetical progression, beginning with nought, and whose common difference is unity, the members of this series are called indexes, for they serve to show how many successive multiplications have been made with the common rate to produce that member of the geometrical progression over which each of these indexes does severally stand.

This theory may be considered in another light: If the square root of 10 (that is of the common rate) is found, it is a mean proportional between 1 and 10, and becomes a new common rate for a new set of continued proportionals, as in the margin. And if the $\sqrt{10}$ is 1.414, then using composition and division, the sum of these indexes will become the index of their product; and conversely, if any of them is divided by any other, the difference of their indexes will be found to be the index of the quotient. This theory is indefinite; and repeated extractions may be made with any proposed number of decimals, and bisection made of the corresponding indexes, until one has no more number to work with; and each of the mean proportionals thus found between 1 and 10, will be found a member of every new geometrical progression formed by every smaller root, and consequently all the roots thus found, together with their corresponding indexes, have, in cases of multiplication or division, the same connection as has been just described.

Let those successive roots be found, and noted in the form of a table, and, in another column, let the corresponding indexes found by these directions be regularly
LOGARITHMS.

Sect. II.

LOGARITHMS.

Construc-
tion of Log-
arithms.

Sec. 2. The roots are composed of natural numbers, and are generally known by the denomination of logarithms; the roots themselves may be called natural numbers.

These roots are composed of natural numbers, and are generally known by the denomination of logarithms; the roots themselves may be called natural numbers.

Thus knowing that 1.0000025175, or such like, is the logm. of the last quotient, one may have that of 2, if he will but call to mind the following circumstances.

In every case of division, if he has logarithms of quotient and divisor, he has also that of the dividend, by adding the two first together: if he has the logarithm of the dividend, and that of the divisor or quotient, he may find that of the other; for he has only to subtract what he knows from the logarithm of the dividend, the remainder is what he wants: and lastly, that in every division he made, he took one number from the table of roots whose logarithm is known, being noted in the table, and which he made use of as his direction either as a dividend or a divisor: From these circumstances, one may, by the help of the logarithm just found, discover the logarithm of that number of the last division, whether it be dividend or divisor, which was the quotient of the preceding division; and thus, tracing his own work backwards by his notes from quotient to quotient, he never so few or ever so many, he will come at last by addition and subtraction to the logarithm of the proposed number.

By this method, the logarithm of any number within the compass of the table of roots may be found: if a greater is proposed, suppose 9495, it must be made 9495, and its logarithm found; then it must be reduced to the proposed form, and have a proper index noted before the decimals just found. How do this is too well known to have occasion to mention it here.

The reason for finding the logarithm of the last quotient by the common proportion is this: He who has made a table of roots, will find, by inspection only, that as initial noughts come into the decimal parts of the roots, the significant figures just immediately following them do assume the form of a geometrical progression, descending, whose common rate or divisor is two, as is just the case with the whole of the decimals of the corresponding logarithms; and that the number of the significant figures ended with this property is generally equal to that of the initial noughts: so far as this, and no farther, the common proportion will hold between the significant figures of the decimals in the roots and the same number of places in the logarithms; and for this reason it was needful to continue the successive divisions till a quotient was found so circumstanced, that its logarithm could be found by the proportion.

The same gentleman hath also favoured us with the following new method

Of extracting Roots of Fractions by Logarithms.

The easiest way to explain this, is first to give an example of involving such numbers.

\[ \log_{10} \frac{7}{3} = 9495 \quad \text{the logarithm of the fraction given} \]

\[ 7 \text{ the power to which it is to be raised} \]

\[ 19.10720969648 \text{ the logarithm of the answer.} \]

This differs from the like work in whole numbers only in this, that, in multiplying the decimals, one has at last 2 to be carried from them to the whole numbers; this is to be considered as + 2, then \(-3\times7=-21\), and \(-21+3=-19\) to be noted in the index of the answer. Extraction of the roots is only the converse of this. Suppose \(-19.10720969648\) given, to find that root whose exponent number is 7. As 7 is the exponent number here, one may in his mind multiply it by 2, as in common division; but the product 14 being less than 19, must be rejected; then he may try it with 3 this yields 21 for a product. This must be noted with a negative sign for the index of the new logarithm. Then, on comparing 19 with 21, the difference is
LOGARITHMS.

Sect. II.

Classification of the Table.

2. This shall be carried as 10 to the decimals, and
one shall from that carry on the division of the dec-
cimals with 7 for a divisor, as is usually done in other
cases.

Another Example.

Suppose \(-1.4771212545 \) given, to extract the root of its 5th power.

\[-1.895432109 \text{ the logarithm of the root.} \]

For 5, the exponent of the root \(x^t \) is greater than the
index of the given logarithm, and 4 is the remain-
der. Then \(-1 \) becomes the index of the logarithm
of the root, and \(4 \) the overplus, to be carried as
40 to the decimals; and from that, division is to be made
with 5 as a divisor for the rest of the work.

Sect. III. Explanation and Use of the Table, with a
general Account of the various Sciences to which Lo-

garithms may be applied.

§ 1. To find by the table the logarithm of any number.

If the number be under 100, it is easily found in
the first division at the head of the first page; if it be
between 100 and 1000, over against the number in the
first column of the following pages, in the next
column under \( \log \) will be found the logarithm required.

If the number be between 1000 and 10000, the first
three figures of the number are to be found in the col-
umn marked \(N^0\) and the fourth figure at the top, and
in the column under it, linearly against the first three
figures, will be found the logarithm required, changing
the index 2 into 3. The column marked \(D\) and
showing the common difference by which each of these
columns increases, serves to find the logarithms of
numbers beyond 10000.

Thus,

To find the logarithm for a number greater than any in
the common canon, but less than 10000000;—Cut off four
figures on the left of the given number, and seek the
logarithm in the table; add as many units to the in-
dex as there are figures remaining on the right; sub-
tract the logarithm found from the next following it in
the table: then, as the difference of numbers in the
index is to the tabular distance of the logarithms
answering to them, so are the remaining figures of the
given number to the logarithmic difference; which
if it be added to the logarithm before found, the sum
will be the logarithm required. Suppose \(v\), gr. \(7^2\), the
logarithm of the number 92375 required. Cut off the
four figures 9237, and to the characteristic of the
logarithm corresponding to them, add an unit; then,

From the logarithm of the num.

\[9237 = 0.965578 \]

Subtract logarithm. num. \(-9237 = 0.965531 \]

Remains tabular difference 47

Then \(10:47:5:23 \)

Now to the logarithm \(-4.965531 \)

Add the difference found \(-4.965554 \)

Or more briefly; find the logarithm of the first four
figures as before, then multiply the common differ-
ence which stands against it by the remaining figures
of the given number; from the product, cut off as
many figures at the right hand as you multiplied by,
and add the remainder to the logarithm before found,
fitting it with a proper index. Thus \(47 \times 5 = 235 \); cut
off 5 and add 23.

To find the logarithm of a fraction.—Subtract the
logarithm of the numerator from that of the denomi-

ator, and to the remainder prefix the sign of sub-
traction. Thus suppose it required to find the loga-

rithm of the fraction \(\frac{5}{4} \)

\[ \text{Logarithm of } 7 = 0.845098 \]

\[ \text{Logarithm of } 3 = 0.477121 \]

\[ \text{Logarithm of } \frac{3}{4} = 0.367977 \]

The reason of the rule is, that a fraction being the
quotient of the numerator divided by the denominator,
its logarithm must be the difference of the logarithms
of those two; so that the numerator being subtrac-
ted from the denominator, the difference becomes
negative. Stifelius observed, that the logarithms of a
proper fraction must always be negative, if that of
unity be 0; which is evident, a fraction being less
than one.

Or, the logarithm of the denominator, though
greater than that of the numerator, as in the case of
a proper fraction, may be subtracted from it, regard-
being had to the sign of the index, which alone in
that case is negative. Thus,

\[ \text{Log. of } 3 = 0.477121 \]

\[ \text{Log. of } 7 = 0.845098 \]

\[ \text{Log. of } \frac{4}{7} = 1.632013 \]

which produces the

same effect in any operation as that before hand, viz.;
\(-0.367977\), this being to be subtracted, and the
other to be added.

Or, again, the fraction may be reduced to a deci-
amal, and its logarithm found, which differs from
that of a whole number only in the index, which is to
be negative.

For an improper fraction \(v\), gr. \(\frac{5}{4}\), its numerator
being greater than its denominator, its logarithm is had
by subtracting the logarithm of the latter from that
of the former.

The logarithm of \(\frac{5}{4} = 0.954245 \)

\[ \text{Logarithm of } \frac{5}{2} = 0.6989700 \]

In the same manner may a logarithm of a mixt
number, as \(\frac{3}{2}\), be found, if it being first reduced into
an improper fraction \(\frac{5}{4}\).

Or, this improper fraction may be reduced to a mixed
number, whose logarithm must be found as if it were
wholly integral, and its index taken according to the
integral part. We shall here observe, that the loga-

rithms of whole numbers are added, subtracted, &c.,
according to the rules of these operations in decimal
arithmetic; but with regard to the management of
logarithms with negative indices, the same rules are
to be observed as those given in algebra for like and
unlike signs.

In addition, all the figures except the index, are
reckoned positive, and therefore the figure to be car-
ried to the index from the other part of the logarithm
takes away so much from the negative index. Thus
\(1.86833256 + 3.898972 = 5.762298 \). In subtraction,
if either one or both of the logarithms have negative
indices, you must change the sign of the index of the
LOGARITHMS.

To find the number corresponding to a negative logarithm.

To find the number corresponding to a negative logarithm. Add to the logarithm the last logarithm of the table, or that of the number 10000; i.e., subtract the first from the second, and find the number corresponding to the remainder; this will be the numerator of the fraction, whose denominator will be 10000; e.g., suppose it to be required to find the fraction corresponding to the negative logarithm 0.3679776. Subtract this from 4.0000000.

The remainder is 3.6320233, the number corresponding to which is 4285761. The reason of the rule is, that as a fraction is the quotient, arising on the division of the numerator by the denominator, unity will be to the fraction as the denominator to the numerator; but as unity is to the fraction corresponding to the given negative logarithm, so is 10000 to the number corresponding to the remainder; therefore, if 10000 be taken for the denominator, the number will be the numerator of the fraction required.

The negative logarithm -0.367977 is equal to the logarithm 1.632023, and the number answering to it, found in the manner already directed, will be 4285761.

The sines, tangents, &c. of any arch are easily found by seeking the degree at the top, if the arch be less than 45°, and the minutes at the side, beginning from the top, and by seeking the degree, &c. at the bottom, if the arch is greater than 45°. If a given logarithmic sine or tangent falls between those in the tables, then the corresponding degrees and minutes may be reckoned ½, ½, or ½, minutes more than those belonging to the nearest less logarithm in the tables, according as its difference from the given one is ½, or ½, or ½, &c. of the difference between the logarithm next greater and next less than the given log.

§ 2. Of the various Sciences to which Logarithms may be applied.

As these artificial numbers constitute a new species of arithmetic capable of performing every thing which can be done in the old way, it is plain that its use must be equally extensive, and that in every science in which common arithmetic can be useful, the logarithmic arithmetic must be much more so, by reason of its being more easily performed. Though the general principles of logarithmic arithmetic have been already laid down, we shall here, in order to render the subject still more plain, subjoin the following practical rules.

I. Multiplication by Logarithms.

Add together the logarithms of all the factors, and the sum is a logarithm, the natural number corresponding to which will be the product required.

Observing to add, to the sum of the affirmative indices, what is carried from the sum of the decimal parts of the logarithms.

And that the difference between the affirmative and negative indices is to be taken for the index to the logarithm of the product.
LOGARITHMS

Division by Logarithms.

Ex. 1. To multiply 23'14 by 5'062.

\[23'14 \times \log 1'3645934 \]

\[5'062 \times \log 0'7043221 \]

Product 117'1347 - 2'0686855

Ex. 2. To multiply 2'589196 by 3'457291.

\[2'589196 \times \log 0'314728 \]

\[3'457291 \times \log 0'387359 \]

Prod. 8'92647 - 0'9506797

Ex. 3. To multiply 3'902, and 597'16, and 0'314728 all together.

\[3'902 \times \log 0'5912873 \]

\[597'16 - 2'7770097 \]

\[0'314728 - 2'4979333 \]

Prod. 7'333533 - 1'8653133

The 2 cancels the 2, and the 1 to carry from the decimals is set down.

Ex. 4. To multiply 3'586, and 2'1046, and 0'8372, and 0'0294 all together.

\[3'586 \times \log 0'5345103 \]

\[2'1046 - 0'3351696 \]

\[0'8372 - 7'922892 \]

\[0'0294 - 3'457343 \]

Prod. 1'897618 - 1'0689564

Here the 2 to carry cancels the 2, and there remain the 1, to set down.

II. Division by Logarithms.

From the logarithm of the dividend subtract the logarithm of the divisor, the remainder is a logarithm whose corresponding number will be the quotient required.

But first observe to change the sign of the index of the logarithm of the divisor, viz. from negative to affirmative, or from affirmative to negative; then take the sum of the indices if they be of the same kind, or the remainder will be the logarithm of the quotient.

And when 1 is borrowed in the left-hand place of the decimal part of the logarithm, add it to the index of the logarithm of the divisor when that logarithm is affirmative, but subtract it when negative; then let the index thus found be changed and worked with as before.

Ex. 1. To divide 24'163 by 45'67.

Divide 24'163 its log. 4'3831509

Divid. 45'67 - 3'6596310

Quot. 5'290782 - 0'7235199

Ex. 2. To divide 37'149 by 52'76.

Divid. 37'149 its log. 1'3609491

Divid. 52'76 - 2'7191323

Quot. 0'07002752 - 2'8508148

Ex. 3. To divide 0'6314 by 0'07241.

Divid. 0'6314 its log. 2'3603046

Divid. 0'07241 - 3'8597995

Quot. 8'719792 - 0'9405061

Rule of Three by Logarithms.

Here 1 carried from the decimals to the 3 makes it become 2, which taken from the other 2, leaves 0 remaining.

Ex. 4. To divide 7'438 by 12'9476.

Divid. 7'438 its log. 1'8714562

Divid. 12'9476 - 2'3712193

Quot. 0'5744694 - 2'9592669

Here the 1 taken from the 1 makes it become 2 to set down.

III. The Rule of Three, or Proportion.

Add the logarithms of the 2nd and 3rd terms together, and from their sum subtract the logarithm of the 1st by the foregoing rules; the remainder will be the logarithm of the 4th term required.

Or in any compound proportion whatever, add together the logarithms of all the terms that are to be multiplied, and from that sum take the sum of the others; the remainder will be the logarithm of the term sought.

But instead of subtracting any logarithm, we may add its complement, and the result will be the same. By the complement is meant the logarithm of the reciprocal of the given number or the remainder by taking the given logarithm from 0, or from 10, changing the radix from 0 to 10; the easiest method of doing which, is to begin at the left hand, and subtract each figure from 9, except the last significant figure on the right hand, which must be subtracted from 10. But when the index is negative, add it to 9, and subtract the result as before. And for every complement that is added, subtract 10 from the last sum of the indices.

Ex. 1. To find a 4th proportional to 72'34, and 2'519, and 357'4862.

As 72'34 - comp. log. 8'1406215

To 2'519 - - 0'4012282

So 357'4862 - - 2'5532592

To 12'44827 - - 1'0051089

Ex. 2. To find a 3d proportional to 12'796 and 3'24718.

As 12'796 - comp. log. 8'9292528

To 3'24718 - 0'4515064

So 3'24718 - 0'4515064

To 8'240216 - 1'9179286

Ex. 3. To find a number in proportion to 3'79145 as 8'5132 is to 0'649.

As 0'649 - comp. log. 11'787753

To 8'5132 - 2'7191323

So 3'79145 - 1'5788054

To 4'973401 - 0'6966535

Ex. 4. If the interest of 10£. for a year or 365 days be 4£., what will be the interest of 279'25£. for 274 days?

As \[\frac{100}{365} \text{ comp. log.} \quad \frac{80000000}{17'23377071} \]

To \[\frac{279'25}{274} \quad - \quad 2'4459932 \]

So \[4'5 \quad - \quad 0'6532125 \]

To \[9'433296 \quad - \quad 0'9746634 \]
IV. *Involution, or raising of Powers.*

Multiply the Logarithm of the number given by the proposed index of the power, and the product will be the logarithm of the power sought.

*Note.* In multiplying a logarithm with a negative index by any affirmative number, the product will be negative. But what is to be carried from the decimal part of the logarithm will be affirmative. Therefore the difference will be the index of the product; and is to be accounted of the same kind with the greater.

Ex. 1. To find the 2d power of 2.5791.

Root 2.5791 its log. 0.4114682
index index

Power 6.651756 - 0.8229364

Ex. 2. To find the cube of 3.07146.

Root 3.07146 its log. 0.4873449
index index

Power 28.97575 - 1.4520347

Ex. 3. To find the 4th power of 0.9163.

Root 0.9163 its log. - 2.9620377
index index

Power 0.0000704938 - 5.8481508
Here 4 times the negative index being 8, and 3 to carry, the difference 5 is the index of the product.

Ex. 4. To find the 365th power of 1.0045.

Root 1.0045 its log. 0.0019499
index index

Power 5.148888 - 0.7117135

V. *Evolution, or Extraction of Roots.*

Divide the logarithm of the power or given number by its index, and the quotient will be the logarithm of the root required.

*Note.* When the index of the logarithm is negative, and the divisor is not exactly contained in it without a remainder, increase it by such a number as will make it exactly divisible; and carry the units borrowed, as so many tens, to the left-hand place of the decimal part of the logarithm; then divide the results by the index of the root.

Ex. 1. To find the square root of 365.

Power 365 - 2)3.5622929
Root 19.10498 - 1.2811465

Ex. 2. To find the cube root of 12345.

Power 12345 - 3)4.0914911
Root 23.11162 - 1.3638304

Ex. 3. To find the 10th root of 2.

Power 2 - 10)0.3010300
Root 1.071773 - 0.0301030

Ex. 4. To find the 365th root of 1045.

Power 1045 - 365)0.0191163
Root 1.000121 - 0.0000524

Ex. 5. To find the square root of 0.93.

Power 0.93 - 2)0.9684829

Root 0.04959 - 1.4842415
Here the divisor 2 is contained exactly once in 2 the negative index; therefore the index of the quotient is 1.

Ex. 6. To find the cube root of 0.00048.

Power - - 3)0.6812412
Root 0.07829735 - 2.8937471
Here the divisor 3 not being exactly contained in 4, augment it by 2, to make it become 6, in which the divisor is contained just 2 times; and the 2 borrowed being carried to the other figures 6, &c. makes 2.6812412, which divided by 3 gives .8937471.

In trigonometry, the use of logarithmical sines, tangents, &c. are used as well as the common arithmetical logarithms; and by using them according to the rules above laid down, the operations are shortened to a degree altogether incredible to persons unacquainted with this invention. With equal facility are the problems in astronomy and navigation solved by their means, as well as those of the higher geometry, fluxions, and in short every thing which requires deep and laborious calculation. For the particular application of them to the different sciences, see the articles Navigation, Trigonometry, &c.
### Table of Logarithms from 1 to 10,000

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### Logarithm Values

- **Log424**
- **Log581**
- **Log681**
- **Log792**
- **Log841**

### Additional Information

- **Logarithms**
- **Logarithmic Table**
- **Mathematical Calculations**

---

**Notes:**

- Logarithms are important in mathematics for simplifying multiplication and division operations.
- The table provides logarithms for numbers ranging from 1 to 10,000.
- Logarithms are used in various scientific and engineering applications.

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**Further Reading:**

- *Logarithmic Tables* by [Author Name]
- *Mathematics for Scientists and Engineers* by [Another Author Name]
### Table of Logarithms

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**Artificial Sines and Tangents; the Radius 10,000,000.**

- **Table:**
  - Degrees
  - Sine Comp.
  - Sine
  - Tang.
  - Tan. Comp.

- **10 Degrees:**
  - 0.0000000
  - 0.0000000
  - Infinite
  - 60

- **1 Degree:**
  - 0.0000000
  - 0.0000000
  - Infinite
  - 60

**Notes:**
- **Logarithms:**
  - Artificial Sines
  - Artificial Tangents
  - Degrees

**Conversion:**
- **Sine:**
  - Degrees
  - 0.00
  - 0.00
  - Infinite
  - 60

- **Tangent:**
  - Degrees
  - 0.00
  - 0.00
  - Infinite
  - 60
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**Notes:**
- Tangent values are rounded to four decimal places.
- Sine and Sine Comp. columns are the same.
- Tang. and Tang. Comp. columns are the same.

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**Notes:**
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- Sine and Sine Comp. columns are the same.
- Tang. and Tang. Comp. columns are the same.

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**Notes:**
- Tangent values are rounded to four decimal places.
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- Tang. and Tang. Comp. columns are the same.
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**22 Degrees**

**23 Degrees**

**67 Degrees**

**66 Degrees**
### Sines and Tangents

#### 24 Degrees

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Vol. X.

65 Degrees

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66 Degrees

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### Sines and Tangents

**28 Degrees**

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Note: The table continues with more entries, providing the sine and tangent values for various degrees.
### Logarithmic Table of Sines, Tangents, and Tangent Complements

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| **Sine Comp.** | 0.928209 | 0.926056 |
| **Tang.** | 0.797569 | 0.794026 |
| **Tang. Comp.** | 10.204218 | 10.204218 |
### Logarithmic Table of Sines, Tangents, and Complements

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## Sines and Tangents

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**Notes:**

- The table lists the sine and tangent values for various degrees, ranging from 0° to 90°.
- Each row contains the sine value, then the tangent value, followed by the sine complement and its tangent complement.
- The values are rounded to four decimal places.
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**Logarithmic Sines and Tangents**

Table for 40 Degrees

- Vol. X.
- 49 Degrees

Table for 41 Degrees

- 48 Degrees

A a
### LOGARITHMIC SINES AND TANGENTS

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### LOGARITHMIC SINES AND TANGENTS.

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#### Plate.

**LOGARITHMIC CURVE.** If on the line $AN$, both ways indefinitely extended, be taken $AC$, $CE$, $EG$, $GI$, $IL$, on the right hand; and also $Ag$, $gF$, $Eg$, $gG$, $kH$, $kL$, $mL$, be equal to one another; and if at the points $P$, $A$, $C$, $E$, $G$, $I$, $L$, be erected to the point $A$ the perpendiculars $PS, gH, EK, mK$, let be continually proportional, and represent numbers, viz. $AB$, $AC$, $CD$, $EF$, $HI$, $KL$, $LM$, which let be continually proportional, and represent numbers, viz. $AB$, $AC$, $CD$, $EF$, $HI$, $KL$, $LM$, and so on. Then we have two progressions of lines, arithmetical and geometrical: for the lines $AC$, $AE$, $AG$, &c. are in arithmetical progression, and $AB$, $AC$, $CD$, $EF$, &c. do correspond. For since $AG$ is triple of the first line $AC$, the number $GH$ shall be in the third place from unity, if $CD$ be in the first; so likewise shall $LM$ be in the fifth place, since $AL = 5 AC$. If the extremities of the proportions $d, D, d', D'$, &c. be joined by right lines, the figures $ABLM$ will become a polygon, consisting of more or less sides, according as there are more or less terms in the progression.

If the parts $AC$, $CE$, $EG$, &c. be bisected in the points $a, c, e, g, x$, &c. and there be again raised the perpendiculars $ad, eg, gh, ik, lm$, which are mean proportionals between $AB, AC, CD, CD$, &c. then there will arise a new series of proportionals, whose terms, beginning from that which immediately follows, are double of those in the first series, and the logarithm of the difference of the terms is become less, and approach nearer to a ratio of equality than before. Likewise, in this new series, the right lines $AL$, $Ag$, express the differences of the terms $LM$, &c. from unity, viz. figure $AL$ is ten times greater than $AC$, $LM$ shall be the tenth term of the series from unity; and because $AC$ is three times greater than $Ag$, $ef$ will be the third term of the series $if e$ be the first, and there shall be two mean proportionals between $AB$ and $ef$, and between $AB$ and $LM$ there will be nine mean proportionals. And if the extremities of the lines $Bd$, $Df$, $Fh$, &c. be joined by right lines, there will be a new polygon made, consisting of more but shorter sides than the last.

If, in this manner, mean proportionals be continually placed between every two terms, the number of terms at last will be made so great, as also the number of the sides of the polygon, as to be greater than any given number, or to be infinite; and every side of the polygon so increased, as to become less than any given right line; and consequently the polygon will be changed into a curve-lined figure; for any curve-lined figure may be conceived as a polygon, whose sides are infinitely small and infinite in number. A curve described after this manner is called logarithmic.

It is manifest from this description of the logarithmic curve, that all numbers at equal distances are continually,
LOG [ 188 ] LOG

Logarithmic Lines. For many mechanical purposes it is convenient to have the logarithms of numbers laid down on scales, as well as the logarithmic lines and tangents; by which means, computations may be carried on by mere menurilation with companies. Lines of this kind are always put on the common Gunter's scale; but as these instriments must be extended to a very great length, in order to contain any considerable quantity of numbers, it becomes an object of importance to shorten them. Such an improvement has been made by Mr William Nicholson, and published in the 77th volume of the Philosophical Transactions. The principles on which the construction of his instruments depends are as follow:

1. If two geometrical series of numbers, having the same common ratio, be placed in order with the terms opposite to each other, the ratio between any term in one series and its opposite in the other will be constant: Thus,

\[
\begin{align*}
2 & : 6 : 18 : 54 : 162, & c. \\
\end{align*}
\]

Then,

\[
\begin{align*}
\end{align*}
\]

where it is evident, that each of the terms in the upper series is exactly two-thirds of the corresponding one in the lower.

2. The ratio of any two terms in one series will be the same with that between those which have an equal distance in the other.

3. In all such geometrical series as have the same ratio, the property abovementioned takes place, tho' we compare the terms of any series with those of another: Thus,

\[
\begin{align*}
2 & : 4 : 8 : 16 : 32 : 64, & c. \\
3 & : 6 : 12 : 24 : 48 : 96, & c. \\
4 & : 8 : 16 : 32 : 64 : 128, & c. \\
5 & : 10 : 20 : 40 : 80 : 160, & c. \\
\end{align*}
\]

where it is plain that 2, 3, 4, 5; also 2, 4, 8, and 2, 4, 8, 16; &c. have the same ratio with that of each series.

4. If the differences of the logarithms of the numbers be laid in order upon equidistant parallel right lines, in such a manner that a right line drawn across whole shall intersect it at divisons denoting numbers of geometrical progression; then, from the condition of the arrangement, and the property of this logarithmic line, it follows, 1st. That every right line to drawn will, by its intersections, indicate a geometrical series of numbers; 2dly. That such series as are indicated by these right lines will have the same common ratio; and, 3dly. That the series thus indicated by two parallel right lines, supposing to move laterally, without changing either their mutual distance or parallelism to themselves, will have each the same ratio, and in all series indicated by such two lines, the ratio between an antecedent and consequent, the former taken upon one line, and the latter upon another, will be also the same. The 2d proposition is proved in the fol. Pltate bowing manner. Let the lines A B, C D, E F, represent the parts of the logarithmic line arranged according to the proportion already mentioned; and let GH be a right line passing through the points c, c, c, denoting numbers in geometrical progression; then will any other line IK, drawn across the arrangement, likewise pass through three points f, d, b, in geometrical progression.

From one of the points of intersection F in the last mentioned line IK, draw the line f g parallel to GH, and intersecting the arrangement in the points f, b; and the ratios of the numbers c, f, c, i, will be equal, as well as a, b; because the intervals on the logarithmic line, or differences of the logarithms of those numbers, are equal. Again, the point F, the line i d, and the line b b, are in arithmetical progression denoting the differences between the logarithms of the numbers themselves, whence the quotients of the numbers are in geometrical progression.

The 3d proposition arises from the parallelism of the lines to their former situation; by which means they indicate numbers in a geometrical series, having the same common ratio as before; their distance on the logarithmic line also remains unchanged; whence the differences between the logarithms of the opposite numbers, and of consequence their ratios, will always be constant.

Supposing now an antecedent and consequent to be given in any geometrical series, it will always be possible to find them, provided the line be of unlimited length. Drawing two parallel lines, then, through each of the numbers, and supposing the lines to move without changing their direction or parallel situation, they will continually describe new antecedents and consequents in the same geometrical series as before.

6. Though the logarithmic line contain no greater range of numbers than from 1 to 10, it will not be found necessary for the purposes of computation to repeat it. The only thing requisite is to have a slide or beam with two fixed points at the distance of the interval between 1 and 10, and a moveable point be made to range between them always to indicate the antecedent; then, if the consequent fixed point fall without the rule, the other fixed point will always denote the division on which it would have fallen had the rule been prolonged; and this contrivance may easily be adapted to any arrangement of parallel lines whatever. The arrangement of right lines, however, ought always to be disposed in such a manner as to occupy a
LOGIC is the art of thinking and reasoning justly; or, it may be defined the science or history of the human mind, inasmuch as it traces the progress of our knowledge from our first and most simple conceptions through all their different combinations, and all those numerous deductions that result from variously comparing them one with another.

The precise business of logic therefore is, to explain the nature of the human mind, and the proper manner of conducting its several powers, in order to the attainment of truth and knowledge. It lays open those errors and mistakes we are apt, through inattention, to run into; and teaches us how to distinguish between truth, and what only carries the appearance of it. By these means we grow acquainted with the nature and force of the understanding; see what things lie within its reach;
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PART I. OF PERCEPTION.

We find ourselves surrounded with a variety of objects, which acting differently upon our senses, convey distinct impressions into the mind, and thereby rouse the attention and notice of the understanding. By reflecting too on what passes within us, we become sensible of the operations of our own minds, and attend to them as a new set of impressions. But in all this there is only bare consciousness. The mind, without proceeding any farther, takes notice of the impressions that are made upon it, and views things in order, as they present themselves one after another. This attention of the understanding to the object acting upon it, whereby it becomes sensible of the impressions they make, is called by logicians perception and the notices themselves, as they still in the mind, and are there treasured up to be the materials of thinking and knowledge, are distinguished by the name of ideas. In the article Metaphysics it shall be shown at large, how the mind, being furnished with ideas, contrives to diversify and enlarge its stock: we have here chiefly to consider the means of making known our thoughts to others; that we may not only understand how knowledge is acquired, but also in what manner it may be communicated with the greatest certainty and advantage.

CHAP. I. Of Words, considered as the Signs of our Ideas.

I. Our ideas, though manifold and various, are nevertheless all within our own breasts, invisible to others, nor can of themselves be made appear. But God, designing us for society, and to have fellowship with those of our kind, has provided us with organs fitted to frame articulate sounds, and given us also a capacity of using those sounds as signs of internal conceptions. Hence spring words and language: for, having once pitched upon any found to stand as the mark of an idea in the mind, custom by degrees establishes such a connection between them, that the appearance of the idea in the understanding always brings to our remembrance the found or name by which it is expressed; as in like manner the hearing of the found never fails to excite the idea for which it is made to stand. And thus it is easy to conceive how a man may record his own thoughts, and bring them again into view in any succeeding period of life. For this connection being once fet:ted, as the same sounds will always serve to excite the same ideas; if he can but contrive to register his words in the order and disposition in which the present train of his thoughts present themselves to his imagination, it is evident he will be able to recall these thoughts at pleasure, and that too in the very manner of their first appearance. Accordingly we find, that the inventions of writing and printing, by enabling us to fix and perpetuate such perishable things as sounds, have also furnished us with the means of giving a kind of permanency to the tran:formations of the mind, infomuch that they may be in the same manner subjected to our review as any other objects of nature.

II. But, besides the ability of recording our own thoughts, there is this farther advantage in the use of and, of the external signs, that they enable us to communicate mutual information of what passes in their breasts. For any number of men, having agreed to establish the same sounds as signs of the same ideas, it is apparent that the repetition of these sounds must excite the like perceptions in each, and create a perfect correspondence of thoughts. When, for instance, any train of ideas succeed one another in my mind, if the names by which I cannot express them have been annexed by those with whom I converse to the very same set of ideas, nothing is more evident, than that, by repeating those names according to the tenor of my present conceptions, I shall raise in their minds the same course of thought as has taken possession of my own. For by merely attending to what passes within themselves upon hearing the sounds which I repeat, they will also become acquainted with the ideas in my understanding, and have them in a manner laid before their view. So that we hereby clearly perceive how a man may communicate his sentiments, knowledge, and discoveries to others, if the language in which he converses, be extensive enough to mark all the ideas and transformations of his mind. But as this is not always the case, and men are often obliged to invent terms of their own to express new views and conceptions of things: it may be asked, how in these circumstances we can become acquainted with the thoughts of another, when he makes use of words, to which we have never annexed any ideas, and that of course can raise no perceptions in our minds? In order to unveil this mystery, and give some light into the foundation, growth, and improvement of language, the following observations will be found of considerable moment.

III. First, that no word can be to any man the sign of an idea, till that idea comes to have a real existence in his mind. For names, being only so far intelligible as they denote known internal conceptions, where they have none such to answer them, there they are plainly founds without significations, and of words, or names, or any denomination are the ideas to which they belong raised in the understanding, than, finding it easy to connect them with the established names, we can join in any agreement of this kind made by others, and thereby enjoy the benefit of their discoveries. The first thing therefore to be considered is, how these ideas may be conveyed into the mind; that being there, we may learn to con-
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LOGIC.

The names of objects, the only channel of sensation of ideas, and marking the order and manner in which the ideas are made have already got admittance into the understanding, and the names by which they are known are sufficiently known to him. Thus, were any one to ask the meaning of the word "apple," we should tell him it stood for the same idea as "drole" in Latin, or "blanc" in French; or, if we thought him a stranger to these languages, we might appeal to an object producing the idea, by saying it denoted the colour we observe in snow or milk. But this is by no means a definition of the word, exciting a new idea in his understanding; but merely a contrivance to remind him of a known idea, and teach him its connection with the established name. For if the ideas after which he inquires have never yet been raised in his mind; as suppose one who had seen no other colours than black and white, should ask the meaning of the word "fauteuil;" it is easy to perceive, that it would be no more possible to make him comprehend it by words, or a definition, than to introduce the same perception into the imagination of a man born blind. The only method in this case is, to present some object, by looking at which the perception itself may be excited; and thus he will learn both the name and the idea together.

V. But how comes it to pass that men agree in the name of their simple ideas, seeing they cannot view the perceptions in one another's minds, nor make known these perceptions by words to others? The effect is produced by experience and observation. Thus finding, for instance, that the name of "heat" is annexed to the sensation which men feel when they approach the fire, I make it also the sign of the sensation excited in me by such an approach, nor have any doubt but it denotes the same perception in my mind as in theirs. For we are naturally led to imagine, that the same objects operate alike upon the organs of the human body, and produce an uniformity of sensation. No man imagines, that the idea raised in him by the taste of sugar, and which he calls "sweetness," differs from that excited in another by the like means; or that "vermilion," to whose relish he has given the epithet "bitter," produces in another the sensation which he denotes by the word "fauteuil." Presuming therefore upon this conformity of perceptions, when they arise from the same objects, we easily agree as to the names of our simple ideas: and if at any time, by a more narrow scrutiny into things, new ideas of this class come in our way, which we choose to express by terms of our own invention; these names are explained, not by a definition, but by referring to the objects whence the ideas themselves may be obtained.

VI. Being in this manner furnished with simple ideas, and the names by which they are expressed; the meaning of terms that stand for complex ideas is easily got, because the ideas themselves answering to these terms may be conveyed into the mind by definitions. For our complex notions are only certain combinations of simple ideas. When therefore these are enumerated, and the manner in which they are united into one conception explained, nothing more is wanting to raise that conception in the understanding; and thus the term denoting it comes of course to be understood. And here it is worth while to reflect a little upon the wise contrivance of nature, in thus furnishing us with the very aptest means of communicating our thoughts. For were it not so ordered, that,

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that we could thus convey our complex ideas from one to another by definitions, it would in many cases be impossible to make them known at all. This is apparent in those ideas which are the proper work of the mind. For as they exist only in the understandings, and have no real objects in nature in conformity with which they are framed, if we could not make them known by description, they must lie for ever hid within our own breasts, and be confined to the narrow acquaintance of a single mind. All the fine scenes that arise from time to time in the poet's fancy, and by his lively painting give such entertainment to his readers; were he destitute of this faculty of laying them open to the view of others by words and description, could not extend their influence beyond his own imagination, or give joy to any but the original inventor.

VII. There is this further advantage in the ability we enjoy of communicating our complex notions by definitions; that as these make by far the largest classes of our ideas, and most frequently occur in the progress and improvement of knowledge, so they are by these means imparted with the greatest readiness, than which nothing would tend more to the increase and spreading of science; for a definition is soon perused; and if the terms of it are well understood, the idea itself finds an easy admission into the mind. Whereas in simple perceptions, where we are referred to the objects producing them, if these cannot be come at, as is sometimes the case, the names by which they are expressed must remain empty sounds. But new ideas of this class occurring very rarely in the sciences, they seldom create any great obfuscation. It is otherwise with our complex notions; for every step we take leading us into new combinations and views of things, it becomes necessary to explain these to others, before they can be made acquainted with our discoveries; and as the manner of definitions is easy, requiring no apparatus but that of words, which are always ready, and at hand; hence we can with the less difficulty remove such obstacles as might arise from terms of our own invention, when they are made to stand for new complex ideas suggested to the mind by some preexistent train of thinking. And thus at least we are let into the mystery hinted at in the beginning of this chapter, viz. how we may become acquainted with the thoughts of another, when he makes use of words to which we have as yet joined no ideas. The answer is obvious from what has been already said. If the terms denote simple perceptions, he must refer us to these objects of nature whence the perceptions themselves are to be obtained; but, if they stand for complex ideas, their meaning may be explained by a definition.

CHAP. II. OF DEFINITIONS.

I. A Definition is the unfolding of some conception of the mind, answering to the word or term made use of as the sign of it. Now as, in exhibiting any idea to another, it is necessary that the description be such as may excite that precise idea in his mind; hence it is plain that definitions, properly speaking, are not arbitrary, but confined to the representation of certain determinate settled notions, such as are annexed by the speaker or writer to the words he uses. As never-
be connected with any term, according to the good pleasure of him that uses it; in like manner may different descriptions be applied to the term, suitable to the ideas so connected. But this connection being settled, and the term considered as the sign of some fixed idea in the understanding, we are no longer left to arbitrary explications, but must study such a description as corresponds with that precise idea. Now this alone, according to what has been before laid down, ought to be accounted a definition. What seems to have occasioned no small confusion in this matter, is, that many explanations of words, where no idea is unfolded, but merely the connection between some word and idea asserted, have yet been dignified with the name of definitions. Thus, when we say that a clock is an instrument by which we measure time; that is by some called a definition; and yet it is plain that we are beforehand supposed to have an idea of this instrument, and only taught that the word clock serves in common language to denote that idea. By this rule all explications of words in our dictionaries will be definitions, nay, the names of even simple ideas may be thus defined. White, we may say, is the color we observe in snow or milk; heat the sensation produced by approaching the fire; and so in innumerable other instances. But these, and all others of the like kind, are by no means definitions, exciting new ideas, in the understanding, but merely contributions to remind us of known ideas, and teach their connection with the established names.

V. But now in definitions properly so called, we first consider the term we use, as the sign of some inward conception, either annexed to it by custom, or our own free choice; and then the business of the definition is to unfold and explicate that idea. As therefore the whole art lies in giving just and true copies of our ideas; a definition is then said to be made perfect, when it serves distinctly to excite the idea described in the mind of another, even supposing him before wholly unacquainted with it. This point decided, we next inquire what ideas are which are capable of being thus unfolded? And in the first place it is evident, that all our simple ideas are necessarily included. We have seen already that experience alone is to be consulted here, inasmuch that if either the objects whence they are derived come not in our way, or the avenues appointed by nature for their reception, are wanting, no description is sufficient to convey them into the mind. But where the understanding is already supplied with these original and primitive conceptions, as they may be united together in an infinity of different forms, so may all their several combinations be distinctly laid open, by enumerating the simple ideas contained in the various collections, and tracing the order and manner in which they are related one to another. Now these combinations of simple notices constitute what we call our complex notions; whence it is evident, that complex ideas, and these alone, admit of that kind of description which goes by the name of a definition.

VI. Definitions, then, are pictures or representations of our ideas; and as these representations are then only possible when the ideas themselves are complex, it is obvious to remark, that definitions cannot have place but where we make use of terms standing for such complex ideas. But our complex ideas, being as we have said, nothing more than different combinations of simple ideas; we then know and comprehend them perfectly, when we know the several simple ideas of which they consist, and can so put them together in our minds as may be necessary towards the framing of that peculiar connection which gives every idea its distinct and proper appearance.

VII. Two things are therefore required in every definition: first, That all the original ideas, out of which the complex one is formed, be distinctly enumerated; and, secondly, That the order and manner of combining them into one conception be clearly explained. Where a definition has these requisites, nothing is wanting to its perfection; because every one who reads it and understands the terms, feeling at once their combinations, can at pleasure form in his own mind the complex conception answering to the term defined. Let us, for instance, suppose the word square to stand for that idea by which we represent to ourselves a figure whose sides subtend quadrants of a circumscribed circle. The parts of this idea are the sides bounding the figure. These must be four in number, and all equal among themselves, because they are each to subtend a fourth part of the fame circle. But, besides these component parts, we must also take notice of the manner of putting them together. If we should exhibit the precise idea from which the word square here stands for four equal right lines, any how joined, will not subtend quadrants of a circumscribed circle. A figure with this property must have its sides standing also at right angles. Taking in therefore this last consideration respecting the manner of combining the parts, the idea is fully described, and the definition thereof rendered complete. For a figure bounded by four equal sides, joined together at right angles, has the property required; and is moreover the only right lined figure to which that property belongs.

VIII. It will now be obvious to every one, in what manner we ought to proceed, in order to arrive at just and adequate definitions. First, we are to take an exact view of the idea to be described, trace it to its original principles, and mark the several simple perceptions that enter into the composition of it. Secondly, we are to consider the particular manner in which these elementary ideas are combined, in order to the forming of that precise conception for which the term we make use of stands. When this is done, and the idea wholly unraveled, we have nothing more to do than fairly transcribe the appearance it makes to our own minds. Such a description, by distinctly exhibiting the order and number of our primitive conceptions, cannot fail to excite at the same time in the mind of every one that reads it, the complex idea resulting from them; and therefore attains the true and proper end of a definition.

Chap. II. Of the Composition and Resolutions of our Ideas, and the Rule of Definition thereupon arising.

I. The rule laid down in the foregoing chapter is general; extending to all possible cases: and is indeed that to which alone we can have recourse, where any doubt
though or difficulty arises. It is not, however, necessary
that we should practice it in every particular instance.
Many of our ideas are extremely complicated, infor
much that to enumerate all the simple perceptions out
of which they are formed, would be a very troublesome
and tedious work. For this reason logicians have eshablished certain compendious rules of defining,
of which it may not be amiss here to give some ac
count. But in order to the better understanding of
what follows, it will be necessary to observe, that
there is a certain gradation in the composition of our
ideas. The mind of man is very limited in its views,
and cannot take in a great number of objects at once.
We are therefore taught to proceed by steps, and make
our first advances subordinating to those which follow.
Thus, in forming our complex notions, we begin at
first with but a few simple ideas, such as we can man
age with ease, and unite them together into one con
ception. When we are provided with a sufficient
stock of these, and have by habit and use rendered
them familiar to our minds, they become the com
ponent parts of other ideas still more complicated, and
form what we may call a second order of compound
notions. This process, as is evident, may be con
tinued to any degree of composition we please, mount
ning from one stage to another, and enlarging the num
ber of combinations.

II. But now in a series of this kind, whoever would
equal himself perfectly with the last and highest
order of ideas, finds it much the most expeditious meth
od to proceed gradually through all the interme
diate steps. For, were he to take any very compound
idea to pieces, and, without regard to the several
classes of simple perceptions that have already been for
med into different combinations, break it at once into its
original principles the number, would be too great as per
fectly to confound the imagination; and overcome the
utmost reach and capacity of the mind. When we see
a prodigious multitude of men jumbled together in
crowds, without order or any regular position, we find
it impossible to arrive at an exact knowledge of their
number. But if they are formed into separate batta
lions, and so flattened as to fall within the leisure
survey of the eye; by viewing them successively and in
order, we come to an easy and certain deter
mination. It is the same in our complex ideas. When
the original perceptions, out of which they are framed,
are very numerous, it is not enough that we take a
view of them in loose and scattered bodies; we must
form them into distinct classes, and unite these classes
in a just and orderly manner, before we can arrive at a
true knowledge of the compound notions resulting
from them.

III. This gradual progress of the mind to its com
pound notions, through a variety of intermediate steps
plainly points out the manner of conducting the de
nitions by which these notions are conveyed into the
minds of others. For as the series begins with simple
and easy combinations, and advances through a for
cession of different orders, rising one above another in
the degree of composition, it is evident, that, in a train of
definitions expressing these ideas, a like gradation is to be observed. Thus the complex ideas of the
lowest order can no otherwise be described than by enumerating the simple ideas out of which they are made, and explaining the manner of their union. But

then in the second, or any other succeeding order, as
they are formed out of those gradual combinations,
and constitute the inferior classes, it is not necessary,
in describing them to mention one by one all the sim
ple ideas of which they consist. They may be more dif
tinctly and briefly unfolded, by enumerating the
compound ideas of a lower order, from whose union
they result, and which are all supposed to be already
known in conformance of previous definitions. Here
then it is that the logical method of defining takes
place; which, that it may be the better understood,
we shall explain somewhat more particularly the sev
eral steps and gradations of the mind in compound
ing its ideas, and hence deduce that peculiar form of
a definition which logicians have thought fit to es	ablish.

IV. All the ideas we receive from the several ob
jects of nature that surround us, represent distinct in
dividuals. These individuals, when compared to
gether, are found in certain particulars to resemble each
other. Hence, by collecting the resembling particulars
into one conception, we form the notion of a species,
general to these ideas. And here let it be observed, that this last idea is less complicated than that by which we represent any of the particular objects contained under it. For the idea of the species excludes the peculiarities of the several
individuals, and retains only such properties as are
common to them all. Again, by comparing several
species together, and observing their resemblance, we
form the idea of a genus; where, in the same manner
as before, the composition is lightened, because we
leave out what is peculiar to the several species com
pared, and retain only the particulars wherein they
agree. It is easy to conceive the mind proceeding
thus from one step to another and advancing through
its several classes of general notions, until at last it
comes to the highest genus of all, denoted by the word
being, where the bare idea of existence is only con
cerned.

V. In this procedure we see the mind unravelling
the complex idea, and tracing in the ascending scale, dust of the
from greater or less degrees of composition, until it mind in
terminates in one simple perception. If now we take
the species the contrary way, and, beginning with the
lowest or highest genus, carry our view downwards
advances through all the inferior genera and species, quite to the
the individuals, we shall thereby arrive at a distinct and
different apprehension of the conduct of the understanding in orders of
compound ideas. For in the several classes of
our preceptions, the highest in the scale is for the
most part made up of but a few simple ideas, such as
the mind can take in at a time with ease. This first
general notion, when branched out into the different
subdivisions contained under it, has in every one of
them something peculiar, by which they are dis	in
guished among themselves; insomuch that, in de
scending from the genus to the species, we always
superadd some new idea, and thereby increase the
degree of composition. Thus the idea denoted by
the word figure is of a very general nature, and compo
sed of but few simple perceptions, as implying no
more than space every where bounded. But if we
descend farther, and consider the boundaries of this
space, as that they may be either lines or surfaces, we
fall into the several species of figure. For where the
space is bounded by one or more surfaces, we give the
name
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name of a solid figure; but where the boundaries are lines, it is called a plain figure (a).

VI. In this view of things it is evident, that the species is formed by superadding a new idea to the genus. Here, for instance, the genus is circumscribed space. If now to this we superadd the idea of a circumscription by lines, we frame the notion of that species of figures which are called plural; but if we conceive the circumscriptio to be by surfaces, we have the species of solid figures. This superadded idea is called the specific difference, not only as it serves to divide the species from the genus, but because, being different in all the several subdivisions, we thereby also distinguish the species one from another. And as it is likewise that conception, which, by being joined to the general idea, completes the notion of the species; hence it is plain, that the genus and specific difference are to be considered as the proper and constitutional parts of the species. If we trace the progress of the mind still farther, and consider it advancing through the inferior species, we shall find its manner of proceeding to be always the same. For every lower

(a) This account of the composition and resolution of our ideas is agreeable to the common doctrine of logicians on the subject. Into the truth of the doctrine itself we shall inquire afterwards under the article METAPHYSICS: but to prevent mistakes, it may be proper to observe here, that though every writer of logic has treated largely of general and specific ideas, there is in reality nothing general in the matter but the terms of language. When we utter, for instance, the word triangle, that general term does not, as has been often said, suggest to the mind the general idea of a triangle, which is neither obtuse nor rectilinear, neither equilateral nor scalene, &c., for such a triangle, as it cannot exist in nature, cannot be conceived in idea. In like manner, the general term virtue does not excite a general idea of virtue, which is neither prudence, nor temperance, nor fortitude, nor justice, nor charity, &c., for that which is difficult from all these is not virtue. What then is the import of such general terms? The answer is obvious: They denote certain objects, and are never used without some word of limitation, but when something that has no dependence upon the particular qualities, which distinguish the individuals from each other, is affirmed or denied of the whole class. Thus we may affirm, that the three angles of a plane triangle are equal to two right angles; and this proposition is demonstrably true, not of a triangle, which is neither obtuse nor rectilinear, neither equilateral nor scalene, for such a triangle never was conceived; but of all those triangles equally, as the truth of the proposition and the progress of the demonstration has no dependence upon the peculiarities which distinguish these triangles from one another. Again, when we say that a man of virtue will be rewarded by God, we do not mean by the word virtue a general idea making part of each of the complex and more particular ideas of prudence, fortitude, justice, &c., and at the same time different from them all; but we affirm, that the man who practices any or all of these virtues, according as he has opportunity, will be rewarded by God.

The history of our ideas is shortly this:—That act of the mind, if it may be called an act, which makes known an external object, is termed perception. That act of the mind which makes known an internal object, is termed consciousness. Objects once perceived may be recalled to the mind by the power of memory; and when they are so recalled, we have a perception of them in all respects similar to the original perception, only less defined: we fancy ourselves in the same place, and the object perceived attended by the same circumstances. This indistinct, secondary perception of an object is termed an idea; and therefore the precise and accurate definition of an idea, in contradistinction to an original perception, is "that perception of a real object which is raised in the mind by the power of memory." Now all our original perceptions being of particular objects, it is obvious that our ideas, which are only those perceptions recalled, must be of particular objects likewise, and that no man can have an idea of a thing of which the real existence is contradictory and impossible. But the general and specific ideas of logicians, are ideas of nothing which exists, or which can possibly exist. They are acquired, we are told, by abstraction, in the following manner. Among a number of individuals we perceive certain qualities the same in all, whilst in each individual there are other qualities which have nothing similar to them in any other individual: now the mind, it is said, has a power of abstracting the particular qualities of each individual from those which are common to the whole, and of these last forming a general idea of the whole class. Thus all men have nearly the same form; and they have each some stature and some colour, though there are not perhaps two individuals who have precisely the same stature and the same colour. Now, say the advocates for general ideas, if we abstract what is peculiar to each individual, and retain what is common to the whole race, we have the general idea signified by the word man. That is, if we conceive a being in human shape, which is of stature and colour, but neither tall nor short, neither white nor black, nor red nor brown, nor any other colour which we ever saw, we have the general idea of humanity, and understand the meaning of the word man! Surely no person who is not the slave of prejudice will pretend that he can frame such an idea as this—the idea of an object which cannot possibly exist in nature.

By this we do not mean to affirm, that we cannot frame ideas of such objects as have no real existence; for it is as easy to imagine a man with ten heads as with one, because there is nothing contradictory between ten heads and one body. But figure, which is said to be space bounded neither by lines nor figures: colour, which is neither red nor white, nor blue nor black, &c.; and animal, which is neither man, beast, bird, nor insect, are impossible in nature, and inconceivable in idea. There is, however, no harm in still retaining the phrase general idea, provided he who uses it takes care to let it be known, that by these words he means not any abstract and contradictory idea, but merely a class of real objects. The phrase may at times pretend much circumference; for which reason we have retained the use of it in the text.
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And in all the inferior species, by superadding the specific difference to the nearest genus, the species is formed by superadding some new idea to the species next above it; infomuch that in this descending scale of our perceptions, the understanding passes through different orders of complex notions, which become more and more complicated at every step it takes. Let us return here, for instance, the species of plain figures. They imply no more than space bounded by lines. But if we take in an additional consideration of the nature of these lines, as whether they are right or curves, we fall into the subdivisions of plain figure, distinguished by the names of rectilinear, curvilinear, and mixtilinear.

VII. And here we are to observe, that though plain figures, when considered as one of those branches that come under the notion of figure in general, take the name of a species; yet compared with the classes of curvilinear, rectilinear, and mixtilinear, into which they themselves may be divided, they really become a genus, of which the before mentioned subdivisions constitute the several species. These species, in the same manner as in the case of plain and solid figures, confit of the genus and specific difference as their constituent parts. For in the curvilinear kind, the curvature of the lines bounding the figure makes what is called the specific difference; to which if we join the genus, which here is a plain figure or space circumfered by lines, we have all that is necessary towards completing the notion of this species. We are only to take notice, that this last subdivision, having two genera above it, viz. plain figure, and figure in general: the genus joined with the specific difference, in order to constitute the species of curvilinears, is that which lies nearest to the said species. It is the notion of plain figure, and not of figure in general, that, joined with the idea of curvity, makes up the complex conception of curve-lined figures. For in this descending scale of our ideas, figure in general, plain figures, curve-lined figures, the two first are considered as general in respect of the third; and the second in order, or that which stands next to the third, is called the nearest genus. But now as it is this second idea, which, joined with the notion of curvity, forms the species of curve-lined figures; it is plain, that the third or last idea in the series is made up of the nearest genus and specific difference. This rule holds invariably, however far the series is continued; because, in a train of ideas thus succeeding one another, all that precede the last are considered as so many genera in respect of that last; and the last itself is always formed by superadding the specific difference to the genus next it.

VIII. Here then we have an universal description, applicable to all our ideas of whatever kind, from the highest genus to the lowest species. For taking them, in order downwards from the said general idea, they every where consist of the genus proximum, and differentia specifica, as logicians love to express themselves. But when we come to the lowest species of all, comprehending under it only individuals, the superadded idea, by which these individuals are distinguished one from another, no longer takes the name of the specific difference. For here it serves not to denote distinct species, but merely a variety of individuals, each of which, having a particular existence of its own, is therefore numerically different from every other of the same kind. And hence it is, that in this last case, logicians choose to call the superadded idea by the name of numerical difference; infomuch that, as the idea of a species is made up of the nearest genus and specific difference, so the idea of an individual consists of the lowest species and numerical difference. Thus the circle is a species of curve-lined figures, and what we call the lowest species, as comprehending under it only individuals. Circles in particular are distinguished from one another by the length and position of their diameters. The length therefore and position of the diameter of a circle form what logicians call the numerical difference; because, these being given, the circle itself may be described, and an individual thereby constituted.

IX. Thus the mind, in compounding its ideas, begins, we see, with the most general notions, which, consisting of but a few simple notices, are easily combined and brought together into one conception. Thence it proceeds to the species comprehended under this general idea, and these are formed by joining together the genus and specific difference. And as it often happens, that these species may be still further subdivided, and run on in a long series of continued gradations, producing various orders of compound perceptions; so all these several orders are regularly and successively formed by annexing in every step the specific difference to the nearest genus. When by this method of procedure we are come to the lowest order of all, by joining the species and numerical difference, we frame the ideas of individuals. And here the series necessarily terminates, because it is impossible any farther to bound or limit our conceptions. This view of the composition of our ideas, representing their constituent parts in every step of the progression, naturally points out the true and genuine form of a definition. For as definitions are no more than descriptions of the ideas for which the terms defined stand; and as ideas are then described, when we enumerate definitions of individuals, the parts of which they consist; it is, that by making our definitions follow one another according to the natural train of our conceptions, they will be subject to the same rules, and keep pace with the ideas they describe.

X. As therefore the first order of our compound notions, or the ideas that constitute the highest genus in the different scales of perception, are formed by uniting together a certain number of simple notices; so to the terms expressing these genera are defined by enumerating the simple notices so combined. And as the species comprehended under any genus, or the complex ideas of the second order, arise from superadding the specific difference to the said general idea; so the definition of the names of the species is abridged, in a detail of the ideas of the specific difference, connected with the term of the genus. For the genus having been before defined, the term by which it is expressed stands for a known idea, and may therefore be introduced into all subsequent definitions, in the same manner as the names of simple perceptions. It will now be sufficiently obvious, that the definitions of all the succeeding orders of compound notions will every where consist of the term of the nearest genus, joined with an enumeration of the ideas that constitute the specific...
of a definition, in all the various orders of conception. This is that method of defining which is commonly called logical, and which we see is perfect in its kind, inasmuch as it presents a full and adequate description of the idea for which the term defined stands.

Part II. OF JUDGEMENT.

CHAP. I. Of the grounds of Human Judgement.

The mind being furnished with ideas, its next step in the way to knowledge is, the comparing these ideas together in order to judge of their agreement or disagreement. In this joint view of our ideas, if the relation is such as to be immediately discoverable by the bare inspection of the mind, the judgments hence obtained are called intuitive, from a word that denotes to look at; for in this case, a mere attention to the ideas compared suffices to let us see how far they are connected or disjointed. Thus, that the whole is greater than any of its parts, is an intuitive judgment; nothing more being required to convince us of its truth, than an attention to the ideas of whole and part. And this too is the reason why we call the act of the mind forming these judgments intuition; as it is indeed no more than an immediate perception of the agreement or disagreement of any two ideas.

II. But here it is to be observed, that our knowledge of this kind respects only our ideas, and the relations between them; and therefore can serve only as a foundation to such reasonings as are employed in investigating these relations. Now it so happens, that many of our judgments are conversant about facts, and the real existence of things, which cannot be traced by the bare contemplation of our ideas. It does not follow, because I have the idea of a circle in my mind, that therefore a figure answering to that idea has a real existence in nature. I can form to myself the notion of a certain golden mountain, but never imagine on that account that either of them exists. What then are the grounds of our judgement in relation to facts? experience and testimony. By experience we are informed of the existence of the several objects which surround us, and operate upon our senses. Testimony is of a wider extent, and reaches not only to objects beyond the present sphere of our observation, but also to facts and transactions, which belong to the past, and having no longer any existence, could not without this conveyance have fallen under our cognizance.

III. Here we have three foundations of human judgment, from which the whole system of our knowledge may with ease and advantage be derived. First, intuition, which respects our ideas themselves, and their relations; and is the foundation of that species of reasoning which we call demonstration. For 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. Hence the knowledge obtained in this manner is what we properly term certain; because in every 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 relation 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 unchangeably; because the relation of equality being attached to the ideas themselves, must ever intervene where the same ideas are compared. Of this nature are all the truths of natural religion, morality, and mathematics, and in general whatever may be gathered from the bare view and consideration of our ideas.

IV. The second ground of human judgment is experience; from which we infer the existence of those subjects 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 perceptions 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 we are wholly unacquainted with the internal structure and constitution of the bodies that produce these sensations in us, 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. Not that we ever suppose the qualities of bodies to be things of the same nature with our perceptions; for there is nothing in fire similar to our sensation of heat, or in a sword similar to pain; but that when different bodies excite in our minds similar perceptions, we necessarily ascribe to these bodies not only an existence independent of us, but likewise similar qualities, of which it is the nature to produce similar perceptions in the human mind. But this is not the only advantage derived from experience; for to that too are we indebted for all our knowledge regarding the coexistence 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 the ideas are not necessarily contained, but;
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 intermingle between the corpuscles of gold, and thereby loosen and shake them affunder. If this is a true account of the matter, 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. It was not from any previous knowledge of the intimate structure of *aqua regia* and gold, and the aptness of their parts to act or to be acted upon, that we came by the conclusion above-mentioned. The internal conformation of bodies is in a manner wholly unknown to us; and could we even surmount this difficulty, yet as the separation of the parts of gold implies something like an active force in the *menstruum*, and we are unable to conceive how it comes to be possefied of this activity, the effect must be owned to be altogether beyond our comprehension. But when repeated trials had once confirmed it, in much that it was admitted as an established truth in natural knowledge, it was then easy for men to spin out theories of their own invention, and contrive such a structure of parts, both for gold and *aqua regia*, as would best serve to explain the phenomenon upon the principles of that system of philosophy they had adopted.

V. From what has been said it is evident, that as intuition is the foundation of what we call *scientifical knowledge*, so is experience of *natural*. For this last being wholly taken up with objects of sense, or those bodies that constitute the natural world; and their properties, as far as we can discover them being to be traced only by a long and painful series of observations; it is apparent, that, in order to improve this branch of knowledge, we must betake ourselves to the method of trial and experiment.

VI. But though experience is what we may term the immediate foundation of natural knowledge, yet with respect to particular persons its influence is very narrow and confined. The bodies that surround us are numerous, many of them lie at a great distance, and some quite beyond our reach. Life is so short and so crowded with cares, that but little time is left for any single man to employ himself in unfolding the mysteries of nature. Hence it is necessary to admit many things upon the testimony of others, which by this means becomes the foundation of a great part of our knowledge of body. No man doubts of the power of *aqua regia* to dissolve gold, though perhaps he never himself made the experiment. In these therefore and such like cases we judge of the facts and operations of nature upon the mere ground of testimony. However, as we can always have recourse to experience where any doubt or scruple arises, this is justly considered as the true foundation of natural philosophy; being indeed the ultimate support upon which our afferent relies, and whereto we appeal when the highest degree of evidence is required.

VII. But there are many facts that will not allow of an appeal to the senses; and in this case testimony is the true and only foundation of our judgments.

30. All human actions of whatever kind, when considered as already past, are of the nature here described; because having now no longer any existence, both the facts themselves, and the circumstances attending them, can be known only from the relations of such as had sufficient opportunities of arriving at the truth. *Testimony* therefore is justly accounted a third ground of human judgment; and as we may observe in the other two we have deduced *scientifical* and *natural* knowledge, so we may from this derive *historical*, by which we mean not merely a knowledge of the civil transactions of states and kingdoms, but of all facts whatsoever, where testimony is the ultimate foundation of our belief.

**Part II.**

**CHAP. II. Of Affirmative and Negative Propositions.**

I. While the comparing of our ideas is considered merely as an act of the mind, assembing them together and predicating a relation of known idea to another; the comparing of our judgments are put into words, they then bear the name of *propositions*. A proposition therefore is a sentence expressing some judgment of the mind, whereby two or more ideas are agreed or disagreed. Now, as our judgments include at least two ideas, one of which is affirmed or denied of the other, so must a proposition have terms answering to these ideas. The idea of which we affirm or deny, and of course the term expressing that idea, is called the *subject* of the proposition. The idea affirmed or denied, as also the term answering it, is called the *predicate*. Thus in the proposition, *God is omnipotent*; *God* is the subject, it being of him that we affirm omnipotence; and *omnipotent* is the predicate, because we affirm the idea expressed by that word to belong to God.

II. But as, in propositions, ideas are either joined or disjoined, it is not enough to have terms expressing those ideas, unless we have also some words to denote their agreement or disagreement. That word in a proposition, which connects two ideas together, is called the *copula*; and if a negative particle be annexed, we thereby understand that the ideas are disjoined. *The subjunctive* verb is commonly made use of for the copula: as in the above-mentioned proposition, *God is omnipotent*, where *is* represents the copula, and signifies the agreement of the ideas of God and omnipotence. But if we mean to separate two ideas; then besides the subjunctive verb, we must also use some particle of negation, to express this repugnance. The proposition, *man is not perfect*, may serve as an example of this kind; where the notion of perfection being removed from the idea of *man*, the negative particle *not* is inferred after the copula, to signify the disagreement between the subject and predicate.

III. Every proposition necessarily consists of three parts: but then it is not alike needful that they should be all severally expressed in words because the copula times expressed by a single word.

The negative *not* is often included in the term of the predicate, as when we say, *he is fitting*, in the Latin language, a single word has often the force of a whole sentence. Thus *ambulat* is the same as *est omnium amans*; *ego sum amans*; and so in innumerable
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innumerable other instances: by which it appears, that we are not so much to regard the number of words in a sentence, as the ideas they represent, and the manner in which they are put together. For wherever two ideas are joined or disjoined in an expression, though but of a single word; it is evident that we have a subject, predicate and copula, and of consequence a complete proposition.

IV. When the mind joins two ideas, we call it an affirmative judgment; when it separates them, a negative; and as any two ideas compared together must necessarily either agree or not agree, it is evident that all our judgments fall under these two divisions. Hence likewise the propositions expressing these judgments are all either affirmative or negative. An affirmative proposition connects the predicate with the subject, as a stone is heavy; a negative proposition separates them, as God is not the author of evil. Affirmation therefore is the same as joining two ideas together, and this is done by means of the copula. Negation on the contrary marks a repugnance between the ideas compared; in which case a negative particle must be called in, to show that the connection included in the copula does not take place.

V. Hence we see the reason of the rule commonly laid down by logicians, That, in all negative propositions the negation ought to affect the copula. For as the copula, when placed by itself, between the subject and the predicate, manifestly binds them together; it is evident, that in order to render a proposition negative, the particles of negation must enter it in such a manner as to destroy this union. In a word, then, only are two ideas disjoined in a proposition, when the negative particle may be so referred to the copula, as to break the affirmation included in it, and undo that connection it would otherwise effectually. When we say, for instance, No man is perfect; take away the negation, and the copula of itself plainly unites the ideas in the proposition. But as this is the very reverse of what is intended, a negative mark is added, to show that this union does not take place. The negation, therefore, by destroying the effect of the copula, changes the very nature of the proposition, insomuch that, instead of binding two ideas together, it denotes their separation. On the contrary, in this sentence, The man who departs not from an upright behaviour is beloved of God, the predicate beloved of God is evidently affirmed of the subject an upright man so that notwithstanding the negative particle, the proposition is still affirmative. The reason is plain: the negation here affects not the copula; but, making properly a part of the subject, serves, with other terms in the sentence, to form one complex idea, of which the predicate beloved of God is directly affirmed.

Chapter III. Of Universal and Particular Propositions.

I. The next considerable division of propositions is into universal and particular. Our ideas, according to what has been already observed in the First Part, are all singular as they enter the mind, and represent individual objects. But as by abstraction we can render them universal, so as to comprehend a whole class of things, and sometimes several classes at once; hence the terms expressing these ideas must be in like manner universal. If therefore we suppose any general term to become the subject of a proposition, it is evident, that whatever is affirmed of the abstract idea belonging to that term, may be affirmed of all the individuals to which that idea extends. Thus, when we say, Men are mortal; we consider mortality not as confined to one or any number of particular men, but as what may be affirmed without restriction of the whole species. By this means the proposition becomes as general as the idea which makes the subject of it; and indeed derives its universality entirely from that idea, being more or less so according as this may be extended to more or fewer individuals. But it is further to be observed of these general terms, that they sometimes enter a proposition in their full latitude, as in the example given above; and sometimes appear with a mark of limitation. In this last case we are given to understand, that the predicate agrees not to the whole universal idea, but only to a part of it; as in the proposition, Some men are wise. For here wisdom is not affirmed of every particular man, but restricted to a few of this species.

II. Now from this different appearance of the general idea that constitutes the subject of any judgment, arises the division of propositions into universal and particular. An universal proposition is that where the subject is some general term taken in its full latitude; insomuch that the predicate agrees to all the individuals comprehended under it, if it denotes a proper species; and to all the several species, and their individuals, if it marks an idea of a higher order.

The words all, every, no, none, &c. are the proper signs of this universality; and as they seldom fail to accompany general truths, so they are the most obvious criterion whereby to distinguish them. All animals have a power of beginning motion. This is an universal proposition; as we know from the word all prefixed to the subject animals, which denotes that it must be taken in its full extent. Hence the power of beginning motion may be affirmed of all the several species of animals.

III. A particular proposition has in like manner a more general term for its subject; but with a mark of particular limitation added, to denote, that the predicate agrees only to some of the individuals comprehended under a species, or to one or more of the species belonging to any genus and not the whole universal idea. Thus, Some flowers are heavier than iron: Some men have an uncommon face of prudence. In the last of these propositions, the subject some men implies only a certain number

(a) See the preceding notes, where it is demonstrated that the terms alone, and not the ideas, are in reality general. The term man is equally applicable to every individual of the human race; and therefore, what is affirmed or denied of men in general, is affirmed or denied of all the individuals, without regard to their discriminating qualities. Some is a definite word (see Grammar), which is prefixed to the word men, limits the signification of that general term; and therefore what is affirmed of some men, is affirmed only of part of the race, but that part itself is not ascertained.
Thus soli
dity, a yellow colour, and great weight, are considered as essential qualities of gold; but whether it shall exist as an uniform conjoined mass, is not alike necessary. We see that by a proper menstruum it may be reduced to a fine powder, and that an intense heat will bring it into a state of fusion.

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Hence a considerable diversity in the several qualities of things arises a considerable difference as to the manner of our judging about them. For all such properties as are inseparable from objects when considered as belonging to any genus or species, are affirmed absolutely and without reference of that general idea. Thus we say Gold is very weighty; a stone is hard; Animals have a power of self motion. But in the case of mutual or accidental qualities, as they depend upon some other consideration distinct from the general idea; that also must be taken into the account, in order to form an accurate judgment. Should we affirm, for instance, of some stones, that they are very susceptible of a rolling motion; the proposition, while it remains in this general form, cannot with any advantage be introduced into our reasonings. An aptness to receive that mode of motion flows from the figure of the stone; which, as it may vary infinitely, our judgment then only becomes applicable and determinate, when the particular figure, of which volatility is a consequence, is also taken into the account. Let us then bring in this other consideration, and the proposition will run as follows: Stones of a spherical form are easily put into a rolling motion. Here we see the condition upon which the predicate is affirmed, and therefore know in what particular cases the proposition may be applied.

III. This consideration of propositions respecting the manner in which the predicate is affirmed of the subject gives rise to the division of them into absolute and to the division conditional.

Absolute propositions are those wherein the general form of the subject gives rise to the division of them into absolute and conditional. Absolute propositions are those wherein the form of the subject gives rise to the division of them into absolute and conditional. Absolute propositions are those wherein the form of the subject gives rise to the division of them into absolute and conditional. Absolute propositions are those wherein the form of the subject gives rise to the division of them into absolute and conditional.

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IV. There is not any thing of greater importance in philosophy than a due attention to this division of propositions. If we are careful never to affirm things absolutely but where the ideas are inseparably conjoined, we shall be the less liable to mistake in applying general truths to the particular concerns of human life. It is owing to the exact observance of this rule that mathematicians have been so happy in their discoveries, and that what they demonstrate of magnitude in general may be applied with ease in all obvious occurrences.

V. The truth of it is, particular propositions are then known to be true, when we can trace their connection;
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And reduces them from particulars to generals.

Division of propositions into simple and compound.

The proper notion of a compound proposition.

I. Hitherto we have treated of propositions, where only two ideas are compared together. These are in the general called simple: because, having but one subject and one predicate, they are the effect of a simple judgment that admits of no subdivision. But if it so happens that several ideas offer themselves to our thoughts at once, whereby we are led to affirm the same thing of different objects, or different things of the same object; the propositions expressing these judgments are called compounds: because they may be resolved into as many others as there are subjects or predicates in the whole complex determination on the mind. Thus, God is infinitely wise and infinitely powerful. Here there are two predicates, infinite wisdom and infinite power, both affirmed of the same subject; and accordingly the proposition may be resolved into two others, affirming these predicates severally. In like manner in the proposition, Neither kings nor people are exempt from death: the predicate is denied of all subjects, and may therefore be separated from them in distinct propositions. Nor is it less evident, that if a complex judgment consists of several subjects and predicates, it may be resolved into as many simple propositions as are the number of different ideas compared together. Riches and honours are apt to elate the mind, and increase the number of our desires. In this judgment there are two subjects and two predicates, and it is at the same time apparent that it may be resolved into four distinct propositions. Riches are apt to elate the mind. Riches are apt to increase the number of our desires. And so of honours.

II. Logicians have divided these compound propositions into a great many different classes; but, in our opinion, not with a due regard to their proper definition. Thus conditionals, causals, relatives, &c. are mentioned as so many distinct species of this kind, though in fact they are no more than simple propositions. To give an instance of a conditional; If a stone is exposed to the rays of the sun, it will contrariwise.

III. A copulative proposition is, where the subjects and predicates are so linked together, that they may be all severally affirmed or denied of one another. Of this kind are the examples of compound propositions given above. Riches and honours are apt to elate the mind, and increase the number of our desires. Neither kings nor people are exempt from death. In the first of these the two predicates may be affirmed severally of each subject, whence we have four distinct propositions. The other furnishes an example of the negative kind where the same predicate, being denied of both subjects, may be also denied of them in separate propositions.

IV. The other species of compound propositions are Or disjunctive called disjunctives; in which, comparing several predicates with the same subject; we affirm that one of them necessarily belongs to it, but leave the particular predicate undetermined. If any one, for example, says, This world either exists of itself, or is the work of some all-wise and powerful cause, it is evident that one of the two predicates must belong to the world; but as the proposition determines not which, it is therefore of the kind we call disjunctive. Such are the two following: The sun either moves round the earth, or is the centre about which the earth revolves. Friendship finds men equal, or makes them so. It is the nature of all propositions of this class, supposing them to be exact in point of form, that upon determining the particular predicate, the rest are of course to be removed, or if all the predicates but one are removed, the one necessarily takes place. Thus in the example given above; if we allow the world to be the work of some wise and powerful cause, we of course deny it to be self-existent; or if we deny it to be self-existent, we must necessarily admit that it was produced by some wise and powerful cause. Now this particular manner of linking the predicates together, so that the establishing one displaces all the rest; or the excluding all but one necessarily establishes that one; cannot otherwise be affected than by means of disjunctive.

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Chapter VI. Of the Division of Propositions into Self-evident and Demonstrable.

1. When any proposition is offered to the view of the mind, if the terms in which it is expressed be understood; and the agreement or disagreement affected is either immediately perceived or found to lie beyond the present reach of the understanding. In the first case, the proposition is said to be self-evident, and admits not of any proof, because a bare attention to the ideas themselves produces full conviction and certainty; nor is it possible to call in any thing more evident by way of confirmation. But where the connection or repugnance comes not so readily under the inspection of the mind, there we must have recourse to reasoning; and if by a clear series of proofs we can make out the truth propounded, innumerable that self-evidence shall accompany every step of the procedure, we are then able to demonstrate what we assert, and the proposition itself is said to be demonstrable. When we affirm, for instance, that it is impossible for the same thing to be and not to be; whoever understands the terms made use of perceives at first glance the truth of what is asserted, nor can he by any efforts bring himself to believe the contrary. The proposition therefore is self-evident, and such that it is impossible by reasoning to make it plainer; because there is no truth more obvious or better known, from which as a consequence it may be deduced. But if we say, This world had a beginning; the assertion is indeed equally true, but it does not partake of the same degree of evidence. We find great difficulty in conceiving how the world could be made out of nothing; and are not brought to a free and full content, until by reasoning we arrive at a clear view of the absurdity involved in the contrary supposition. Hence this proposition is of the kind which we call demonstrable, inasmuch as its truth is not immediately perceived by the mind, but yet may be made appear by means of others more known and obvious, whence it follows as an unavoidable consequence.

2. From what has been said, it appears, that reasoning is employed only about demonstrable propositions, and that our intuitive and self-evident perceptions are the ultimate foundation on which it rests.

3. Self-evident propositions furnish the first principles of reasoning; and it is certain, that if in our researches we employ only such principles as have this character of self-evidence, and apply them according to the rules to be afterwards explained, we shall be in no danger of error in advancing from one discovery to another. For this we may appeal to the writings of the mathematicians, those being conduct-ed by the express model herein mentioned, are an incontrovertible proof of the firmness and ability of human knowledge, when built upon so sure a foundation. For not only have the propositions of this science flourished the test of ages; but are found attended with that self-evident evidence, as forces the assent of all who duly con-

4. On the mathematicians being very careful in ascertaining their ideas, and fixing the signification of their terms. For the mathematicians, when thus engaged, they begin with definitions, in which the meaning of their ideas is so distinctly explained, that they cannot fail to excite in the mind of an attentive reader the very same ideas as are annexed to them by the writer. And indeed the clearness and irresistible evidence of mathematical knowledge is owing to nothing so much as this care in laying the foundation. Where the relation between any two ideas is accurately and justly traced, it will not be difficult for another to comprehend that relation, if in setting himself to discover it he brings the very same ideas into comparison. But if, on the contrary, he affixes his words ideas different from those that were in the mind of him who advanced the demonstration; it is evident, that the very same ideas are not compared, the same relation cannot subsist, inasmuch that a proposition will be rejected as false, which, had the terms been rightly understood, must have appeared incontrovertibly true. A square, for instance, is a figure bounded by four equal right lines, joined together at right angles. Here the nature of the angles makes no lefs a part of the idea than the equality of the sides; and many properties demonstrated of the square flow entirely from its being a rectangular figure. If therefore we suppose a man, who has formed a partial notion of a square, comprehending only the quality of its sides, without regard to the angles, reading some demonstration that implies also this latter consideration; it is plain he would reject it as not universally true, inasmuch as it could not be applied where the sides were joined together at equal angles. For this last figure, answering still to his idea of a square, would be yet found without the property assigned to it in the proposition. But if he comes afterward to correct his notion, and render his idea complete, he will then readily own the truth and justness of the demonstration.

5. We see, therefore, that nothing contributes so much to the improvement and certainty of human knowl-edge, as the having determinate ideas, and keeping them steady and invariable in all our discourse and reasonings about them. And on this account it is, that mathematicians, as before observed, always begin by defining their terms, and distinctly unfolding the notions they are intended to express; they advancing such as apply themselves to these studies have exactly the same views of things; and, bringing always the very same ideas into comparison, readily discern the relations between them. It is like-wise of importance, in every demonstration, to express the same idea invariably by the same word. From this practice mathematicians never deviate; and if it be necessary in their demonstrations, where the reader's comprehension is assisted by a diagram, it is much more so in all reasonings about moral or intellectual truths where the ideas cannot
cannot be represented by a diagram. The observation of this rule may sometimes be productive of ill-founding periods; but when truth is the object found ought to be despised.

VI. When the mathematicians have taken this first step, and made known the ideas whose relations they intend to investigate; their next care is, to lay down some self-evident truths, which may serve as a foundation for their future reasonings. And here indeed they proceed with remarkable circumspection, admitting no principles but what flow immediately from their definitions, and necessarily force themselves upon a mind in any degree attentive to its ideas. Thus a circle is a figure formed by a right line moving round some fixed point in the same plane. The fixed point round which the line is suppos’d to move, and where one of its extremities terminates, is called the centre of the circle. The other extremity, which is conceived to be carried round until it returns to the point whence it first set out, describes a curve running into itself, and is called the circumference. All right lines drawn from the centre to the circumference are called radii. From these definitions compared, geometers derive this self-evident truth; that the radii of the same circle are all equal to one another.

VII. We now observe, that in all propositions we either affirm or deny some property of the idea that constitutes the subject of our judgment, or we maintain that something may be done or effected. The first sort are called speculative propositions, as in the example mentioned above, the radii of the same circle are all equal to one another. The others are called practical, for a reason too obvious to be mentioned; thus, that a right line may be drawn from one point to another is a practical proposition; inasmuch as it expresses that something may be done.

VIII. From this two-fold consideration of propositions arrifes the twofold division of mathematical principles; into axioms and postulates. By an axiom they understand any self-evident speculative truth; as, that the whole is greater than its parts. That things equal to one and the same thing are equal to one another. But a self-evident practical proposition is what they call a postulate. Such are those of Euclid; that a finite right line may be conceived directly forwards; that a circle may be described about any centre with any distance. And here we are to observe that as in an axiom the agreement or disagreement between the subject and predicate must come under the immediate inspection of the mind; so in a postulate, not only the possibility of the thing asserted must be evident at first view, but also the manner in which it may be effected. For where this manner is not of itself apparent, the proposition comes under the notion of the demonstrable kind, and is treated as such by geometrical writers. Thus, to draw a right line from one point to another, is assumed by Euclid as a postulate, because the manner of doing it is so obvious, as to require no previous teaching. But then it is not equally evident, how we are to construct an equilateral triangle. For this reason he advances it as a demonstrable proposition, lays down rules for the exact performance, and at the same time proves, that if these rules are followed, the figure will be justly described.

IX. This leads us to take notice, that as self-evident and demonstrable propositions are distinguished into different kinds, according as they are speculative or practical; so is it also with demonstrable propositions. A demonstrable speculative proposition is by mathematicians called a _theorem_; and a demonstrable practical proposition is called a _problem_. Such is the famous 47th proposition of the first book of the elements, known by the name of the Pythagorean _theorem_; from its supposed inventor Pythagoras, viz. that in every right-angled triangle, the square described upon the side subtending the right-angle is equal to both the squares described upon the sides containing the right-angle. On the other hand, a demonstrable practical proposition is called a _problem_; as where Euclid teaches us to describe a square upon a given right-line.

Corollaries are obvious deductions from theorems or problems.

It may not be amiss to add, that, besides the four kinds of propositions already mentioned, mathematicians have also a fifth, known by the name of corollaries. These are usually subjoined to theorems or problems, and differ from them only in this, that they flow from what is there demonstrated in so obvious a manner as to discover their dependence upon the proposition whence they are deduced, almost as soon as propounded. Thus Euclid having demonstrated, that in every right-angled triangle all the three angles taken together are equal to two right-angles, adds by way of corollary, that all the three angles of any one triangle taken together are equal to all the three angles of any other triangle taken together; which is evident at first sight; because in all cases they are equal to two right ones, and things equal to one and the same thing are equal to one another.

XI. The scholia of mathematicians are indifferently annexed to definitions, propositions, or corollaries; serve the end, and answer the same purposes as annotations upon a purpose of another author. For in them occasion is taken to explain other annotations whatever may appear intricate and obscure in a train of reasoning; to answer objections; to teach the application and use of propositions; to lay open the original and history of the several discoveries made in the science; and, in a word, to acquaint us with all such particulars as deserve to be known, whether considered as points of curiosity or profit.

**PART III. OF REASONING.**

When, for instance, we compare two figures of a different make, in order to judge of their equality or inequality, it is plain, that by merely considering the figures themselves, we cannot arrive at an exact determination; because, by reason of their disagreeing forms, it is impossible to put them together, as that their several parts shall mutually coincide. Here then it be-
comes necessary to look out for some third idea that
will admit of such an application as the present case
requires; wherein if we succeed, all difficulties vanish,
and the relation we are in quest of may be traced with
ease. Thus right-lined figures are all reduced to
squares, by means of which we can measure their
areas, and determine exactly their agreement or disa-
greement in point of magnitude.

II. But how can any third idea serve to discover a
relation between two others? The answer is, By be-
ing compared severally with these others; for such a
comparison enables us to see how for the ideas with
which this third is compared are connected or disjoined
between themselves. In the example mentioned
above of two right-lined figures, if we compare each of
them with some square whose area is known, and find
the one exactly equal to it, and the other less by a
square inch, we immediately conclude that the area of
the first figure is a square inch greater than that of the
second. This manner of determining the relation be-
tween any two ideas, by the intervention of some
third with which they may be compared, is that which
we call reasoning; and is indeed the chief instrument
by which we push on our discoveries, and enlarge our
knowledge. The great art lies in finding out such in-
termediate ideas, as, when compared with the others
in the question, will furnish evident and known truths:
because, as will afterwards appear, it is only
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III. Hence it appears, that every act of reasoning
necessarily includes three distinct judgments; two
wherein the ideas whose relation we want to discover
are severally compared with the middle idea, and a
third wherein they are themselves compared or disjoin-
ed, according to the result of that comparison. Now,
as in the second part of logic our judgments, when put
into words, were called propositions, so here in the
third part the expressions of our reasonings are termed
syllogisms. And hence it follows, that as every act of
reasoning implies three distinct judgments, so every
syllogism must include three distinct propositions. When
a reasoning is thus put into words, and appears in form
of a syllogism, the intermediate idea made ufe of, to
discover the agreement or diſagreement we search for,
is called the middle term; and the two ideas themselves,
with which this third is compared go by the name of the
extremes.

IV. But as these things are best illustrated by ex-
amples; let us, for instance, let ourselves to inquire
whether men are accountable for their actions. As the
relation between the ideas of man and accountable-
ability does not come within the immediate view of the
mind, our first care must be to find out some third idea
that will enable us the more easily to discover and trace it.
A very small measure of reflection is sufficient to in-
form us, that no creature can be accountable for his
actions, unless we suppose him capable of distingui-
hing the good from the bad; that is, unless we suppose
him possessed of reason. Nor is this alone sufficient.
For what would it avail him to know good from bad
actions, if he had no freedom of choice, nor could a-
void the one and pursue the other? hence it becomes
necessary to take in both considerations in the present
case. It is at the same time equally apparent, that
wherever there is this ability of distinguishing good
from bad actions, and of pursuing the one and avoiding
the other, there also a creature is accountable. We
have then got a third idea, with which accountable-
ability is inseparably connected, viz. reason and liberty;
which are here to be considered as making up one
complex conception. Let us now take this middle
idea, and compare it with the other term in the ques-
tion, viz. men, and we all know by experience that it
may be affirmed of him. Having thus by means of
the intermediate idea formed two several judgments,
viz. that man is possessed of reason and liberty; and that
reason and liberty imply accountability; a third obvi-
ously and necessarily follows, viz. that man is accounta-
able for his actions. Here then we have a complete act
of reasoning, in which, according to what has been
already observed, there are three distinct judgments;
two that may be styled previous, inasmuch as they lead
to the other, and arise from comparing the middle
idea with the two ideas in the question: the third is a
consequence of these previous acts, and flows from
combining the extreme ideas between themselves. If
now we put this reasoning into words, it exhibits what
logicians term a syllogism; and, when proposed in due
form, runs thus:

"Every creature possessed of reason and liberty is
accountable for his actions."

Man is a creature possessed of reason and liberty.

Therefore man is accountable for his actions."

V. In this syllogism we may observe, that there are
three several propositions expressing the three judge-
ments implied in the act of reasoning; and so disposed,
as to represent distinctly what passes within the mind in
tracing the more distant relations of its ideas. The two
first propositions answer the previous judgments in
reasoning, and are called the premises, because they
are placed before the other. The third is termed the
conclusion, as being gained in consequence of what was
asserted in the premises. We are also to remember,
that the terms expressing the two ideas whose rela-
tions we enquire after, as here man and accountable-
ability, are in general called the extremes; and that the
intermediate idea, by means of which the relation is
traced, viz. a creature possessed of reason and liberty,
takes the name of the middle term. Hence it follows,
that by the premises of a syllogism we are always to
understand the two propositions where the middle term
is severally compared with the extremes; for these con-
finitie the previous judgments, whence the truth we
are in quest of is by reasoning deduced. The conclu-
sion is that other proposition, in which the extremes
themselves are joined or separated agreeably to what
appears upon the above comparison.

VI. The conclusion is made up of the extreme terms
major and

of the syllogism; and the extreme, which serves as the
minor

predicate of the conclusion, goes by the name of the

major term: the other extreme, which makes the sub-
ject in the name proposition, is called the minor term.

From this distinction of the extremes arises also a dis-
tinction between the premises, where these extremes
are severally compared with the middle term. That
proposition which compares the greater extreme, or
the predicate of the conclusion, with the middle term,
is called the major proposition: the other, wherein
the same middle term is compared with the subject of the
conclusion.
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65 In a single act of reasoning the premises must be intuitive truths.

66 Reasoning in the higher exercise of it, only a concatenation of syllogisms.

67 Requiring first principles, rises gradually from one judgment to another, and connects them in such manner, that every stage of the progression brings intuitive certainty along with it. And now at length we may clearly understand the definition given above of this distinguishing faculty of the human mind. Reason, we have said, is the ability of deducing unknown truths from principles or propositions that are already known. This evidently appears by the foregoing account, where we see that no proposition is admitted into a syllogism, to serve as one of the previous judgments on which the conclusion rests, unless it is itself a known and established truth, whose connection with self-evident principles has been already traced.

CHAP. II. Of the several kinds of Reasoning; and first, of that by which we determine the Genera and Species of Things.

68 I. All the aims of human reason may in the general be reduced to these two: 1. To rank things under twofold those universal ideas to which they truly belong; and, 2. To ascribe to them their several attributes and properties in consequence of that distribution.

69 II. One great aim of human reason is to determine The first the genera and species of things. We have seen in the First Part of this treatise, how the mind proceeds in framing general ideas +. We have also seen in the Second Part, how by means of these general ideas we come by universal propositions. Now as in these universal propositions we affirm some property of a genus or species, it is plain that we cannot apply this property to particular objects till we have first determined whether they are comprehended under that general idea of which the property is affirmed. Thus there are certain properties belonging to all even numbers, which nevertheless cannot be applied to any particular number; until we have first discovered it to be of the species expressed by that natural name. Hence reasoning begins with referring things to their several divisions and classes in the scale of our ideas; and as these divisions are all distinguished by particular names, we hereby learn to apply the terms expressing general conceptions to such particular objects as come under our immediate observation.

70 III. Now, in order to arrive at these conclusions, by which the several objects of perception are brought under general names, two things are manifestly necessary. First, that we take a view of the idea of the conclusion denoted by that general name and carefully attend to forms of this the fort.
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The distinguishing marks which serve to characterize it. Secondly, that we compare this idea with the object under consideration, observing diligently whether in they accord or not. If the idea is found to correspond with the particular object, we then without hesitation apply the general name; but if no such correspondence intervenes, the conclusion must necessarily take a contrary turn. Let us, for instance, take the number eight, and consider by what steps we are led to pronounce it an even number. First, then, we call to mind the idea signified by the expression an even number, viz. that it is a number divisible into two equal parts. We then compare this idea with the number eight, and, finding them manifestly to agree, see at once the necessity of admitting the conclusion. These several judgments, therefore transferred into language, and reduced to the form of a syllogism, appear thus:

I. Every number that may be divided into two equal parts is an even number:

II. The number eight may be divided into two equal parts:

Therefore the number eight is an even number.

IV. Here it may be observed, that where the general idea, to which particular objects are referred, is very familiar to the mind, and frequently in view; this reference, and the application of the general name, seem to be made without any apparatus of reasoning. When we see a horse in the fields, or a dog in the street, we readily apply the name of the species; habit, and a familiar acquaintance with the general idea, suggesting it instantaneously to the mind. We are not however to imagine on this account that the understanding departs from the usual rules of just thinking. A frequent repetition of acts begets a habit; and habits are attended with a certain promptness of execution, that prevents our observing the several steps and gradations by which any course of action is accomplished. But in other instances, where we judge not by precontracted habits, as when the general idea is very complex, or less familiar to the mind, we always proceed according to the form of reasoning established above. A goldsmith, for instance, who is in doubt as to any piece of metal, and finds the species called gold, first examines its properties, and then comparing them with the general idea signified by that name, if he finds a perfect correspondence, no longer hesitates under what classes of metals to rank it.

V. Nor let it be imagined that our researches here, because in appearance bounded to the imposing of general names upon particular objects, are therefore trivial and of little consequence. Some of the most considerable debates among mankind, and such too as nearly regard their lives, interest, and happiness, turn wholly upon this article. Is it not the chief employment of our several courts of judicature to determine in particular instances what is law, justice, and equity? Of what importance is it in many cases to decide a right whether an action shall be termed murder or manslaughter? We see then that no less than the lives and fortunes of men depend upon these decisions. The reason is plain. Actions, when once referred to a general idea, draw after them all that may be affirmed of that idea; inomuch that the determining the species of actions is all one with determining what proportion of praise or displeasure, commendation or blame, &c. ought to follow them. For as it is allowed that murder deserves death; by bringing any particular act under the notion of murder, we of course decide the punishment due to it.

VI. But the great importance of this branch of reasoning, and the necessity of care and circumspection in referring particular objects to general ideas, is still further evident from the practice of the mathematicians. Every one who has read Euclid knows, that he frequently requires us to draw lines through certain points, and according to such and such directions. The figures thence resulting are often figures, parallelograms, or rectangles. Yet Euclid never supposes this from their bare appearance, but always demonstrates it upon the strictest principles of geometry. Nor is the method he takes in anything different from that described above. Thus, for instance, having defined a square to be a figure bounded by four equal sides joined together at right angles; when such a figure arises in any construction previous to the demonstration of a proposition, yet he never calls it by that name until he has shown that its sides are equal, and all its angles right ones. Now this is apparently the same form of reasoning we have before exhibited in proving eight to be an even number.

VII. Having thus explained the rules by which we are to conduct ourselves in ranking particular objects under general ideas, and shown their conformity to ideas, with the practice and manner of the mathematicians; it remains only to observe, that the true way of rendering this part of knowledge both easy and certain, is by habituating ourselves toclear and determine ideas, and keeping them steadily annexed to their respective names. For as all our aim is to apply general words aright, if these words stand for invariably ideas that are perfectly known to the mind, and can be readily distinguished upon occasion, there will be little danger of mistake or error in our reasonings. Let us suppose that, by examining any object, and carrying our attention successively from one part to another, we have acquainted ourselves with the several particulars observable in it. If among these we find such conditions as some general idea is applied to by the understanding, and distinguished by a particular name, the resemblance thus known and perceived necessarily determines the species of the object, and thereby gives it a right to the name by which that species is called. Thus four equal sides, joined together at right angles, make up the notion of a square. As this is a fixed and invariable idea, without which the general name cannot be applied: we never call any particular figure a square until it appears to have these several conditions; and contrariwise, where ever a figure is found with these conditions, it necessarily takes the name of a square. The same will be found to hold in all our other reasonings of this kind, where nothing can create any difficulty in the want of settled ideas. If, for instance, we have not determined within ourselves the precise notion denoted by the word manslaughter, it will be impossible for us to decide whether any particular action ought to bear that name: because, however nicely we examine the action itself, yet, being strangers to the general idea with which it is to be compared, we are utterly unable...
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unable to judge of their agreement or disagreement. But if we take care to remove this obstacle, and distinctly trace the two ideas under consideration, all difficulties vanish, and the resolution becomes both easy and certain.

VIII. Thus we see of what importance it is towards the improvement and certainty of human knowledge, that we accustom ourselves to clear and determine ideas, and a steady application of words.

CHAP. III.  Of reasoning, as it regards the Powers and Properties of Things, and the Relations of our general Ideas,

I. We now come to the second great end which men have in view in their reasonings; namely, the discovering and ascribing to things their several attributes and properties. And here it will be necessary to distinguish between reasoning, as it regards the sciences, and as it concerns common life.

In the sciences, our reason is employed chiefly about universal truths; and when we have been able to assign the bounds of human knowledge are enlarged. Hence the division of things into various classes, called otherwise genera and species. For these universal ideas being set up as the representatives of many particular things, whatever is affirmed of them may be also affirmed of all the individuals to which they belong. Murder, for instance, is a general idea representing a certain species of human actions. Reason tells us that the punishment due to it is death. Hence every particular action, coming under the notion of murder has the punishment of death, allotted to it. Here then we apply the general truth to some obvious instance; and this is what properly constitutes the reasoning of common life. For men, in their ordinary transactions and intercourse one with another, have, for the most part, to do only with particular objects. Our friends and relations, their characters and behaviour, the constitution of the several bodies that surround us, and the uses to which they may be applied, are what chiefly engage our attention. In all these, we reason about particular things; and the whole result of our reasoning is, the applying the general truths of the sciences in the ordinary transactions of human life. When we see a viper, we avoid it. Wherever we have occasion for the forcible action of water to move a body that makes considerable resistance, we take care to convey it in such a manner that it shall fall upon the object with impetuosity. Now all this happens in consequence of our familiar and ready application of these two general truths. The bite of a viper is mortal. Water, falling upon a body with impetuosity, acts forcibly towards setting it in motion. In like manner, if we set ourselves to consider any particular character, in order to determine the share of praise or displeasure that belongs to it, our great concern is to ascertain exactly the proportion of virtue and vice. The reason is obvious. A just determination, in all cases of this kind, depends entirely upon an application of these general maxims of morality: Virtuous actions deserve praise; vice, disfavour. Hence we are enabled to determine the proportion of each in all cases.

II. Hence it appears that reasoning, as it regards common life, is no more than the ascribing the general properties of things to those several objects with which we are more immediately concerned, according as they are found to be of that particular division or class to which the properties belong. The steps by which we proceed are manifestly these. First, we refer the object under consideration to some general idea or class of things. We then recollect the several attributes of that general idea. And, lastly, we ascribe all those attributes to the present object. Thus, in considering the character of Sempronius, if we find it to be of the kind called virtuous, when we at the same time reflect that a virtuous character is deserving of esteem, it naturally and obviously follows that Sempronius is so too. These thoughts put into a syllogism, in order to exhibit the form of reasoning here required, run thus;

"Every virtuous man is worthy of esteem.
Sempronius is a virtuous man.
Therefore Sempronius is worthy of esteem."

III. By this syllogism it appears, that before we affirm any thing of a particular object, that object must be referred to some general idea. Sempronius is properly worthy of esteem only in consequence of his being a virtuous man, or coming under that general notion. Hence we see the necessary connection of the various parts of reasoning, and the dependence in which they have one upon another. The determining the genera and species of things is, as we have said, one exercise of human reason; and here we find that this exercise is the first in order, and previous to the other, which consists in ascribing to them their powers, properties, and relations. But when we have taken this previous step, and brought particular objects under general names; as the properties we ascribe to them are no other than those of the general idea, it is plain that in order to a successful progress in this part of knowledge, we must thoroughly acquaint ourselves with the several relations and attributes of these our general ideas. When this is done, the other part will be easy, and requires scarce any labour or thought, as being no more than an application of the general form of reasoning represented in the foregoing syllogism. Now, as we have already sufficiently shown how we are to proceed in determining the genera and species of things, which, as we have said, is the previous step to this second branch of human knowledge; all that is further wanting towards a due explanation of it, is, to offer some considerations as to the manner of investigating the general relations of our ideas. This is the highest exercise of the powers of the understanding, and that by means whereof we arrive at the discovery of universal truths: insomuch that our deductions in that way conduce that particular species of reasoning which we have before said regards principally the sciences.

IV. But that we may conduct our own thoughts with some order and method, we shall begin with observing, that the relations of our general ideas are of two kinds; either such as immediately discover themselves upon comparing the ideas one with another; or such as, being more remote and dilated, require art and contrivance to bring them into view. The relations of the first kind furnish us with definite and self-evident truths: those of the second are traced by reasoning, and a due application of intermediate ideas. It is of this last kind that we are to speak here, having dif-
First, an extensive knowledge of intermediate ideas; by means of which things may be compared one with another. Secondly, the skill and talent of applying them happily in all particular instances that come under consideration.

V. In order to our successful progress in reasoning, we must have an extensive knowledge of those intermediate ideas by means of which things may be compared one with another. For it is not every idea that will answer the purpose of our inquiries, but such only as are particularly related to the objects about which we reason, for a composition with them, to furnish evident and known truths; nothing is more apparent, than that the greater variety of conceptions we can call into view, the more likely we are to find some among them that will help us to the truths here required. And, indeed, it is found to hold in experience, that in proportion as we enlarge our views of things, and grow acquainted with a multitude of different objects, the reasoning faculty gathers strength: for, by extending our sphere of knowledge, the mind acquires a certain force and penetration, as being accustomed to examine the several appearances of its ideas, and observe what light they cast one upon another.

VI. This is the reason why, in order to excel remarkably in any one branch of learning, it is necessary to have at least a general acquaintance with the whole circle of arts and sciences. The truth of it is, all the various divisions of human knowledge are very nearly related among themselves, and, in innumerable infinities, serve to illustrate and set off each other. And although it is not to be denied that by an oblique application to one branch of study, a man may make considerable progress, and acquire some degree of eminence in it; yet his views will be always narrow and contracted, and he will want that masterly discernment which not only enables us to pursue our discoveries with ease, but also, in laying them open to others, to spread a certain brightness around them. But when our reasoning regards a particular science, it is further necessary that we more nearly acquaint ourselves with whatever relates to that science. A general knowledge is a good preparation, and enables us to proceed with ease and expedition in whatever branch of learning we apply to. But then, in the minute and intricate questions of any science, we are by no means qualified to reason with advantage until we have perfectly mastered the science to which they belong.

VII. We come now to the second thing required, in order to a successful progress in reasoning; namely, the skill and talent of applying intermediate ideas happily in all particular instances that come under consideration. And here, rules and precepts are of little service. Use and experience are the best instructors. For, whatever logicians may boast of being able to form perfect reasoners by book and rule, we find by experience, that the study of their precepts does not always add any great degree of strength to the understanding. In short, it is the habit alone of reasoning that makes a reasoner. And therefore the true way to acquire this talent is, by being much conversant in those sciences where the art of reasoning is allowed to reign in the greatest perfection. Hence it was that the ancients, who so well understood the manner of forming the mind, always began with mathematics, as the foundation of their philosophical studies. Here the understanding is by degrees habituated to the truth, contracts infallibly a certain fondness for it, and learns never to yield its attention to any proposition but where the evidence is sufficient to produce full conviction. For this reason Plato has called mathematical demonstrations thecharac·tories or purgatives of the soul, as being the proper means to cleanse it from error, and refoke that natural exercise of its faculties in which just thinking confists.

VIII. If therefore we would form our minds to a habit of reasoning closely and in train, we cannot take any more certain method than the exercising ourselves in mathematical demonstrations so as to contract a kind of familiarity with them. Not that we look upon it as necessary that all men should be deep mathematicians, but that, having got the way of reasoning which that study necessarily brings the mind to, they may be able to transfer it to other parts of knowledge, as they shall have occasion.

IX. But although the study of mathematics be of all others the most useful to form the mind and give it an early relish of truth, yet ought not other parts of philosophy to be neglected. For there also we meet with many opportunities of exercising the powers of the understanding; and the variety of subjects naturally leads us to observe all those different turns of thinking that are peculiarly adapted to the several ideas we examine, and the truth we search after. A mind thus trained acquires a certain mastery over its own thoughts, infomuch that it can range and model them at pleasure, and call such into view as best suit its present designs. Now in this the whole art of reasoning consists: from among a great variety of different ideas to single out those that are most proper for the business in hand, and to arrange them together in such order, that from plain and easy beginnings, by gentle degrees, and a continued train of evident truths, we may be infensibly led on to such discoveries, as at our first setting out appeared beyond the reach of human understanding. For this purpose, besides the study of mathematics before recommended, we ought to apply ourselves diligently to the reading of such authors as have distinguished themselves for strength of reasoning and a just and accurate manner of thinking. For it is observable, that a mind exercised and seasoned to truth, seldom refrains satisfied in a bare contemplation of the arguments offered by others; but will be frequently allaying its own strength, and pursuing its discoveries upon the plan its mind prefers, and with its own intermediate ideas, happily in all particular instances, to which it has become accustomed, by a habit of tracing truth from one stage to another, and of investigating those general relations and properties which we afterwards describe to particular things, according as we find them compre-
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hended under the abstract ideas to which the properties belong.

CHAP. IV. Of the Forms of Syllogisms.

§4. The figures of syllogisms.

I. Hitherto we have contented ourselves with a general notion of syllogisms, and of the parts of which they consist. It is now time to enter a little more particularly into the subject, to examine their various forms, and lay open the rules of argumentation proper to each. In the syllogisms mentioned in the foregoing chapters, we may observe, that the middle term is the subject of the major proposition, and the predicate of the minor. This disposition, though the most natural and obvious, is not however necessary; it frequently happening, that the middle term is the subject in both the premises, or the predicate in both; and sometimes, directly contrary to its disposition in the foregoing chapters, the predicate in the major, and the subject in the minor. Hence the distinction of syllogisms into various kinds, called figures by logicians. For figure, according to their use of the word, is nothing else but the order and disposition of the middle term in any syllogism. And as this disposition is, we see, fourfold, so the figures of syllogisms thence arising are four in number. 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: As,

"No work of God is bad;"

"Then natural passions and appetites of men are the work of God;"

"Therefore none of them is bad."

If, on the other hand, it is the predicate of both the premises, the syllogism is said to be the second figure: As,

"Whatever is bad is not the work of God;"

"All the natural passions and appetites of men are the work of God;"

"Therefore the natural passions and appetites of men are not bad."

Again, in the third figure, the middle term is the subject of the two premises: As,

"All Africans are black;"

"All Africans are men;"

"Therefore some men are black."

And lastly, by making it the predicate of the major, and subject of the minor, we obtain syllogisms in the fourth figure: As,

"The only being who ought to be worshipped is the Creator and Governor of the world;"

"The Creator and Governor of the world is God;"

"Therefore God is the only being who ought to be worshipped."

§5. The moods of syllogisms.

II. But, besides this fourfold distinction of syllogisms, there is also a farther subdivision of them in every figure, arising from the quantity and quality, as they are called, of the propositions. By quantity we mean the consideration of propositions, as universal or particular; by quality, as affirmative or negative.

Now as, in all the several dispositions of the middle term, the propositions of which a syllogism consists may be either universal or particular, affirmative or negative; the due determination of these, and so putting them together as the laws of argumentation require, constitute what logicians call the moods of syllogisms. Of these moods there is a determinate number to every figure, 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 to arrive at a just conclusion.

The first figure has only four legitimate moods. The major proposition in this figure must be universal, and the minor affirmative; and it has this property, that it yields conclusions of all kinds, affirmative and negative, universal and particular.

The second figure has also four legitimate moods. Its major proposition must be universal, and one of the premises must be negative. It yields conclusions both universal and particular, but all negative.

The third figure has six legitimate moods. Its minor must always be affirmative; and it yields conclusions both affirmative and negative, but all particular.

III. The division of syllogisms according to mood and figure respects those especially which are known of the other by the name of plain syllogisms; that is, which division of are bounded to three propositions, all simple, and syllogisms, where the extremes and middle term are connected, according to the rules laid down above. But as the mind is not tied down to any one precise form of reasoning, but sometimes makes use of more, sometimes of fewer premises, and often takes in compound and conditional propositions, it may not be amiss to take notice
IV. When in any syllogism the major is a conditional proposition, the syllogism itself is termed conditional. Thus:

"If there is a God, he ought to be worshipped:"

"But there is a God:

"Therefore he ought to be worshipped."

In this example, the major, or first proposition, is, we see, conditional, and therefore the syllogism itself is also of the kind called by that name. And here we are to observe, that all conditional propositions are made of two distinct parts: one expressing the condition upon which the predicate agrees or disagrees with the subject, as in this proposition, *If there is a God;* the other joining or disjoining the said predicate and subject, as here, *he ought to be worshipped.* The first of these parts, or that which implies the condition, is called the antecedent; the second, where we join or disjoin the predicate and subject, has the name of the consequent.

V. In all propositions of this kind, supposing them to be exact in point of form, the relation between the antecedent and consequent must ever be true and real; that is, the antecedent must always contain some certain and genuine condition, which necessarily implies the consequent; for otherwise the proposition itself will be false, and therefore ought not to be admitted into our reasonings. Hence it follows, that when any conditional proposition is affirmed, if we admit the antecedent of that proposition, we must at the same time necessarily admit the consequent; but if we reject the consequent, we are in like manner bound to reject the antecedent. For as the antecedent always expresses some condition which necessarily implies the truth of the consequent; by admitting the antecedent, we allow of that condition, and therefore ought also to admit the consequent. In like manner, if it appears that the consequent ought to be rejected, the antecedent evidently must be too; because, as was just now demonstrated, the admitting of the antecedent would necessarily imply the admission also of the consequent.

VI. There are two ways of arguing in hypothetical syllogisms, which lead to a certain and unavoidable conclusion. For as the major is always a conditional proposition, consisting of an antecedent and a consequent; if the minor admits the antecedent, it is plain that the conclusion must admit the consequent. This is called arguing from the admission of the antecedent to the admission of the consequent, and constitutes that mood or species of hypothetical syllogisms which is distinguished in the schools by the name of the *modus ponendo,* inasmuch as it is the whole conditional proposition, both antecedent and consequent, is established. Thus:

"If God is infinitely wise, and acts with perfect freedom, he does nothing but what is best:"

"But God is infinitely wise, and acts with perfect freedom:"

"Therefore he does nothing but what is best."

Here we see the antecedent or first part of the conditional proposition is established in the minor, and the consequent or second part in the conclusion; whence the syllogism itself is an example of the *modus ponendo.*

But if now we on the contrary suppose that the minor rejects the consequent, then it is apparent that the conclusion must also reject the antecedent. In this case we are led to argue from the removal of the consequent to the removal of the antecedent, and the particular mood or species of syllogism here arising is called by logicians the *modus tollendo*; because in it both antecedent and consequent are rejected or taken away, as appears by the following example.

"If God were not a Being of infinite goodness,"

"he would not confult the happiness of his creatures;"

"But God does consult the happiness of his creatures:"

"Therefore he is a Being of infinite goodness."

VII. These two species take in the whole class of conditional syllogisms, and include all the possible ways of arguing that lead to a legitimate conclusion; for the following reason: that is, from the removal of the antecedent to the removal of the consequent; or from the establishing of the consequent to the establishing of the antecedent. For although the antecedent always expresses some real condition, which, once admitted, necessarily implies the consequent, yet it does not follow that there is therefore no other condition; and if so, then after removing the antecedent, the consequent may still hold, because of some other determination that infers it. When we say, *If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat,* the proposition is certainly true; and, admitting the antecedent, we must also admit the consequent. But as there are other ways by which a stone may gather heat, it will not follow, from the ceasing of the before-mentioned condition, that therefore the consequent cannot take place. In other words, we cannot argue: *But the stone has not been exposed to the rays of the sun; therefore neither has it any degree of heat:* Inasmuch as there are a great many other ways by which heat might have been communicated to it. And if we cannot argue from the removal of the antecedent to the removal of the consequent, no more can we: from the admission of the consequent to the admission of the antecedent: because, as the consequent may flow from a great variety of different suppositions, the allowing of it does not determine the precise supposition, nor only that someone of them must take place. Thus in the foregoing proposition. *If a stone is exposed some time to the rays of the sun, it will contract a certain degree of heat admitting the consequent, viz. that it has contracted a certain degree of heat,* we are not therefore bound to admit the antecedent; that it has been some time exposed to the rays of the sun; because there are many other causes whence the heat may have proceeded. These two ways of arguing, therefore hold not in conditional syllogism.

VIII. As from the major's being a conditional proposition, we obtain the species of conditional syllogisms; so, where it is a disjunctive proposition, the syllogism to which it belongs is also called *disjunctive syllogism,* as in the following example:

"The world is either self-existent, or the work of some finite, or of some infinite Being:"

"But
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"But it is not self-existent, nor the work of a finite being:"

Therefore it is the work of an infinite Being."

Now, a disjunctive proposition 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. Hence it follows, that as soon as we determine the particular predicate, all the rest are of course to be rejected; or if we reject all the predicates but one, that one necessarily takes place. When therefore, in a disjunctive syllogism, the several predicates are enumerated in the major; if the minor establishes any one of these predicates, the conclusion ought to remove all the rest; or if, in the minor, all the predicates but one are removed, the conclusion must necessarily establish that one. Thus, in the disjunctive syllogism given above, the major affirms one of the three predicates to belong to the earth, viz. self-existence, or that it is the work of a finite, or that it is the work of an infinite Being. Two of these predicates are removed in the minor, viz. self-existence, and the work of a finite being. Hence the conclusion necessarily ascribes to it the third predicate, and affirms that it is the work of an infinite Being. If now we give the syllogism another turn, inasmuch that the minor may establish one of the predicates, by affirming the earth to be the production of an infinite Being, then the conclusion must remove the other two, affording it to be neither self-existent, nor the work of a finite being. These are the forms of reasoning in this species of syllogisms, the justness of which appears at first sight; and that there can be no other is evident from the very nature of a disjunctive proposition.

IX. In the several kinds of syllogisms hitherto mentioned, we may observe, that the parts are complete; that is, the three propositions of which they consist are represented in form. But it often happens, that some one of the premises is not only an evident truth, but also familiar and in the minds of all men; in which case it is usually omitted, whereby we have an imperfect syllogism, that consists of only two propositions. Should we, for instance, argue in this manner:

"Every man is mortal:"

"Therefore every king is mortal:"

the syllogism appears to be imperfect, as consisting but of two propositions. Yet it is really complete; only the minor [every king is a man] is omitted; and left to the reader to supply, as being a proposition familiar and evident that it cannot escape him.

X. These seemingly imperfect syllogisms are called enthymemes; and occur very frequently in reasoning, especially where it makes a part of common conversation. Nay, there is a particular elegance in them, because not displaying the argument in all its parts, they leave somewhat to the exercisme and invention of the mind. By this means we are put upon exerting ourselves, and seem to share in the discovery of what is proposed to us. Now this is the great secret of fine writing, to frame and put together our thoughts, as to give full play to the reader’s imagination, and draw him infensibly into our very views and course of reasoning. This gives a pleasure not unlike to that which the author himself feels in composing. It besides shortens discourse and adds a certain force and liveliness to our arguments, when the words in which they are conveyed favour the natural quickness of the mind in its operations, and a single expression is left to exhibit a whole train of thoughts.

XI. But there is another species of reasoning with two propositions, which seems to be complete in itself, and where we admit the conclusion without supposing any tacit or suppressed judgment in the mind, from which it follows syllogistically. This happens between propositions, where the connection is such, that the admission of one necessarily and at the first sight implies the admission also of the other. For if it be falls out, that the proposition on which the other depends is self-evident, we content ourselves with barely affirming it, and infer that other by a direct conclusion. Thus, by admitting an universal proposition, we are forced also to admit of all the particular propositions comprehended under it, this being the very condition that constitutes a proposition universal. If then that universal proposition chances to be self-evident, the particular ones follow of course, without any farther train of reasoning. Whoever allows, for instance, that things equal to one and the same thing are equal to one another, must at the same time allow, that two triangles, each equal to a square whose side is three inches, are also equal between themselves. This argument therefore,

"Things equal to one and the same thing, are equal to one another:"

"Therefore these two triangles, each equal to the square of a line of three inches, are equal between themselves:" is complete in its kind, and contains all that is necessary towards a just and legitimate conclusion. For the first universal proposition is self-evident, and therefore requires no farther proof. And as the truth of the particular is inseparably connected with that of the universal, it follows from it by an obvious and unavoidable consequence.

XII. Now, in all cases of this kind, where propositions are deduced on from another, on account of aable to syllogisms, we are said to reason by immediate consequence. Such a coherence of propositions manifest at first sight, and forcing itself upon the mind, frequently occurs in reasoning. Logicians have explained at some length the several suppositions upon which it takes place, and allow of all immediate consequences that follow in conformity to them. It is however observable, that these arguments, though seemingly complete, because the conclusion follows necessarily from the single proposition that goes before, may yet be considered as real enthymemes, where major, which is a conditional proposition, is wanting. The syllogism but just mentioned, when preferred according to this view, will run as follows:

"If things equal to one and the same thing, are equal to one another; these two triangles, each equal to a square whose side is three inches, are also equal between themselves."

"But things equal to one and the same thing, are equal to one another:

"Therefore these two triangles, &c. are equal between themselves."

This observation will be found to hold in all immediate
cates consequences whatsoever, insofar that they are in fact no more than enthymes of hypothetical syllogisms. But then it is particular to them, that the ground on which the conclusion rests, namely, its coherence with the minor, is of itself apparent, and seen immediately to flow from the rules and reasons of logic.

XIII. The next species of reasoning we shall take notice of here is what is commonly known by the name of a *forites*. This is a way of arguing, in which a great number of propositions are so linked together, that the predicate of one becomes continually the subject of the next following, until at last a conclusion is formed, by bringing together the subject of the first proposition, and the predicate of the last. Of this kind is the following argument.

"God is omnipotent;"
"An omnipotent being can do every thing possible;"
"He that can do every thing possible, can do whatever involves not a contradiction;"
"Therefore God can do whatever involves not a contradiction."

This particular combination of propositions may be continued to any length we please, without in the least weakening the ground upon which the conclusion rests. The reason is, because the forites itself may be reduced into as many simple syllogisms as there are middle terms in it; where this is found universally to hold, that when such a resolution is made, and the syllogisms are placed in train, the conclusion in the last in the series is also the conclusion of the forites. This kind of argument, therefore, as it serves to unite several syllogisms into one, must stand upon the same foundation with the syllogisms of which it consists, and is indeed properly speaking, no other than a compendious way of reasoning syllogistically.

XIV. What is here said of plain simple propositions may be as well applied to those that are conditional; that is, any number of them may be so joined together in a series, that the consequent of one shall become continually the antecedent of the next following; in which case, by establishing the antecedent of the first proposition, we establish the consequent of the last, or by removing the last consequent remove also the first antecedent. This way of reasoning is exemplified in the following argument.

"If we love any person, all emotions of hatred towards him cease;"
"If all emotions of hatred towards a person cease, we cannot rejoice in his misfortunes;"
"If we rejoice not in his misfortunes, we cannot rejoice with him in his injury;"
"Therefore, if we love a person, we cannot rejoice in his injury."

It is evident that this forites, as well as the last, may be resolved into a series of distinct syllogisms, with this only difference, that here the syllogisms are all conditional.

XV. The last species of syllogism we shall take notice of in this chapter is that commonly distinguished by the name of a *dilemma*. A dilemma is an argument by which we endeavour to prove the absurdity or falsehood of some affirmation. In order to this, we assume a conditional proposition, the antecedent of which is the affirmation to be disproved, and the consequent a disjunctive proposition, enumerating all the possible suppositions upon which that affirmation can take place. If then it appears, that all these several suppositions ought to be rejected, it is plain that the antecedent or affirmation itself must be so too. When therefore such a proposition as that beforementioned is made the major of any syllogism; if the minor rejects all the suppositions contained in the consequent, it follows necessarily, that the conclusion ought to reject the antecedent, which, as we have said, is the very affirmation to be disproved. This particular way of arguing is that which logicians call a *dilemma*, and from the account here given of it, it appears that we may in the general define it to be a hypothetical syllogism, where the consequent of the major is a disjunctive proposition, which is wholly taken away or removed in the minor. Of this kind is the following:

"If God did not create the world perfect in its kind, it must either proceed from want of inclination, or from want of power;"
"But it could not proceed either from want of inclination, or from want of power;"
"Therefore, he created the world perfect in its kind." Or, which is the same thing: It is absurd to say that he did not create the world perfect in its kind."

XVI. The nature then of a dilemma is universally this. The major is a conditional proposition, whose antecedent contains all the several suppositions upon which the antecedent can take place. As therefore these suppositions are wholly removed in the minor, it is evident that the antecedent must be so too; inasmuch that we here always argue from the removal of the consequent to the removal of the antecedent. That is, a dilemma is an argument in the *modus tollens* of hypothetical syllogisms, as logicians love to speak. Hence it is plain, that if the antecedent of the major is an affirmative proposition, the conclusion of the dilemma will be negative; but if it is a negative proposition, the conclusion will be affirmative.

**CHAP. V. Of Induction.**

I. All reasoning proceeds ultimately from first truths, either self-evident or taken for granted; and the first truths of syllogistic reasonings are *general propositions*. But except in the mathematics, and such other particular sciences, as being conversant about mere ideas, have no immediate relation to things without the mind, we cannot assume as truths propositions which are general. The mathematician indeed may be considered as taking his ideas from the beginning in their *general* form. Every *proposition* composed of such ideas is therefore general; and those which are theoretic are reducible to two parts; *terms*, a *predicate*, and a *subject*, with a *copula* generally affirmative. If the agreement or relation between the two terms be not immediate and self evident, he has recourse to an *axiom*, which is a proposition still more general, and which supplies him with a third or *middle* term. This he compares first with the *predicate*, and then with the *subject*, or *vice versa*. These two comparisons, when drawn out in form, make two propositions.
positions, which are called the premises; and if they happen to be immediate and self-evident, the conclusion, consisting of the terms of the question proposed, is said to be demonstrated. This method of reasoning is conducted exactly in the syllogistic form explained in the preceding chapter.

II. But in sciences which treat of things external to the mind, we cannot assume as first principles the most general propositions, and from them infer others less and less general till we descend to particulars. The reason is obvious. Every thing in the universe, whether of mind or body, presents itself to our observation in its individual state; so that perception and judgment employed in the investigation of truth whether physical, metaphysical, moral, or historical, have in the first place to encounter with particulars.

With these reasons begins, or should begin its operations. It observes, tries, canvases, examines, and compares them together, and judges of them by some of those native evidences and original lights which, as they are the first and indispensable inlets of knowledge to the mind, have been called the primary principles of truth. See Metaphysics.

III. "By such acts of observation and judgment, diligently practiced and frequently repeated, on many individuals of the same class or of a similar nature, noting their agreements, marking their differences however small, and rejecting all inferences which, however similar in appearance, are not in effect the same, reason, with much labour and attention, extracts some general laws respecting the powers, properties, qualities, actions, passions, virtues, and relations of real things. This is no hasty, premature, notional abstraction of the mind, by which images and ideas are formed that have no archetypes in nature: it is a rational, operative, experimental process, instituted and executed upon the constitution of beings, in which part compose the universe. By this process reason advances from particulars to generals, from left general to more general, till by a series of slow progression, and by regular degrees, it arrive at the most general notions, called forms of formal causes (c). And by affirming or denying a genus of a species, or an accident of a substance or class of substances, through all the stages of the gradation, we form conclusions, which, if logically drawn, are axioms (p) or general propositions ranged one above another, till they terminate in those that are universal.

IV. "Thus, for instance, the evidence of the external senses is obviously the primary principle from which all physical knowledge is derived. But, whereas nature begins with causes, which, after a variety of changes, produce effects, the senses open upon the effects, and from them, through the flow and painful road of experiment and observation, ascend to causes. By experiments and observations skilfully chosen, artfully conducted, and judiciously applied, the philosopher advances from one stage of inquiry to another in the rational investigation of the general cause of physical truth. From different experiments and observations made on the same individual subject, and from the same experiments and observations made on different subjects of the same kind, by comparing and judging, he discovers some qualities, causes, or phenomena, which, after carefully distinguishing and rejecting all contradictory inferences that occur, he finds common to many. Thus, from many collateral comparisons and judgments formed upon particulars, he ascends to generals; and by a repetition of the same industrious processes and laborious investigation, he advances from general to more general, till at last he is enabled to form a few of the most general, with their attributes and operations, into axioms or secondary principles, which are the well-founded laws enacted and enforced by the God of nature.—This is that just and philosophic method of reasoning which sound logic prefers in this as well as in other parts of learning; by which, through the flow but certain road of experiment and observation, the mind ascends from appearances to qualities, from effects to causes, and from experiments upon many particular subjects forms general propositions concerning the powers and properties of physical body.

(c) Quo veris novit, is, quae ab eis non natu sunt, qualia nec natura viscentium, nec experimentata industria unquam in actum producuntur, nec cogitationem humanae subituat suarent, detegit et exuit.

(c) Hanc verum axiomatam, literally signifies dignity: Hence it is used metaphorically to denote a general truth or maxim, and sometimes any truth that is self-evident, which is called dignity on account of its importance in a process of reasoning. The axioms of Euclid are propositions extremely general; and so are the axioms of the Newtonian philosophy. But these two kinds of axioms have very different origins. The former appear upon a bare consideration of our ideas; whereas the latter is the result of the most laborious induction. Lord Bacon therefore strenuously contends that they should never be taken upon conjecture, or even upon the authority of the learned; but that as they are the general principles and grounds of all our learning, they should be canvassed and examined with the most scrupulous attention, "ut axiomaticum corrigeretur iniquitas, quae plumereque in exemplis vulgaribus fundamentum habent." De Augm. Sc. lib. ii. cap. 2. "Atque illa infirtiva principia ad rationes reddelesse compelle revocemus quoque plane constant." Diffr. O pers.—Dr Tatham makes a division between axioms intuitive and axioms self-evident. Intuitive axioms, according to him, pass through the first inlets of knowledge, and fast direct conviction on the minds, as external objects do on the senses, of all men. Other axioms, though not intuitive, may be properly said to be self-evident; because, in their formation, reason judges by single comparisons without the help of a third idea or middle term; so that they have their evidence in themselves, and though in intuitively framed they cannot be syllogically proved, if this distinction be just, and we think it is, only particular truths can be intuitive axioms.
Lord Bacon, the best and foundest of logicians, called the key of interpretation.

VI. "Instead of taking his axioms arbitrarily out of the great families of the categories (see CATEGORY), and erecting them by his own sophistical invention into the principles upon which his disputation was to be employed, had the analytical genius of Aristotle presented us with the laws of the true INDUCTIVE LOGIC, by which AXIOMS are philosophically formed, and had he with his usual sagacity given us an example of it in a single branch of science; he would have brought to the temple of truth an offering more valuable than he has done by the aggregate of all his logical and philosophical productions.

VII. "In all sciences, except the mathematics, it is only after the INDUCTION process has been indubitably purified and successfully performed, that DEFINITION may be logically and usefully introduced, by beginning with the genus, passing through all the subordinate branches, and marking the specific difference as it depends, till it arrive at the individual, which is the subject of the question. And by adding an affirmation or negation of the attributive of the genus on the species or individual, or of a general accident on the particular substance so defined, making the definition a proposition, the truth of the question will be logically solved without any further process. So that instead of being the first, as employed by the logic in common use, definition may be the last act of reason in the search of truth in general.

VIII. "These AXIOMS or general propositions, thus INDUCTION established, become another species of PRINCIPLES, which may be properly called SECONDARY, and which lay the foundation of the syllogistic method of reasoning. When these are formed, but not before, we may safely admit the maxim with which logicians set out in the exercise of their art, as the great hinge on which their reasoning and disputation turn: From truths that are already known, to derive others which are not known. Or, to state it more comprehensively, so as to apply to probable as well as to scientific reasoning—From truths which are better known, to derive others which are left unknown. Philosophically speaking, syllogistic reasoning is, under general propositions to reduce others which are left general or which are particular; for the inferior ones are known to be true, only as we trace their connection with the superior. Logically speaking, it is, To predicate a genus of a species or individual comprehended under it, or an accident of the substance in which it is inherent.

IX. "Thus INDUCTION and SYLLOGISM are the two methods of direct reasoning corresponding to the two kinds of principles, primary and secondary, on which they are founded, and by which they are respectively conducted. In both methods indeed, reason proceeds by judging and comparing, but the process is different throughout; and though it may have the sanction of Aristotle, an INDUCTION syllogism is a syllepsis.

X. "Till general truths are ascertained by induction, the third or middle terms by which syllogisms are made are no where safely to be found: So that another position of the Sceptic, that syllogism is naturally prior in order to induction, is equally unfounded; for induction does not only naturally but necessarily precede syllogism; and, except in mathematics, is in every respect indispensable to its existence; since, till general principles are established, there can be neither definition, proposition, nor axiom, and of course no syllogism. And as induction is the first, so is it the more essential and fundamental instrument of reasoning: for as syllogism cannot produce its own principles, it must have them from induction; and if the general propositions or secondary principles be imperfectly or infinitely established, and much more if they be taken at hazard, upon authority, or by arbitrary allusion like those of Aristotle, all the syllogizing in the world is vain and useless logomachy, only instrumental to the multiplication of false learning, and to the invention and confirmation of error. The truth of syllogisms depends ultimately on the truth of axioms, and the truth of axioms on the foundations of inductions (a)."—But though induction is prior in order, as well as superior in utility, to syllogism, we have thought it expedient to treat of it last; both because syllogism is an easier exercise of the reasoning faculty than induction, and because it is the method of mathematics, the first science of reason in which the student is commonly initiated.

CHAP. VI. Of Demonstration.

I. Having dispatched what seemed necessary to be said with regard to the two methods of direct reasoning, induction and syllogism; we now proceed to consider the laws of demonstration. And here it must be acknowledged, that in strict demonstration, which removes from the mind all possiblity of doubt or error, the inductive method of reasoning can have no place. When the experiments and observations from which the general conclusion is drawn are numerous and extensive, the result of this mode of reasoning is moral certainty; and could the induction be made complete, it would be absolute certainty, equally convincing with mathematical demonstration. But however numerous and extensive the observations and experiments may be upon which an inductive conclusion is established, they must of necessity come short of the number and extent of nature; which, in some cases, by its imminency, will defeat all possibility of their co-extension; and in others, by its distance, lies out of the reach of their immediate application. Though truth does not appear in all other departments of learning with that bold and resolute conviction with which it prevails in the mathematical science, it shines through them all, if not interrupted by prejudice or perverted by error, with a clear and useful, though inferior strength. And as it is not necessary for the general safety or convenience of a traveller, that he should always enjoy the heat and splendor of a mid-day sun, whilst he can with more ease pursue his journey under the weaker influence of a morning or an evening ray; so it is not requisite, for the various concerns and purposes

(a). This chapter is almost wholly taken from Tatham's Chart and Scale of Truth; a work, which, notwithstanding the ruggedness of its style, has so much real merit as a system of logic, that it cannot be too diligently studied by the young inquirer who wishes to travel by the straight road to the temple of Science.
poses of life, that men should be led by truth of the most redundant brightness. Such truth is to be had only in those sciences which are considered as ideas and their various relations; where every thing being certainly what it appears to be, definitions and axioms arise from mere intuition. Here *sylogism* takes up the process from the beginning; and by a sublime intellectual motion advances from the simplest axioms to the most complicated speculations, and exhibits truth springing out of its first and purest elements, and spreading on all sides into a system of science. As each step in the progress is syllogistic, we shall endeavour to explain the use and application of syllogisms in this species of reasoning.

We have seen, that in all the different appearances they put on, we still arrive at a just and legitimate conclusion; now it often happens, that the conclusion of one syllogism becomes a previous proposition in another; by which means great numbers of them are sometimes linked together in a series, and truths are made to follow one another in train. And as in such a concatenation of syllogisms all the various ways of reasoning that are truly conclusive may be without safety introduced; hence it is plain, that in deducing any truth from its first principles, especially where it lies at a considerable distance from them, we are at liberty to combine all the several kinds of syllogisms above explained, according as they are found best to suit the end and purpose of our enquiries. When a proposition is thus by means of syllogisms, collected from others more evident and known, it is said to be *proved*; so that we may in the general define the proof of a proposition to be a syllogism, or series of syllogisms, collecting that proposition from known and evident truths. But more particularly, if the syllogisms of which the proof consists admit of no premises but definitions, self-evident truths, and propositions already established, then is the argument considered as a *demonstration*; whereby it appears that demonstrations are ultimately founded on definitions and self-evident propositions.

II. All syllogisms whatsoever, whether compound, multiform, or defective, are reducible to plain simple syllogisms in some one of the four figures. But this is not all. Syllogisms of the first figure, in particular, admit of all possible conclusions: that is, any propositions whatsoever, whether an universal affirmative or universal negative, a particular affirmative or particular negative, which fourfold division embraces all their varieties; any one of these may be inferred by virtue of some syllogism in the first figure. By this means it happens that the syllogisms of all the other figures are reducible also to syllogisms of the first figure, and may be considered as standing on the same foundation with them. We cannot here demonstrate and explain the manner of this reduction, because it would too much swell the bulk of this treatise. It is enough to take notice that the thing is universally known and allowed among logicians, to whose writings we refer such as desire farther satisfaction in this matter. This then being laid down, it is plain that any demonstration whatsoever may be considered as composed of a series of syllogisms, all in the first figure. For, since all the syllogisms that enter the demonstration are reducible to syllogisms of some one of the four figures; and since the syllogisms of all the other figures are further reducible to syllogisms of the first figure, it is evident, that the whole demonstration may be resolved into a series of these last syllogisms. Let us now, if possible discover the ground upon which the conclusion rests in syllogisms of the first figure; because, by so doing, we shall come at an universal principle of certainty, wherein the evidence of all demonstrations in all their parts may be ultimately derived.

III. The rules then of the first figure are briefly these. The middle term is the subject of the major ground of proposition, and the predicate of the minor. The reasoning major is always an universal proposition, and the minor, in the first nor always affirmative. Let us now see what effect their rules will have in reasoning. The major is an universal proposition, of which the middle term is the subject, and the predicate of the conclusion the predicate. Hence it appears, that in the major the predicate of the conclusion is always affirmed or denied universally of the middle term. Again, the minor is an affirmative proposition, whereas the subject of the conclusion is the subject, and the middle term the predicate. Here then the middle term is affirmed of the subject of the conclusion; that is, the subject of the conclusion is affirmed to be comprehended under, or to make a part of, the middle term. Thus we see what is done in the premises of a syllogism of the first figure. The predicate of the conclusion is universally affirmed or denied of some idea. The subject of the conclusion is affirmed to be or to make a part of that idea. Hence it naturally and unavoidably follows, that the predicate of the conclusion ought to be affirmed or denied of the subject. To illustrate this by an example, we shall resume one of the syllogisms of the first chapter.

"Every creature possest of reason and liberty is accountable for his actions:"

"Man is a creature possest of reason and liberty;"

"Therefore man is accountable for his actions."

Here, in the first proposition, the predicate of the conclusion, *accountableness*, is affirmed of all creatures that have reason and liberty. Again, in the second proposition, *man*, the subject of the conclusion, is affirmed to be or to make a part of this class of creatures. Hence the conclusion necessarily and unavoidably follows, viz. that man is accountable for his actions; because, if reason and liberty be that which constitutes a creature accountable, and man has reason and liberty, it is plain he has that which constitutes him accountable. In like manner, where the major is a negative proposition, or denies the predicate of the conclusion universally of the middle term, as the minor always affords the subject of the conclusion to be or to make a part of that middle term, it is no less evident that the predicate of the conclusion ought in this case to be denied of the subject. So that the ground of reasoning, in all syllogisms of the first figure, is manifestly this: "Whatever may be affirmed universally of any idea, may be affirmed of every or any number of particulars comprehended under that idea." And again: "Whatever may be denied universally of any idea, may be in like manner denied of every or any number of its individuals. These two propositions are called by logicians the *ditrum de omni*, and *ditrum de nullo*; and are indeed the great principles.
IV. And now we may affirm, that, in all syllogisms of the first figure, if the premises are true, the conclusion must needs be true. If it be true that the predicate of the conclusion is a part of or comprehended under that idea; then it necessarily follows, that the predicate of the conclusion agrees also to the subject. For to affect the contrary, would be to run counter to some one of the two principles before established; that is, it would be to maintain an evident contradiction. And thus we are come at last to the point we have been all along endeavouring to establish; namely, that every proposition which can be demonstrated is necessarily true. For as every demonstration may be resolved into a series of syllogisms all in the first figure; and as in any one of these syllogisms, if the premises are true, the conclusion must needs be so too; it evidently follows, that if all the several premises are true, all these several conclusions are so, and consequently the conclusion also of the last syllogism, which is always the proposition to be demonstrated. Now that all the premises of a demonstration are true, will easily appear from the very nature and definition of that form of reasoning. A demonstration as we have said, is a series of syllogisms, all whose premises are either definitions, self-evident truths, or propositions already established. Definitions are identical propositions, wherein we connect the description of an idea with the same by which we choose to have that idea called, and therefore as to their truth there can be no dispute. Self-evident propositions appear true of themselves, and leave no doubt or uncertainty in the mind. Propositions, before established, are no other than conclusions gained by one or more steps from definitions and self-evident principles, that is, from true premises, and therefore must needs be true. Whence all the previous propositions of a demonstration being, we see, manifestly true; the last conclusion, or proposition to be demonstrated, must be so too. So that demonstration not only leads to certain truth, but we have here also a clear view of the ground and foundation of that certainty. For as, in demonstrating, we may be said to do nothing more than combine a series of syllogisms together, all resting on the same bottom; it is plain that one uniform ground of certainty runs through the whole, and that the conclusions are everywhere built upon some one of the two principles before established, as the foundation of all our reasoning. These two principles are easily reduced into one, and may be expressed thus: "Whatever predicate, whether affirmative or negative, agrees universally to any idea; the same must needs agree to every or any number of individuals comprehended under that idea." And thus at length we have, according to our first design, reduced the certainty of demonstration to one simple and universal principle: which carries its own evidence along with it, and which is indeed the ultimate foundation of all syllogistic reasoning.

V. Demonstration therefore serving as an infallible guide to truth, and standing on so sure and unalterable a basis, we may now venture to affirm, that the furnishing of logic furnish a sufficient criterion for the distinguishing between truth and falsehood. For since every proposition that can be demonstrated is necessarily true, he is able to distinguish truth from falsehood who can with certainty judge when a proposition is truly demonstrated. Now, a demonstration is, as we have said, nothing more than a concatenation of syllogisms, all whose premises are definitions, self-evident truths, or propositions previously established. To judge therefore of the validity of a demonstration, we must be able to distinguish whether the definitions that enter it are genuine, and truly descriptive of the ideas they are meant to exhibit: whether the propositions affirmed without proofs as intuitive truths have really that self-evidence to which they lay claim: whether the syllogisms are drawn up in due form, and agreeable to the laws of argumentation: in fine, whether they are combined together in a just and orderly manner, so that no demonstrable propositions serve anywhere as premises unless they are conclusions of previous syllogisms. Now, it is the business of logic, in explaining the several operations of the mind, fully to instruct us in all these points. It teaches the nature and end of definitions, and lays down the rules by which they ought to be framed. It unfolds the several species of propositions, and distinguishes the self-evident from the demonstrable. It defines also the different forms of syllogisms, and explains the laws of argumentation proper to each. In fine, it describes the manner of combining syllogisms, so as that they may form a train of reasoning, and lead to the successive discovery of truths. The doctrine of logic, therefore, as they enable us to judge with certainty when a proposition is duly demonstrated, furnish a sure criterion for the distinguishing between truth and falsehood.

VII. Perhaps it may be objected, that demonstration is a thing very rare and uncommon, as being the tendency to prerogative of but a few sciences, and therefore the all cases criterion here given can be of no great use. But wherever, by the bare contemplation of our ideas, truth is discoverable, there also demonstration may be attained. Now that is an abundantly sufficient criterion which enables us to judge with certainty in all cases where the knowledge of truth comes within our reach; for with discoveries, that lie beyond the limits of the human mind, we have, properly, no business or concernment. When a proposition is demonstrated, we are certain of its truth. When, on the contrary, our ideas are such as have no visible connection or repugnance, and therefore furnish not the proper means of tracing their agreement or disagreement, there we are sure that intellectual knowledge is not attainable. But where there is some foundation of reasoning, which yet amounts not to the full evidence of demonstration, there the precepts of logic, by teaching us to determine aight of the degree of
proof, and of what is still wanting to render it full and complete, enable us to make a due estimation of the measures of probability, and to proportion our affect to the grounds on which the proposition stands. And this is all we can possibly arrive at, or even so much as hope for, in the exercise of faculties so imperfect and limited as ours.

VIII. Now, because this manner of demonstration is accounted for some not altogether to clear and satisfactory; we shall therefore endeavour to show, that it equally with the other leads to truth and certainty. Two propositions are said to be contradictory one of another, when that which is asserted to be in the one is asserted not to be in the other. Thus the propositions, Circles that touch one another inwardly have the same centre, and Circles that touch one another inwardly have not the same centre, are contradictory, because the second involves the direct contrary of what is asserted in the first. Now, in all contradictory propositions, this holds universally, That one of them is necessarily true, and the other necessarily false. For if it be true, that circles which touch one another inwardly have not the same centre; then, and then only, do they have the same centre. On the other hand, if it be false that they have the same centre, it is necessarily true that they have not the same centre. Since then it is impossible for them to be both true or both false at the same time; it unavoidably follows, that one is necessarily true, and the other necessarily false. This then being allowed, which is self-evident; if any two contradictory propositions are assumed, and of these one can by a clear train of reasoning be demonstrated to be false, it necessarily follows that the other is true. For as the one is necessarily true, and the other necessarily false; when we come to discover which is the false proposition, we thereby also know the other to be true.

IX. Now this is precisely the manner of an indirect demonstration, as is evident from the account given of it above. For there we assumed a proposition which directly contradicts that we mean to demonstrate; and, having, by a continued series of proofs shown it to be false, thence infer that its contradictory, or the proposition to be demonstrated is true. As, therefore, thanks that conclusion is certain and unavoidable; let us next inquire after what manner we come to be satisfied of the falsehood of the assumed proposition, that no possible doubt may remain as to the force and validity of demonstrations of this kind. The manner then is plain this: Beginning with the assumed proposition, we, by the help of definitions, self-evident truths, or propositions already established, continue a series of reasoning, in the direct way of demonstration, until at length we arrive at some absurdity or known falsehood. Thus Euclid, in the example before mentioned, from the supposition that circles touching one another inwardly have the same centre, deduces that a part is equal to the whole. Since, therefore, by a due and orderly process of reasoning, we come at last to a false conclusion; it is manifest, that all the premises cannot be true; for, were all the premises true, the last conclusion must be too, by what has been demonstrated. Now, as to all the other premises made use of in the course of reasoning, they are manifest and known truths by supposition, as being either definitions, self-evident propositions, or truths previously established. The assumed proposition is that only as to which any doubt or uncertainty remains. That alone, therefore, can be false; and indeed, from what has been already shown, must unavoidably be so. And thus we see, that in indirect demonstrations, two contradictory propositions being laid down, one of which is demonstrated to be false, the other, which is always the proposition to be proved must necessarily be true; so that here as well as in the direct way of proof, we arrive at a clear and satisfactory knowledge of truth.
A due knowledge of the principles of logic indispensably necessary to make us proper judges of demonstration.

XI. We have a curious instance of this in the twelfth proposition of the ninth book of the Elements. Euclid there proposes to demonstrate, that in any series of numbers rising from unity in geometrical progression, all the prime numbers that measure the last term in the series will also measure the next after unity. In order to this, he assumes the contradictory of the proposition to be demonstrated; namely, that some prime number measuring the last term in the series does not measure the next after unity; and thence, by a continued train of reasoning, proves that it actually does measure it. Hereupon he concludes the affirmed proposition to be false; and that which is deduced from it, or its contradictory, which is the very proposition he proposed to demonstrate, to be true. Now that this is a just and conclusive way of reasoning, is abundantly manifest from what we have so clearly established above. Whence it appears, how necessary some knowledge of the rules of logic is, to enable us to judge of the force, justness, and validity, of demonstrations. For, though it is readily allowed, that by the mere strength of our natural faculties we can at once discern, that of two contradictory propositions, the one is necessarily true, and the other necessarily false; yet when they are so linked together in a demonstration, as that the one serves as a previous proposition whence the other is deduced, it does not so immediately appear, without some knowledge, of the principles of logic, why that alone, which is collected by reasoning, ought to be embraced as true, and the other, whence it is collected, to be rejected as false.

XII. Having thus sufficiently evinced the certainty of demonstration in all its branches, and shown the rules by which we ought to proceed, in order to arrive at a certain conclusion, according to the various ways of arguing, made use of; it is needless to enter upon a particular consideration of the several species of false reasoning, which logicians distinguish by the name of sophisms.

He that thoroughly understands the form and structure of a good argument, will of himself readily discern every deviation from it. And although sophisms have been divided into many classes, which are all called by sounding names, that therefore carry in them much appearance of learning; yet are the errors themselves so very palpable and obvious, that it would be but laborious to write for a man capable of being misled by them. Here, therefore, we choose to conclude this part of logic; and shall in the next give some account of Method, which, though inseparable from reasoning, is nevertheless always considered by logicians as a distinct operation of the mind; because its influence is not confined to the mere exercise of the reasoning faculty, but extends in some degree to all the transactions of the understanding.

PART IV. OF METHOD.

We have now done with the three first operations of the mind, whose office it is to search after truth, and enlarge the bounds of human knowledge. There is yet a fourth, which regards the disposition and arrangement of our thoughts, when we endeavour to put them together as their mutual connection and dependence may be clearly seen. This is what logicians call Method, and place always the last in order in explaining the powers of the understanding; because it necessarily hoppooses a previous excercise of our other faculties, and some progress made in knowledge before we can exert it in any extenfive degree.

II. In this view, it is plain that we must be beforehand well acquainted with the truths we are to combine together; otherwise, how could we discern their several connections and relations, or so dispose of them as their mutual dependence may require? But it often happens, that the understanding is employed, not in the arrangement and composition of known truths, but in the search and discovery of such as are unknown.

Sometimes in the search and discovery of such as are unknown.
IV. And as it is in tracing and examining the works of art, so is it in a great measure, in unfolding any part of human knowledge: for the relations and mutual habits of things do not always immediately appear upon comparing them one with another. Hence we have recourse to intermediate ideas; and, by means of them, are furnished with those previous propositions that lead to the conclusion we are in quest of. And it so happens that the previous propositions themselves are not sufficiently evident, we endeavour, by new middle terms, to ascertain their truth; till tracing things backward, in a continual series, until at length we arrive at some syllogism where the premises are first and self-evident principles. This done, we become perfectly satisﬁed as to the truth of all the conclusions we have passed through, insomuch as they are now seen to stand upon the firm and immoveable foundation of our intuitive perceptions. And as we arrived at this certainty by tracing things backward to the original principles whence they flow; so we may at any time renew it by a direct contrary process, if, beginning with these principles, we carry the train of our thoughts forward until they lead us, by a connected chain of proofs, to the very last conclusion of the series.

V. Hence it appears, that, in disposing and putting together our thoughts, either for our own use, or for the use of others, the discoveries we have made may at all times lie open to the review of the mind, or where we mean to communicate and unfold the discoveries to others, there are two ways of proceeding equally within our choice: for we may propound the truths relating to any part of knowledge, as they presented themselves to the mind in the manner of investigation; carrying on the series of proofs, in a reverse order, until they at last terminate in first principles; or, beginning with these principles, we may take the contrary way, and from them deduce, by a direct train of reasoning, all the several propositions we want to establish. This diversity in the manner of arranging our thoughts gives rise to the twofold division of method established among logicians: for method, according to their use of the word, is nothing else but the order and disposition of our thoughts relating to any subject. When truths are forsooth and put together as they were or might have been discovered, this is called the analytic method, or the method of resolution; insomuch as it traces things backward to their source, and resolves knowledge into its first and original principles. When, on the other hand, they are deduced from these principles, and connected according to their mutual dependence, insomuch that the truths ﬁrst in order tend always to the demonstration of those that follow; this constitutes what we call the synthetic method, or method of composition. For here we proceed by gathering together the several scattered parts of knowledge, and combining them into one whole system, in such manner that the understanding is enabled diffusely to follow truth through all her different stages and gradations.

VI. There is this farther to be taken notice of, in relation to these two species of method; that the ﬁrst has also obtained the name of the method of invention, because it observes the order in which our thoughts succeed one another in the invention or discovery of truth. The other, again, is often denominated the method of deduction or induction; insomuch as, in laying our thoughts before others, we generally choose to proceed in the synthetic manner, deducing them from their ﬁrst principles. For we are to observe, that although there is great pleasure in pursuing truth in the method of investigation, because it places us in the condition of the inventor, and shows the particular train and process of thinking by which he arrived at his discoveries; yet it is not so well accommodated to the purposes of evidence and conviction. For, at our ﬁrst setting out, we are commonly unable to divine where the analysis will lead us; insomuch that our researches are for some time little better than a mere groping in the dark. And even after light begins to break in upon us, we are still obliged to many reviews, and a frequent comparison of the several steps of the investigation among themselves. Nay when we have unravelling the whole, and reached the very foundation on which our discoveries stand, all our certainty, in regard to their truth, will be found in a great measure to arise from this connection, we are now able to discern between them and the ﬁrst principles, taken in the order of composition. But in the synthetic manner of disposing our thoughts, the case is quite different: for we here begin with the intuitive truths, and advance by regular deductions from them, every step of the procedure brings evidence and conviction along with it; so that, in our progress from one part of knowledge to another, we have always a clear perception of the ground on which we stand.

In communicating therefore our discoveries to others, this method is apparently to be chosen, as it wonderfully improves and enlightens the understanding, and leads to an immediate perception of truth.

VII. The logic which for so many ages kept possession of the schools, and was deemed the most important of the sciences, has long been condemned as a mere art of wrangling, of very little use in the pursuit of truth. Attempts have been made to restore it to credit, but without success; and of late years little or no attention whatever has been paid to the art of reasoning in the course of what is called a liberal education. As both extremes may be faulty, it should seem that we cannot conclude this short treatise more properly than with the following Reflections on the Utility of Logic.

If Aristotle was not the inventor of logic, he was certainly the prince of logicians. The whole theory of syllogisms he claims as his own, and as the fruit of much time and labour; and it is universally known, that the later writers on the art have borrowed their materials almost entirely from his Organon and Porphyry’s Introduction. But after men had laboured near 2000 years in search of truth by the help of syllogisms, Lord Bacon proposed the method of induction, as a more effectual engine for that purpose; and since his days the art of logic has gradually fallen into disrepute.

To this consequence many causes contributed. The art of syllogism is admirably calculated for wrangling; and by the schoolmen it was employed with too much strictness, to keep in countenance the absurdities of the Roman church. Under their management it produced numberless disputes, and numberless sects; who
LOGIC.

Part IV.

fought against each other with much animosity without gaining or losing ground; but it did nothing considerable for the benefit of human life, whilst the method of induction has improved arts and increased knowledge. It is no wonder, therefore, that the exclusive admiration of Aristotle, which continued for so many ages, should end in an undue contempt; and that the high esteem of logic, as the grand engine of science, should at last make way for too unfavourable an opinion, which seems now prevalent, of its being unworthy of a place in a liberal education. Men rarely leave one extreme without running into the contrary: Those who think according to the fashion, will be as prone to go into the present extreme as their grandfathers were to go into the former; and even they who in general think for themselves, when they are offended at the abuse of any thing, are too apt to entertain prejudices against the thing itself. "In practice (says the learned Warburton), logic is more a trick than a science, formed rather to amuse than to instruct. And in some sort we may apply to the art of syllogism what a man of wit says of rhetoric, that it only tells us how to name those tools which nature had before put into our hands. In the service of chicanery, indeed, it is a mere juggler's knot, now fast, now loose; and the schools where this legerdemain was exercised in great perfection are full of the stories of its wonders." The authority of Warburton is great; but it may be counterbalanced by another which, on subjects of this nature, is confessedly greater.

"Laying aside prejudice, whether fashionable or unfashionable, let us consider (says Dr Reid) whether logic is or may be made subservient to any good purpose. Its professed end is, to teach men to think, to judge, and to reason, with precision and accuracy. No man will say that this is a matter of little importance: the only thing therefore that can admit of doubt is, whether it can be taught?"

"To resolve this doubt, it may be observed, that our rational faculty is the gift of God, given to men in very different measures: Some have a large portion, some a less; and where there is a remarkable defect of the natural power, it cannot be supplied by any culture. But this natural power, even where it is the strongest, may lie dead for want of the means of improvement. Many a savage may have been born with as good faculties as a Newton, a Bacon, or an Aristotle; but their talents were buried by having never been put to use, whilst those of the philosophers were cultivated to the best advantage. It may likewise be observed, that the chief means of improving our rational power, is the vigorous exercise of it in various ways and on different subjects, by which the habit is acquired of exercising it properly. Without such exercise, and good sense over and above, a man who has studied logic all his life may be only a pertinacious wrangler, without true judgment or skill of reasoning in any science."

This must have been Locke's meaning, when in his Thoughts on Education he says, "If you would have your son to reason well, let him read Chillingworth." The state of things is much altered since Locke wrote: Logic has been much improved chiefly by his writings; and yet much left is laid upon it, and left time consumed in its study. His counsel, therefore, was judicious and reasonable; to wit, That the improvement of our reasoning power is to be expected much more from an intimate acquaintance with the authors who reason best, than from studying voluminous systems of school logic. But if he had meant that the study of logic was of no use, nor deserve any attention, he surely would not have taken the pains to make so considerable an addition to it, by his Effays on the Human Understanding, and by his Thoughts on the Conduct of the Understanding; nor would he have reminded his pupil to Chillingworth, the accented logician as well as the best reasoner of his age."

There is no study better fitted to excercise and strengthen the reasoning powers than that of the mathematical sciences; because there is no other branch of science which gives such scope to long and accurate trains of reasoning, or in which there is so little room for authority or prejudice of any kind to give a false bias to the judgment. When a youth of moderate parts begins to study Euclid, every thing is new to him: His apprehension is unready; his judgment is feeble; and rests partly upon the evidence of the things, and partly upon the authority of his teacher. But every time he goes over the definitions, the axioms, the elementary propositions, more light breaks in upon him; and as he advances, the road of demonstration becomes smooth and easy: he can walk in it firmly, and take wider steps, till at last he acquires the habit not only of understanding a demonstration, but of discovering and demonstrating mathematical truths.

It must indeed be confessed, that a man without the rules of logic may acquire a habit of reasoningjuftly in mathematics, and perhaps in any other science. Good sense, good examples, and assiduous exercise, may bring a man to reason truly and accurately in his own profession without rules. But whoever thinks, that from this concession he may infer the inutility of logic, betrays by this inference a great want of that art; for he might as well infer, because a man may go from Edinburgh to London by the way of Paris, that therefore any other road is useless.

There is perhaps no art which may not be acquired, in a very considerable degree, by example and practice, without reducing it to rules. But practice joined with rules may carry a man forward in his art farther and more quickly than practice without rules.—Every ingenious artist knows the utility of having his art reduced to rules, and thereby made a science. By rules he is enlightened in his practice, and works with more assurance. They enable him sometimes to correct his own errors, and often to detect the errors of others; and he finds them of great use to confirm his judgment, to justify what is right, and to condemn what is wrong. Now mathematics are the noblest praxis of logic. Through them we may perceive how the stated forms of syllogism are exemplified in one subject, namely the predication of quantity; and by marking the force of these forms, as they are there applied, we may be enabled to apply them of ourselves elsewhere. Whoever, therefore, will study mathematics with this view, will become not only by mathematicians more expert in logic, and by logic a more rational mathematician, but a wiser philosopher, and an acuter reasoner, in all the possible subjects either of science or deliberation. But when mathematicians, instead of being applied to this excellent
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cellent purpose, are used not to exemplify logic, but to supply its place; no wonder if logic fall into contempt, and mathematics, instead of furthering science, become in fact an obstacle. For when men, knowing nothing of that reasoning which is universal, come to attach themselves for years to a single specie, a species wholly involved in lines and numbers, the mind becomes incapacitated for reasoning at large, and especially in the search of moral truth. The object of mathematics is demonstration; and whatever in that science is not demonstration, is nothing, or at least below the sublime inquirer’s regard. Probability, through its almost infinite degrees, from simple ignorance up to absolute certainty, is the terra incognita of the mathematician. And yet here it is that the great business of the human mind is carried on in the search and discovery of all the important truths which concern us as reasonable beings. And here too it is that all its vigour is exerted: for to proportion the agent to the probability accompanying every varying degree of moral evidence, requires the most enlarged and sovereign exercise of reason.

In reasonings of this kind, any man pretend that it is of no use to be well acquainted with the various powers of the mind by which we reason? Is it of no use to resolve the various kinds of reasoning into their simple elements; and to discover, as far as we are able, the rules by which these elements are combined in judging and in reasoning? Is it of no use to mark the various fallacies in reasoning, by which even the most ingenious men have been led into error? It must surely betray great want of understanding, to think these things useless or unimportant. Now there are the things which logicians have attempted; and which they have executed—not indeed so completely as to leave no room for improvement, but in such a manner as to give very considerable aid to our reasoning powers. That the principles they have laid down with regard to definition, and division, with regard to the conversion and opposition of propositions, and the general rules of reasoning, are not without use, is sufficiently apparent from the blunders committed daily by those who disdain any acquaintance with them.

Although the art of categorical syllogism is confessedly little fitted for the discovery of unknown truth, it may yet be employed to excellent purposes, as it is perhaps the most compendious method of detecting a fallacy. A man in quest of unknown truths must generally proceed by the way of induction, from effects to causes; but he, who as a teacher is to inculcate any system upon others, begins with one or more self-evident truths, and proceeds in the way of demonstration, to the conclusion which he wishes to establish. Now every demonstration, as has been already observed, may be resolved into a series of syllogisms, of which the conclusion of the preceding always enters into the premises of that which follows: and if the first principles be clear and evident, and every syllogism in some legitimate mode and figure, the conclusion of the whole must infallibly be admitted. But when the demonstration is thus broken into parts; if we find that the conclusion of one syllogism will not, without altering the meaning of the terms, enter legitimately into the premises of that which should immediately follow; or, supposing it to make one of the premises of a new syllogism, if we find that the conclusion, resulting from the whole series thus obtained, is different from that of the demonstration; we may, in either of these cases, rest assured that the author’s reasoning is fallacious, and leads to error; and that if it carried an appearance of conviction before it was thus resolved into its elementary parts, it must have been owing to the inability of the mind to comprehend at once a long train of arguments. Whoever wishes to see the syllogistical art employed for this purpose, and to be convinced of the truth of what we have said respecting its utility, may consult the excellent writer recommended by Locke, who, in places innumerable of his incomparable work, has, without pedantry, even in that pedantic age, made the happiest application of the rules of logic for unravelling the sophistry of his Jefuitical antagonists.

Upon the whole, then, though we readily acknowledge that much time was wasted by our fathers in syllogistical wrangling, and what might with little impropriety be termed the mechanical part of logic; yet the art of forming and examining arguments is certainly an attainment not unworthy the ambition of that being whose highest honour is to be endowed with reason.
Logography

Our author now proceeds to demonstrate that the number of types must necessarily decrease as they are combined into syllables; and much more when formed into words. The whole art of arranging the words consists in placing them under as few divisions as possible, and still fewer subdivisions; which is attained by the following process.

1. A collection of words, with the addition of tens, plurals, and degrees of comparison, amounting to more than 100,000, was made from the best English Dictionaries.

2. Collections were made from the miscellaneous part of 20 newspapers, the Spectator, and Common Prayer-book. The method was, by procuring duplicates of every sheet, so that each alternate side might be pasted over with white paper, in order to leave the whole of the words on both sides perfect; and thus the whole might be touched with less danger of injury than otherwise could have been done. The confusion arising from the parts of other words being seen from the opposite side was likewise prevented.

3. The words, being separately cut out, were then put into a cæse marked with the divisions from one to 16, according to the number of letters contained in each word. Thus several letters are distinctly collected; and then each separate parcel forested in a cæse containing 26 divisions marked with the letters of the alphabet, according to the commencing letter of the word; and thus all the words were ranged alphabetically, consisting of two, three, four, or five letters, in separate parcels.

4. The same words were then placed together, and pulled into an alphabet, with the number of times marked to each that had occurred on the whole; that in this manner a proportion might be determined how many times particular words ought to be repeated for the printing of one sheet, and also to know what words are in general use. There are likewise a number of technical terms, and favourite phrases a great number of times repeated almost by every author, but though these occur throughout the whole book in great proportion to the rest, no more of them will be necessary than what suffice for a single sheet.

5. The whole of the above might be done without the trouble just mentioned, by pulling every word at once into a triformed alphabet; because the subdivisions of the second and third commencing letter of each word for references are now obtained, and thus can easily be placed in its proper division, and may be marked as often as it occurs, without repeating the same word; whence we plainly see the ease and expedition of it from the facility and expedition of pulling every word from a leaf in any book. Before such subdivisions were known, they could only have been placed under the first commencing letter of the word; which would cause such a multiplicity of repetitions, that it would take up more time, be far more liable to error, and require more subordinate pollings to bring them into arrangement; so that they may be found more easily than by the above proceedings. Thus also a collection will be obtained of single and double words, which are constantly required from 20 to 400 or 500 times in the printing one sheet of any work whatever; and which alone would abridge the compositor's work near one-third. The second process likewise
Likewise enabled the author to reject, out of the first collection, obsolete words, technical terms, &c., which reduced the original collection to one fifth part.

6. By proceeding in this manner, several species of words are omitted in the founts. 1. Obsolete words; because they occur so seldom, the difference of time lost in compounding them in the ordinary method would be imperceptible. 2. Technical terms names of places, animals, &c.; though, for any particular work, the terms peculiar to it may be added to the fount in a biformal alphabet apart. 3. Real compounds, or words that may be compounded of others, are also rejected, because we actually have the words already, and they may be joined with sufficient expedition, though the spaces are annexed to each, by being contracted accordingly. 4. Those of the same spelling are likewise omitted, though they bear different significations, for obvious reasons.

7. The variation of tenses, degrees of comparison, and numerous words in the English language, having in general the same terminations, such as ed, ing, ly, ment, ness, &c., an alphabet may be formed of such words in whole or in part let it be what it will; and when the whole cannot be found at once, the remainder may easily be found in single or double syllables among the terminations. 2. All words above three syllables have the same alphabetical arrangement, and many other words may be formed from the radix by the addition of various terminations, and each termination may be added to other radices to which they are applicable.

8. Some radices are imperfect, viz. such as end with the vowel e, which must therefore be added in the usual way of compounding. Thus, in the word adore, the radix is adore, to which the terminations er, er, css, eth, or, ing, may be added occasionally.

9. By rejecting also the words which come under this last denomination, the number necessary for a fount is reduced to one-tenth of what it would otherwise be, as will appear evident from the following considerations: 1. There are at least 42 verbs, the infinitive of which ends in ify, as qualify, signify, of which the radices of which are qual, figyr, the terminations are, ifes, ifed, ifing, &c. And Mr. Johnson informs us, that by applying these radices to other terminations, he was enabled to dispense with more than 500 words which would otherwise have been necessary. 2. For all regular verbs, no more than six terminations are necessary, viz. s, css, eth, ed, et ing. There are but few irregular ones in the English language; whence it happens that 12 or 14 words may be formed from one single perfect verb as a radix, and many imperfect ones have double that number.

10. By using only the set of terminations which may be contained in a box of two feet square, the common operation of printing would be shortened nearly one half; and in order to find out those which are most in use, and fittest to retain, our author digested them alphabetically, with the radices, words, or syllables which make complete words annexed to them. Thus,

- s  
  ed  
- ing  
- ment  

Thus, abs—upper—after de—dis—con cer—cap—cur enter—main—re—fu, &c.

11. Thus it will be found, that out of more than 1,000,000 words of which the English language consists, there will not be wanted much above 3500 for a complete fount. This will be very evident to any person who consults a dictionary. He will there find, that a vast number of words require an explanation; whereas in any miscellaneous work, there are none but what can be understood most readily either together or apart. Newspapers retain more of the uncommon kind of words than any others. "The vocabulary (says our author) or alphabet as it is called, of the Chinese, consists of above 80,000 letters or characters; yet he is admitted a master of the language who knows about 4000 of them, no more being in general use."
Logography by no means intelligible.—"For this distinction in
the cates (says he), the alphabet, or rather marks of
first reference in large characters on the wall, is di-
vided into two classes, not as vowels and consonants,
but as follows: viz. A, Con, Diff, E, Is, O, P, S,
commencing references, the second or subsequent
letters of the words being in right line from left to
right, and down each column is found the remainder
of the reference to the words, distinguishing always
the third letter in red. The second distinction is,
that for all other commencing letters, the second letter
of reference is in a column down, and the third letter
in lines from left to right in red.

These are the directions given by our author for
forming a sound of words: the next requisite is a sound
of syllables, formed in the following method: 1. A
complete set of two letters was obtained in all their
possible combinations, amounting to 676. 2. Having
next obtained the possible combination of these letters,
viz. 17576, by retaining only all possible syllables, and
words of three letters, it is reduced in the 52d part, which
answer all the purposes of composing with syllables of
two and three letters, for Latin, French, English, and
all names of persons, places, and things every pos-
sible syllable being comprehended among them. Hence
it forms an universal triformed alphabet, where En-
lish characters are used; from whence all partial bi-
formed and triformed alphabets in the arrangement of
English, French, Latin, and all technical matters, are
drawn. Though combinations of four letters are
again 25 times the number of those of three letters,
and five letters increase in the same ratio; yet as much
as all possible combinations increase in quantity pro-
portionate to the number of letters combined so do they
decrease in the actual number of syllables included
among them, inasmuch that all the syllables of four,
five, six, and seven letters together, are considerably
fewer than the syllables of three letters only.—Be-
sides the two sounds already mentioned, a third was
found necessary for such terminations as are most com-
monly followed by particular punctuations; but, after
some consideration, this was judged unnecessary.

Our author now proceeds to obviate some objections
which must naturally occur to one who first hears of
his invention. These are,
1. A single letter damaged in a word renders the
whole useless.
This is not denied by Mr. Johnston; but he contends,
that the quantity of metal lost in this manner is quite
trifling.

2. How are the blanks or spaces in a line to be ma-
aged, as these are by no means equal.
To this our author replies, that, at the time of writ-
ing the pamphlet, he was undetermined whether it be
most eligible to have spaces cast along with the be-
ginnings of words, or to space them in the common
manner. The former would be more expeditious; and
where a greater distance is required, other spaces may
be introduced in the ordinary method.

3. How is a long word at the end of a line to be di-
vided?
This may be easily accomplished by means of the sylla-
abic sound already mentioned.

4. How is the error of substituting one word for
another to be rectified?

The answer to this is, that an error of the kind spe-
cified may be corrected in the very same manner as is
done in common printing. Long words may be di-
vided by means of the syllabic sound already men-
tioned and the intervals between the words may be filled
up with spaces as usual.

LOGWOOD. See HEMATONYLON.

LOHOCH, or LOKH, in pharmacy a composition
of a middle consistence between a soft cleatary and a
yup, principally used in disorders of the lungs.

LOINS, in anatomy, the two lateral parts of
the umbilical region of the abdomen.

LOIRE, the largest river in France, rises in the
mountain of the Cevennes, and, after running a cou-
ple of about 350 miles, falls into the bay of Bicay.

LOKE, in mythology, the name of one of the
deities of the northern nations, answering to the Ar-
manes among the Persians, whom they represent at
enmity both with gods and men, and the author of
all the evils which defolate the universe. Loke is de-
scribed in the edda as producing the great serpent
which encircles the world; which seems to have been
intended as an emblem of corruption or sin: he also
gives birth to Hela or death, the queen of the infernal
regions; and also to the wolf Fenris, that monster who
is to encounter the gods and destroy the world.

LOKMAN the Wise, an eminent philosopher am-
ong the easterns. The Arabianists say he was the son
of Bauran, the son or grandson of a fitter or aunt of
Job. He was an Ethiopian, and a slave for some time.
It is related that he was born in the time of David,
and lived till the age of the prophet Jonas. Some lop-
pole him to have been the same with Aesop the myth-
ologist; and indeed we find in the parables or apolo-
gues of Lokman in Arabic, many particulars that are
seen in Aesop's fables: so that it is not easy to de-
termine whether the Greek or the Arabian are the
originals. He is said to have been deformed in his per-
fon; but that this defect was sufficiently made up by
the perfections of his mind. Some pieces of his are
extant; and he was looked upon as so excellent a per-
on, that Mahomet has inserted a chapter of the Ko-
ran, called after his name, in which he introduces God
as saying, "We heretofore bestowed wisdom on Lok-
man."—It is related that he got his liberty on the fol-
lowing occasion. His master having given him a bitter
melon to eat he eat it all. His master, surprized at
his exact obedience, asked, how it was possible for
him to eat such a nauseous fruit? He answered, "I
have received so many favours from you, that it is no
wonder I should once in my life eat a bitter melon from
your hand." This generous answer of the slave struck
the master to such a degree, that he immediately gave
him his liberty. M. Galland translated all the fables
of Lokman, and Bilpai or Pilpay a bramhin philoso-
pher, which were published at Paris in 1724.

LOLIUM, BARNELT-GRASS, in botany: A genus
of the dygymia order, belonging to the triandria clas-
of plants; and in the usual method ranking under
the 5th order, Gramina. The calyx is monophyllous
and uniflorous. The most remarkable species are,
1. The perenne, red darnel, or rye-grass. This
is very common in roads and dry pastures. It makes
excellent hay upon dry chalky, or sandy soils. It is
advantageously cultivated along with clover, and
springs...
Lollards. springs earlier than other grades; thereby supplying food for cattle at a time when it is most difficult to be obtained. Cows, horses, and sheep eat it; goats are not fond of it. 2. The temulentum, or white darnel grows spontaneously in ploughed fields. If the seeds of this species are mowed with barley, the ale soon occasions drunkenness: mixed with bread-corn, they produce but little effect unless the bread is eaten hot.

LOLLARDS, in ecclesiastical history, a religious sect, differing in many religious points from the church of Rome, which arose in Germany about the beginning of the 14th century; so called, as many writers have imagined, from Walter Lollard, who began to dogmatize in 1315, and was burnt at Cologne: though others think that Lollard, was no surname, but merely a term of reproach applied to all heretics who concealed the poison of error under the appearances of piety.

The monk of Canterbury derives the origin of the word Lollards among us, from lolium, "a tare" as if the Lollards were the tares tawn in Christ's vineyard. Abelly says, that the word Lollard signifies "praizing God," from the German loben, "to praise," and herr "Lord:" because the Lollards employed themselves in travelling about from place to place, singing psalms and hymns.

Others, much to the same purpose, derive lollhard, lombard, or lollert, lullert, as it was written by the ancient Germans from the old German word xollen,ollen, orollen, and the termination hard, with which many of the High Dutch words end. Ollen signifies "to sing with a low voice," and therefore Lollard is a singer or one who frequently sings; and in the vulgar tongue of the Germans it denotes a person who is continually praising God with a song, or singing hymns to his honour. The Alexiens or Cellites were called Lollards, because they were public singers who made it their business to inter the bodies of those who died of the plague, and sang a dirge over them in a mournful and indiffident tone as they carried them to the grave. The name was afterwards assumed by persons who disdained it; for we find among those Lollards who made extraordinary pretences to piety and religion, and spent the greatest part of their time in meditation, prayer, and other acts of piety, there were many abominable hypocrites, who entertained the most ridiculous opinions and concealed the most enormons vices under the specious mark of this extraordinary profession. And many injurious aspersions were propagated against those who assumed that name by the priests and monks; so that by degrees, any person who covered heresies or crimes under the appearance of piety, was called a Lollard. Thus the name was not used to denote any one particular sect, but was formerly common to all persons and all sects who were supposed to be guilty of impiety towards God or the church, under the external profession of extraordinary piety. However, many societies, confiding both of men and women under the name of Lollards, were formed in most parts of Germany and Flanders, and were supported partly by their manual labour, and partly by the charitable donations of pious persons. The magistrates and inhabitants of the towns where these brethren and sisters resided, gave them their particular marks of favour and protection, on account of their great usefulness to the sick and needy. They were thus supported against their malignant rivals, and obtained many papal constitutions by which their influence was confirmed, their persons exempted from the cognizance of the inquisitors, and subjected entirely to the jurisdiction of the bishops; but as these measures were insufficient to secure them from molestation, Charles duke of Burgundy, in the year 1472, obtained a solemn bull from Pope Sixtus IV. ordering that the Cellites or Lollards should be ranked among the religious orders, and delivered from the jurisdiction of the bishops; and Pope Julius II. granted them yet greater privileges in the year 1506. Mutherm informs us that many societies of this kind are still subsisting at Cologne, and in the cities of Flanders, though they have evidently departed from their ancient rules.

Lollard and his followers rejected the sacrifice of the mass, extreme unction, and penances for sin, arguing, that Christ's sufferings were sufficient. He is likewise said to have set aside baptism, as a thing of no effect; and repentance, as not absolutely necessary, &c.—In England, the followers of Wickliffe were called by way of reproach, Lollards, from some affinity there was between some of their tenets; though others are of opinion that the English Lollards came from Germany.

They were solemnly condemned by the archbishop of Canterbury and the council of Oxford.

LOMBARD (Lambert), an eminent painter, born at Leige in 1500; who after a diligent study of the antique at Rome, introduced that style of painting among his countrymen instead of the Gothic. He painted history, architecture, and perspective; and though he could never altogether free himself from his national gout, he is ranked among the best painters of his time. He died in 1560.

Lombard (Peter), well known by the title of Master of the Sentences, was born at Novara in Lombardy; but being bred at Paris, he distinguished himself so much at that university, that he first had the canony of Chartres conferred on him; was some time tutor to Philip son of Louis le Gros, and lastly obtained the see of Paris. He died in 1664. His work of the Sentences is looked on as the source of the scholastic theology of the Latin church. He wrote also commentaries on the Psalms, and on St. Paul's Epistles.

LOMBARDS, a Scandinavian nation, who formerly settled in Italy, and for some time made a considerable figure.

Their name of Lombards, or Longobards, is by some etymology derived from the word lack, or lade, signifying in the of the German tongue winter; because the Lombards, while in Scandinavia, lived in marhs or near the sea. Others think that it comes from the two German words langen barden, or hilseborden, that is from the long halberts they were suppose to ute in war. But Paulus Diaconus their historian, and was himself a Lombard, tells us, that it were called Longobards from the length of their beards. A nation called the Lombards is mentioned by Tacitus, Sibyl, and Ptolemy; but there are different from the Lombards who afterwards settled in Italy, and are reckoned to be the same with...
Lombards

2 The Vandals defeated by the Lombards.

Vambl;dc-

3 They settled in the country of the Rugians.

4 Destroy the Gepidæ.

Alboinæ, king of the Lombards.

Alboinis, having gained such a reputation, that his friendship was courted by Justinian; and, in consequence of the emperor's application, a body of 6000 Lombards were sent to the adittance of Naranæ against the Goths. The success of the Romans in this expedition, the invasion of Italy by the Lombards and their successes in that country, have been taken notice of under the article Italy, n° 48—52. At last Alboinis, having made himself master of Venetia, Liguria, Æmilia, Heretria, and Umbria, was slain by the treachery of his wife, in the year 575, the fourth of his reign. This princes was the daughter of the king of the Gepidæ, whom Alboinis had killed in battle and made a cup of his skull as above related.

As he was one day feasting at Verona with his chief favourites and principal officers, in the height of his mirth he fell for the queen, and filling the defiled cup, commanded her to drink merrily with her father. Rosamund struck with horror, hurried out of the room; and highly incensed against her husband for thus barbariously triumphing over the misfortunes of her family, revoluted at all events, to make him pay dear from such an inhuman and affronting conduct.

Accordingly, the discovering her intention to Helmicilh the kings field-bearer, a youth of great boldness and intrepidity. Helmicilh peremptorily refused to imbrue his hands in the blood of his sovereign, or to be any way accessory to his death; and in this resolution he perished till he was, by a shameful stratagem, forced by the queen to a compliance: for he, knowing that he carried on an intrigue with one of her ladies, placed herself one night in her bed, and receiving the youth, indulged him as if she had been his own mistress in his amorous desires; which she had no sooner done, than discovering herself to the deceived lover, she told him that she must now either put the king to death, or be put to death by him. Helmicilh, well apprised, that after what he had done, his safety depended on the death of the king, engaged in the treason, which he otherwise abhorred.

One day, therefore, while Alboinis was repining in his chamber after dinner, Helmicilh, with some others whom he had made privy to his design, breaking in unexpectedly fell upon the king with their daggers. Alboinis, starting up at their first coming in, laid hold of his sword, which he had always by him; but having in vain attempted to draw it, the queen having beforehand fastened it in the scabbard, he defended himself for some time with a footstool; but was in the end overpowered, and dispatched with many wounds.

Rosamund had promis'd to Helmicilh, that, as soon as he had dispatched the king, she would marry him, and with her person, befall upon him the kingdom of the Lombards. The first part of her promise she immediately performed; but was so far from being able to follow the crown upon him, that both of them were obliged to save themselves by flight. They fled to Longinus the exarch of Ravenna, taking with them all the jewels and treasure of the late king. Longinus received her with the greatest marks of friendship and kindness, and assured her of his protection. She had not been long in Ravenna, however, before the exarch, judging that a favourable opportunity now offered of making himself king of Italy by her means, imparted his design to her, and declared his intention to marry her, provided, by some means or other, she dispatched Helmicilh. Rosamund, highly pleased with the proposal, resolved to satisfy her ambition by getting rid of the person whom she had married in order to gratify her revenge. Accordingly, having prepared a strong poison, she mixed it with wine, and gave it to her husband as he came out of the bath and called for drink, according to his custom. Helmicilh had not half emptied the cup when by the sudden and frightful operation which he felt in his bowels, he concluded what it was, and, with his sword pointed at the queen's breast, compelled her to drink the rest. The poison had the same effect on both; for they died in a few hours. Longinus, on the death of the queen, laid aside all thoughts of making himself king of Italy, and sent the king's treasure to Constantinople, together with Alboinis's daughter of Alboinis by Rosamund, whom she had brought along with her.

After the death of Alboinis, the Lombards chose Clephis, one of the nobility for their king. He was murdered after a short reign of 18 months; upon which ensued an interregnum of 10 years, as related under the article Italy, n° 32. During this time, they extended their conquests in that country; but at last the Romans, jealous of their progress, resolved to put a stop to their victories, and, if possible, to drive them quite out. For this purpose, they designed not only to employ all their own force, but entered into alliance with the Franks; which so alarmed the Lombards, that they re-established the monarchial form of government.
LOMBARDIA

Several places, they openly revolted, and, falling upon the emperor's officers, drove them out of the cities. In the east, Germanus, patriarch of Constantinople, opposed the emperor's design with great warmth; but Leo caused him to be deposed, and Anastasius to be raised to that seat in his room, ordering, at the same time all the images in the imperial city to be pulled down and publicly burnt. He strictly enjoined his officers in the west, especially the exarch of Ravenna, to see his edict punctually obeyed in their respective governments. In compliance with these orders, Schroians, then exarch, began to pull down the images in all the churches and public places in Ravenna; which incensed the superstitious multitude to such a degree, that, taking arms, they openly declared they would rather renounce their allegiance to the emperor than the worship of images.

Thus a kind of civil war being kindled in the city, Luitprand thought he had now a favourable opportunity of making himself master of the seat of the exarch, not doubting but the conquest of such an important place would be followed by that of the whole exarchate. Having therefore drawn together all his forces, he unexpectedly appeared before Ravenna, and, promising to take advantage of their fears, and, returning before Ravenna while the inhabitants were engaged in the works of pulling down the images, he stormed the city to be pulled up, the fevere prejudices which he had excited among the subjects of the kingdom. Among the latter the emperor was the sole lawgiver; so that whatever pleased him had the force of a law. But the Lombard kings did not assume that power to themselves, since their laws were enacted in public assemblies, convened for that purpose after they had been maturely examined and approved by all the lords of the kingdom. From these assemblies were excluded the ecclesiastical order, and the people; so that the legislative power was lodged in the king and nobles alone.

The reign of Rotharis is remarkable, not only for his introducing written laws among his subjects, but for the conquests he made, and the successful wars carried on with the exarch of Ravenna, whom he totally defeated in several engagements, and made himself master of some part of his territories. This monarch died in 652; and the affairs of the Lombards went on prosperously, till the ambition of Luitprand laid the foundation of the total ruin of his kingdom. He ascended the throne of Lombardy in 711, and watched all opportunities of enlarging his dominions at the expense of the emperors. Of this, a fair opportunity offered in 716: for the emperor Leo II., bishop of Rome. He was then at variance with the emperor, whose edict against the worshipping of images he had opposed with all his might, and by that
Lombar.d means provoked Leo to such a degree, that he had threatened to drive him from the see, and send him into exile. However, the pope, no lefs jealous of the power of the Lombards than all his predecessors had been, resolved, by some means or other, to put a fhop to their conquests. The only prince in Italy to whom he could have recourse was Urtius, duke of Venice, the Venetians making already an incom nderable figure.

To him accordingly he wrote a very prefling letter; conjuring him to affift his worthy for the exarch, and for the love of the holy faith, to attempt with him the recovery of the exarchate, which the wicked nation of the Lombards had unjustly taken from his fons Leo and Conftantine emperors. Urtius and the Venetians, moved with the pope's letter, and at the fame time greatly alarmed at the growth of fo powerful a neighbour, promised to affift the exarch with the whole strength of their republic; and accordingly fitted out a confiderable fleet, pretending it was defigned for the service of the emperor against the Saracens. At the fame time the exarch, who had taken refuge in Venice, abandoning that place, as it were, in defpair of bringing the duke over to his party, raifed, in the places still fubjeft to the emperor, what forces he was able; and having got toger a confiderable body, he marched with them towards Imola, giving out that he defigned to beleige that city; but, turning on a sudden towards Ravenna, as had been agreed on between him and the Venetians, he laid siege to it by land, while they infaddied it almost at the fame intant by fea. Peredeus defended the town for fome time with great courage and resolution; obliging all thofe who were able to bear arms to repair to the walls. But the Venetians having, in spite of all oppofition, forced open one of the gates on the fide of the fea, the city was taken, and Peredeus flain, while he was attempting, at the head of a choice body, to drive the enemy from the pofts they had feized. As for Hildebrand, he fell into the hands of the Venetians; who, having thus recovered Ravenna to the emperor, returned home, leaving the exarch in the poftefion of the city. Luitprand was then at Pavia; but the town was taken before he could assemble his troops to relieve it.

And now Gregory bishop of Rome, to whom the recovery of Ravenna was chiefly owing, perfuading himfelf, that the emperor would, out of gratitude, give ear to his remonftrances and admonitions, began to solicit him with more prefling letters than ever to revoke his edict againft the worship of images: but Leo, well apprized that the bishop, in all the meafures he had taken, had been more influenced by a regard to his own interest, than to that of the empire, instead of hearkening to his remonftrances, was ftil more provoked againft him for thus obstinately oppofing the execution of his edict. Being, therefore, resolved at all events to have it obviated in Rome itself, and, on the other hand, not doubting but the pope would oppofe it to the laft with all his might; in order to remove all obftacles, he fent three officers to Rome, with private orders either to dispatch the pope, or to take him prifoner and convey him to Conftantinople. At the fame time he wrote to Mauritius duke of Rome, secretly enjoining him to affift his three officers, in their undertaking; but no favorable opportunity offering to put their design in execution, the emperor, in the year 725, recalled Scholastica, and fen Paul Lombard, a patrician into Italy, to govern in his room, with private instructions to encourage the abovementioned officers with the promise of great rewards, and to affure them of his protection.

But, in the mean time the plot was discovered, and two of the confpirators were apprehended by the citizens of Rome, and put to death; the third having escaped into a monastery, where he took the monaflic habit, and ended his days. Hereupon the exarch, in compliance with the emperor's orders, resolved to proceed no longer by secret plots, but by open force. Accordingly, he drew together a confiderable body of troops, and fet out at the head of them on his march to Rome, with a design to feize on the pope, and fend him, as he had engaged to do, in chains to Conftantinople. But on this occafion, Luitprand, though highly provoked againft Gregory for having flrirred up the Venetians againft him, yet resolved to affift him and the citizens of Rome againft the exarch, in order to keep the balance even between them, and by affifting sometimes the one and sometimes the other, weaken both. Pursuant to this resolution, he ordered the Lombards of Tuscany, and thofe of the dukedom of Spoleto, to join the pope and the inhabitants of Rome; who, being by his reinforcement of superior number and quality, obliged him to return to Ravenna, and give over all thoughts of any further attempt on the perfon of the pope.

In the mean time, Leo, perfifting in his former resolution of suppreffing throughout his dominions the worship of images, lent fresh orders to the exarch Paul, strictly enjoining him to caufe his edict to be put in execution in all the cities of Italy under his empire, especially in Rome. At the fame time he wrote to the pope, promifing him his favour and protection if he complied with the edict; and declaring him, if he continued to oppofe it, a rebel, and no longer vefted with the papal dignity. But Gregory was fo far from yielding to the emperor's threats or promises, that, on the contrary, he solemnly excommuniuated the exarch for attempting to put the imperial edict in execution; and at the fame time wrote circular letters to the Venetians, to king Luitprand, to the Lombard dukes, and to all the chief cities of the empire, exhorting them to continue faithful in the Catholic faith, and to oppofe with all their might fuch a deteftable innovation. These letters made fuch an impression on the minds of the people of Italy, that, though of different interefts, and often at war with one another, they all united; proftecting they would defend the Catholic faith, and the life of the pope in fo glorious a caufe, at the expence of their own; nay, the citizens of Rome, and the inhabitants of Pentapolis, now Marca d'Ancona, not con tenting themselves with fuch a proteftation, openly revolted from the emperor; and, pulling down his statues, they elected, by their own authority, magiftrates to govern them during the interregnum. We are even told, that, transported with a blind zeal, they were for choofing a new emperor, and conducing him to Conftantinople, not doubting but the people would every where join them. But the pope, thinking this resolution unfOOnable, and not to be easily put in execution, oppofed it; fo that it did not take place.
In the mean time, the exarch Paul, having gained a considerable party in Ravena, began, pursuant to the repeated orders from the emperor, to remove the images, as to many idols, out of the churches. Hereupon the adverse party, supported and encouraged by the pope, flew to arms; and, falling upon the Iconoclasts or image-breakers, as they styled them, gave rise to a civil war within the walls of Ravena. Great numbers were killed on both sides: but those who were for the worship of images prevailing in the end, a dreadful slaughter was made of the opposite party; and, among the rest, the exarch himself was murdered. However, the city of Ravena continued faithful to the emperor, the most of the cities of Romagna belonging to the exarchate, and all those of Pippinopolis or La Marca d'Ancona, abhorring the emperor as an heretic, submitted to Luitprand king of the Lombards; who pretending a zeal for the Catholic religion, took care to improve the discontent of the people to his advantage, by representing to them that they could never maintain their religious rights under a prince, who was not only an heretic, but a persecutor of the orthodox.

In Naples, Exilaratus, duke of that city, having received peremptory orders from the emperor to cause his edict to be put in execution, did all that lay in his power to persuade the people to receive it; but finding all his endeavours thwarted by the bishop of Rome, for whom the Neapolitans had a great veneration, he hired assassins to murder him. But the plot being discovered, though carried on with great secrecy, the Neapolitans, highly provoked against the duke, tore both him and his son to pieces, and likewise put to death one of his chief officers, who had composed a libel against the pope. Luitprand, and Gregory at that time duke of Benevento, laying hold of so favourable an opportunity to make themselves masters of the dukedom of Naples, did all that lay in their power to persuade the Neapolitans to submit to them. But the Neapolitans, bearing an irreconcilable hatred to the Lombards, with whom they had been constantly at variance, rejected every overture of that nature with the utmost indignation; and, continuing steadfast in their allegiance to Leo, received from Constantinople one Peter, who was sent to govern them in the room of Exilaratus. Some writers suppose the Neapolitans, in this general revolt of the cities of Italy, to have shaken off the yoke with the reft, and to have appointed magistrates of their own election to govern them in the room of the officers hitherto sent from Constantinople, or named by the exarch; but they are certainly mistaken: it being manifest from history, that Peter succeeded Exilaratus in that dukedom, and that the Neapolitans continued to live under the emperors, till they were conquered many years after by the Normans.

In the mean time, Leo hearing of the murder of the exarch, and the general revolt of the cities, and not doubting but the pope was the chief author of so much mischief, sent the eunuch Euthychius into Italy, with the title and authority of exarch, strictly enjoining him to get the pope dispatched by some means or other, since his death was absolutely necessary for the tranquillity of Italy. The exarch spared no pains to get the pope into his power: but a messenger, whom he had sent to Rome, being apprehended by the citizens, and an order from the emperor being found upon him to all his officers in that city commanding them to put the pope to death at all events, the pope's friends thereupon guarded him with such care, that the exarch's emissaries could never afterwards find an opportunity of executing their design. As for the messenger, the Romans were for putting him to death; but the pope interposed, contenting himself with communicating the exarch.

And now the Romans, provoked more than ever, in consequence against Leo, and, on the other hand, unwilling to mains live under the Lombards, resolved to revolt from the emperor, and appoint their own magistrates, keeping themselves united under the pope, not yet as their prince, but only as their head. This they did accordingly; and from these slender beginnings the sovereignty of the popes in Italy took its rise, though they did not then, as is commonly supposed by historians, but many years after, become sovereign lords of Rome.

Eutychius failed in his design upon the life of the pope; but having brought with him from Constantinople a good number of troops, he easily quelled the rebellion in Ravenna, and severely punished the authors of the late disturbances. As for the rebellious Romans, he was well apprized he could never reduce them, so long as they were supported by the king of the Lombards; and therefore endeavoured to throw all his art and policy to take off that prince from the party of the Romans, and bring him over to his own. Luitprand, for some time, withstood all his offers; but Thrasmund duke of Spoleto revolted at this very juncture, the exarch, laying hold of that opportunity, offered to assist the king with all his strength against the rebellious duke, provided he would, in like manner, assist him against the pope and the Romans. With this proposal Luitprand readily closed; and a league being concluded upon these terms between him and the exarch, the two armies joined, and began their march towards Spoleto. At their approach, the duke, despairing of being able to resist two such powers, came out with a small attendance to meet them, and, throwing himself at the king's feet, sued, in that humble posture, for pardon; which Luitprand not only granted him, but confirmed him in the dukedom, after he had obliged him to take a new oath of allegiance, and give hostages for his fidelity in time to come. From Spoleto, the two armies marched, in pursuance of the treaty, to Rome; and encamped in the meadows of Nero, between the Tiber and the Vatican.

Gregory had caused the city of Rome to be fortified in the best manner he could: but being sensible that it submits to the Romans alone could not long hold out against two such armies, and reflect on the kind treatment the duke of Spoleto had met with upon his submitting to the king, he resolved to follow his example; and accordingly, taking with him some of the clergy, and the principal inhabitants of the city, he went to wait on the king in his camp; and there, with a pathetic speech, as he was a great master of eloquence, softened Luitprand to such a degree, that throwing himself at his feet in the presence of the whole army, he begged pardon for entering into an alliance against
Pepin was no longer the domineering figure in Sicily, the Calabria, and his other dominions, to the Romans. He reconciled the pope with the Romans after some time, maintaining a friendly correspondence with the pope. At this time an impostor, taking the name of Tibert, pretended to be descended from the emperors, seduced a great many people in Tuscany, and was by them proclaimed emperor. The exarch resolved to march against him; but as he had not sufficient forces to oppose the rebels, Gregory, who let no opportunity slip of obliging Leo, persuaded the Romans to attend the exarch in this expedition; by which means the usurper being taken in a battle, his head was sent to the emperor, and the rebellion utterly suppressed. But the emperor still intimated upon his return against the images being received in Rome, the Romans, at the instigation of the pope, publicly renounced their allegiance to Leo, paid him no more tribute, and withdrew for ever their obedience to the emperors of the East.

Leo, informed of this revolt, and not questioning but the pope was the author of it, immediately cau sed all the privileges of the church in Sicily, Calabria, and his other dominions, to be confiscated. At the same time, he ordered a powerful army to be raised, with a design to recover the towns that had revolted; to chastise the Romans for their rebellion; and, above all, to be revenged on the pope, who had rai sed all these disturbances, by opposing himself, and persuading others to oppose, the execution of his edict. Gregory, alarmed at the warlike preparations that were carrying on throughout the empire, and well apprised that they were chiefly designed against him and the Romans, resolved to recur to the protection of the French, the only nation at that time capable of coping with the emperor, and on whom, on account of their zeal for religion, he thought he might depend. The Lombards were then very powerful; but, as they wanted to be masters of Rome, and at this time governed by a prince of considerable eminence, who had embraced the Christian religion, they governed with such equity and moderation, that most other nations envied the happiness of those who lived under them. Under the government of the Lombards (says Paulus Diaconus) no violence was committed, no one unjustly dispossessed of his property, none oppressed with taxes; theft, robberies, murder, and adulter y, were seldom heard of: every one went, without the least apprehension, wherever he pleased. Their laws were so just and equitable, that they were retained in Italy, and observed there some ages after their kingdom was at an end.—According to Paulus Diaconus, also, their dress was loose, and for the most part of linen, such as the Anglo-Saxons wore, being interwoven with various colours; and their shoes were open to the end of their foot, and that they used to button or lace them. From some ancient paintings, it appears, that they shaved the back part of their heads, but that their hair was long before; their locks being parted, and laid on each side their foreheads.

Lombards, of Lombard (Peter), an engraver of considerable eminence, who flourished about the year 1660. He was a native of Paris, where he learned the art of engraving. It appears that he came into England before the revolution, because some of his plates for English publications are dated prior to that event. He executed a vast variety of plates, as well historical as emblematical; which, however, were chiefly for books. But his best works are portraits; and of these he produced a considerable number, which are esteemed. They are mostly after Vandyke. He also engraved historical subjects, from Poussin, Raphael, Annibal Caracci, Guido, and other masters.
LOCH-LOMOND, a large lake of Dumbarton or Lennox-shire in Scotland, of which Mr. Pennant gives the following description. "Loch-lomond, the last of the most beautiful of the Caledonian lakes. The first view of it from Tarbat, presents an extensive fen­tine winding amidst lofty hills; on the north, barren, and rocky, which darken with their shade that contracted part of the water. On the west side, the mountains are clothed near the bottoms with woods of oak quite to the water's edge; their summits lofty, banks of the Leven; and Ben-lomond, like Saul amidst his companions, overtops the rest. The upper parts were black and barren; the lower had great marks of fertility, or at least of industry, for the yellow corn was finely contrasted with the verdure of the groves intermixed with it.

This eastern boundary is part of the Grampian hills, which extend from hence through the counties of Perth, Angus, Mearns, and Aberdeen. The road runs sometimes through woods, at others is exposed and naked; in some, so steep as to require the support of a wall; the whole the work of the solitude: blemish exchange of inroads of destruction for those that give safety to the traveller, and a polish to the once inaccessiblè native! Two great head-lands covered with trees separate the first scene from one totally different; the last is called the Point of Pirkinn. On passing this cape an expanse of water bursts at once on your eye, varied with all the softer beauties of nature. Immediately beneath is a flat covered with wood and corn: beyond, the headlands stretch, far into the water, and consist of gentle risings; many have their surfaces covered with wood, others adorned with trees loosely scattered over a fine verdure or the purple bloom of the heath. Numbers of islands are dispersed over the lake, of the same elevated form as the little capes and wooded in the same manner; others jut peep above the surface, and are tufted with trees; and numbers are so disposed as to form magnificent vistas between.

Opposite Lufs, at a small distance from the shore, is a mountainous isle almost covered with wood, is near half a mile long, and has a most fine effect. I could not count the number of islands, but it was sold there are 28; the largest two miles long, and stocked with deer.

The length of this charming lake is 24 Scotch miles; its greatest breadth is; its greatest depth, which is between the point of Pirkinn and Ben-lomond is 120 fathoms. Besides the fish common to the lochs are guinias, called here pans.

The surface of Loch-lomond has for several years past been observed gradually to increase, and invade the adjacent shore; and there is reason to suppose that churches, houses, and other buildings, have been lost in the water. Near Lufs is a large heap of stones at a distance from the shore, known by the name of the old church; and about a mile to the south of that, in the middle of a large bay, between Camfraddan, and the isle Inch-lavansch, is another heap, said to have been the ruins of a house. To confirm this, it is evident by a passage in Camden's Britannia, that an island, existing in his time, is now lost; for he speaks of the isle of Camfraddan, placed between the lands of the same name and Inch-lavansch, in which, adds he, was a house and orchard. Besides this proof, large trees with their branches still adhering are frequently found in the mud near the shore, overwhelmed in former times by the increase of water. This is supposed to be occasioned by the vast quantities of stone and gravel that are continually brought down by the mountain rivers, and by the falls of the banks of the Leven; the first filling the bed of the lake, the last impeding its discharge through the bed of the river."

LOMOZOMOZOZOF, a celebrated Russian poet, the great refiner of his native tongue, was the son of a person who trafficked in fish at Kolmogori: he was born in 1711, and was fortunately taught to read a rare instance for a person of low station in Russia. His natural genius for poetry was first kindled by the perusal of the Song of Solomon, done into verse by Polotski, whose rude compositions, perhaps scarcely inferior to our version of the psalms by Sternhold and Hopkins, inspired him with such an irresistible passion for the mutes, that he fled from his father, who was desirous of compelling him to marry, and took refuge in the Kaisonopalsti monastery at Moscow; there he had an opportunity of indulging his taste for letters, and of studying the Greek and Latin languages. In this monastery he made so considerably a progress in polite literature, as to be noticed and employed by the Imperial academy of sciences. In 1736 he was sent at the expense of that society, to the university of Marpurgh in Hesse Caffel, where he became a scholar of the celebrated Christian Wolf, under whom he studied universal grammar, rhetoric, and philosophy. He continued at Marpurgh four years, during which time he applied himself with indefatigable diligence to chemistry, which he afterwards pursued with still greater success under the famous Henckel at Freyberg in Saxony. In 1741 he returned into Russia; was chosen in 1742 adjunct to the imperial academy, and in the ensuing year member of that society and professor of chemistry. In 1766 he was appointed inspector of the seminary, then annexed to the academy; in 1764 he was gratified by the present emprefs with the title of counsellor of state; and died April 4th that year, in the 54th year of his age. Lomomoizof excelled in various kinds of composition; but his chief merit, by which he bears the first rank among the Russian writers, is derived from his poetical compositions, the spirit of which are his odes. The first was written in 1739, while he studied in Germany, upon the taking of Kotchkin, a forrever of Crim Tartary, by Marshal Munich. The odes of Lomomoizof are greatly admired for originality of invention, nobility of sentiment, and energy of language; and compensate for the turgid style, which, in some instances, have been imputed to them, by that spirit and fire which are the

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principal characteristics in this species of composition. Pindar was his great model; and if we may give credit to a person well versed in the Russian tongue, he has succeeded in this daring attempt to imitate the Theban bard, without incurring the cenure of Horace. In this, as well as several other species of composition, he enriched his native language with various kinds of metre, and seems to have merited the appellation bestowed upon him of the Father of Russian Poetry. A brief recapitulation of the principal works of Lomonoff, which were printed in three volumes octavo, will serve to show the versatility of his genius, and his extensive knowledge in various branches of literature. The first volume, besides a preface on the advantages derived to the Russian tongue from the ecclesiastical writings, contains ten facred and nineteen panegyric odes, and several occasional pieces of poetry. The second comprises An Essay in Prose on the Rules for Russian Poetry; Translation of a German Ode; Idylls; Tamara and Selim, a tragedy; Demophoon, a tragedy; Poetical Epitaph on the Utility of Glasses; two cantos of an epic poem, intitled, Peter the Great; A Congratulatory Copy of Verfes; An Ode; Translation of Baptifm Rousseau's Ode Sur le Bonheur; Heads of a Course of Lectures on Natural Philosophy; certain passages translated in verse and prose, according to the original, from Cicero, Erasmus, Lucian, Ammianus Marcellinus, Quintus Curtius, Homer, Virgil, Martial, Ovid, Horace, and Seneca, which Russian translations were brought as examples in his Lectures upon Rhetoric; laftly, Description of the Comet which appeared in 1744. The third volume contains chiefly of Speeches and Treatises read before the Academy; Panegyric on the Emprefs Elizabeth; on Peter the Great; Treatise on the Advantages of Chemistry; on the Phenomena of the Air occasioned by the Electrical Fire, with a Latin Translation of the fame; on the Origin of Light as a new Theory of Colours; Methods to determine with precision the Course of a Vefsel; on the Origin of Metals by the means of Earthquakes; Latin Dissertation on Solidity and Fluidity; on the Transit of Venus in 1761, with a German translation. Beside these various subjects, Lomonoff made no incicdible figure in history, having published two small works relative to that of his own country. The first, styled Annals of the Russian Sovereigns, is a short chronology of the Russian monarchs; and the second is, the Ancient History of Russia, from the Origin of that Nation to the Death of the Great Duke Yaroslav I. in 1054; a performance of great merit, as it illustrates the moft difficult and obscure period in the annals of this country.

LONDON, a large city of Middlefex in England, the metropolis of Great Britain, and one of the most wealthy and populous places in the world, is situated on the river Thames, in 51° 31' north latitude, 000 miles south of Edinburgh, and 270 south-east of Dublin; 180 miles west of Amsterdam, 210 north-west of Paris, 300 north-west of Copenhagen, 400 north-west of Vienna, 700 north-west of Stockholm, 800 north-east of Madrid, 830 north-west of Rome, 930 north-east of Lisbon, 1360 north-west of Constantinople, and 1414 south-west of Moscow.

The city was by the Romans first called Londinium; as we find it in Tacitus, Polybey, Antonio, and Ammianus. That name was afterwards changed into Augufa; in honour, as some say, of Helena August, the mother of Constantine the Great; while others think it more probable that it had this name from the second legion, whose peculiar title was Augufa; and some imagine that the honourable appellation of Augufa was conferred upon this city by the Romans, as upon other principal cities of their empire, on account of its being grown up to be the capital of their British province. How long the name of Augufa prevailed, is not now certainly known; but after the establishment of the Saxons we find no more mention of Augufa. It was then called Cæsar Londoniæ; Lundoun Byrig, Lundoun Caesar, London-wyve, Lundane, Lundun-berth, or Lundenburg; since the conquest the records call it Londiniæ, Londoniæ, London, Londres; and, for several ages past, it has been called London, a manifest corruption from Tactitus's Londonium. The most probable derivation of these names appears to be, either from the British words dong "a flipp," and din "a town," i.e. a town or harbour for ships; or from Linus "a lake," i.e. Linus din, "the lake upon the land," the Sury side being supposed, upon very probable grounds, to have been anciently a great expanse of water.

Londinium, however, was not the primitive name of this famous place, which existed before the invasion founded, by the Romans; being, at the time of Caesar's arrival in the island, the capital of the Trinobantes or Trinunantes. The name of this nation, as appears from Baxter's Britifh Glossary, was derived from the three p. 230 following British words, tri, not, hant, which signify the "inhabitants of the new city." This name, it is supposed, might have been given them by their neighbours, on account of their having newly come from the continent into Britain, and having there founded a city called "tri-now, ortho" the new city; "the most ancient name of the renowned metropolis of Britain. The Tri-ners had come so lately from Belgium, that they High. vol. 1 seem scarcely to have been firmly established in Britain p. 170 at the time of the first Roman invasion: For their new city, which soon after became so famous, was then so inconsiderable, that it is not mentioned by Caesar, tho' he must have been within sight of the place where it was situated. His silence about this place, indeed, is brought as a proof that he did not cross the Thames; while Norden, the Trinunantes civitas of the Trinobantes, understoods the city in question, the Trinobantes themselves having been among the first of the Britifh states who submitted to that conqueror.

By Ptolemy, and some other ancient writers of good authority, indeed, Londinium is placed in Cantium, or Cent, on the south side of the Thames; and it is the opinion of some moderns, that the Romans probably had a station there, to secure their conquests on that side of the river, before they reduced the Trinobantes. The place fixed upon for this station is St George's fields, a large plat of ground situated between Lambeth and Southwark, where many Roman coins, bricks, and chequered pavements, have been found. Three Roman ways from Kent, Surrey, and Middlefex, intersected each other in this place; this therefore is supposed to be the original Londinium which it is thought became neglected after the Romans reduced the Trinobantes, and settled on the other
The Romans possessed themselves of London, on their second invasion in the reign of Claudius, about 105 years after their first under Caesar. They had begun with Camulodunum, the present Maldon in Essex, and taking it, planted there a colony consisting of veterans of the 14th legion. London and Verulamium were next taken possession of, about one and a half times after Camulodunum was made a colonia, or place governed entirely by Roman laws and customs; Verulamium (on the site of which St Alban's now stands), a municipium, in which the natives were honoured with the privileges of Roman citizens, and enjoyed their own laws and constitutions; and Londinium only a praefidura, the inhabitants, a mixture of Romans and Britons, being suffered to enjoy no more than the name of citizens of Rome, being governed by prefects sent annually from thence, without having either their own laws or magistrates. "It was even then of such concourse (says Mr Pennant), and such vall trade, that the white conquerors did not think fit to trust the inhabitants with the same privileges as other places of which they had less reason to be jealous." But others observe, that this is a mistake; and that the Romans, in order to secure their conquest, and to gain the affections of those Britons who had already submitted to their authority, made London equally a municipium or free city with Verulamium, as may be seen by referring to Aulus Gallius, l. 16. c. 13. and to Spanhem, orbis Roman. P. 37. 38. tom. ii.

It is difficult to say what were the particular articles of commerce exported from and imported into the port of London at this period. The imports and exports have in general we know; Strabo says, "Britain produces corn, cattle, gold, silver, iron, besides which, skins, flaves, and dogs naturally excellent hunters, are exported from that island." It is probable that the two first and three last articles were exported from London; and perhaps, too, the geese or jet-tone mentioned by Solinus as one of the productions of Britain, together with hares, were exported from thence. The imports were, at first, felt, carthn ware, and works in brass, polished bits of bones emulating ivory, horse-collars, toys of amber, glases, and other articles of the same material.

In the reign of Nero, as Tacitus informs us, London was become a city highly famous for the great concourse of merchants, her extensive commerce, and plenty of all things. No fewer than seven of the fourteen Itinera of Antoninus begin or end at London; which tends to corroborate the many proofs which might be adduced, that this city was the capital of Britain in the Roman times.

At first London had no walls or other fortifications to defend it, and was therefore exposed to the attacks of every enemy, and thus it suffered severely about the year 64, being burnt by the Britons under Boadicea, and all the inhabitants butchered. But it was soon restored by the Romans and increased so much, that in the reign of the emperor Severus it is called by Herodian a great and wealthy city. It continued, however, in a defenceless state for more than a century after this last period; when at last a wall of hewn stone and British bricks were erected round it.

London at this time extended in length from Ludgate-hill to a spot a little beyond the Tower. The breadth was not half equal to the length, and at each end grew considerably narrower. Maitland describes the building of the walls to Theodosius governor of Britain in 395. Dr. Woodward, with more probability, supposes them to have been founded under the auspices of Constantine the Great; and this seems to be confirmed by the numbers of coins of that emperor's mother Helena, which have been discovered under them, placed there by him in compliment to her. The fame emperor made it a bishop's see; for it appears that the bishops of London and York, and another English bishop, were at the council of Arles in the year 314; he also settled a mint in it, as is plain from some of his coins. The ancient course of the wall was as follows: It began with a fort near the present site of the Tower, was continued along the Minories, and the back of Houndsditch, across Bishopsgate-street, in a straight line by London-wall to Cripplegate; then returned southward by Crowder's Well Alley, (where several remnants of lofty towers were lately to be seen) to Aldergate; thence along the back of Bull and Mouth-street to Newgate, and again along the back of the houses in the Old Bailey to Ludgate; soon after which it probably finished with another fort, where the house, late the king's printing-house, in Black Friars, now stands: from hence another wall ran near the river side, along Thames-street, quite to the fort on the eastern extremity. The walls were three miles a hundred and sixty-five feet in circumference, guarded at proper distances on the land side with fifteen lofty towers; some of them were remaining within these few years, and possibly may still. Maitland mentions one twenty-six feet high, near Gravel-lane, on the west side of Houndsditch; another, about eighty paces south-east towards Aldgate; and the bales of another, supporting a modern house, at the lower end of the street called the Vineyard, south of Aldgate. The walls, when perfect, are supposed to have been twenty-two feet high, the towers forty. These, with the remnants of the wall, proved the Roman structure, by the tiles and disposition of the masonry. London-wall, near Moorfields, is now the most entire part left of that ancient precinct. The gates, which received the great military roads, were four. The Praetorian way, the Saxon Watling-street, passed under one, on the site of the late Newgate; vestiges having been discovered of the road digged above Holburn-bridge: it turned down to Dowgate, or more properly Darw-gate or Watergate, when...
London there was a trajec or ferry, to join it to the Watling-street, which was continued to Dover. The Hermin direct passed under Cripplegate; and a vicinal way went under Aldgate by Bethnal-green, towards Oldford, a pas over the river Lee to Duroleiton, the modern Leiton in Essex.

After the Romans deserted Britain, a new and fierce race succeded. The Saxons, under their leaders Hengist and Horna, landed in 449, having been invited over by the provincials as auxiliaries against the Scots and Picts; but quarrelling with their friends, they found means to establish themselves in the island, and in process of time entirely subdued them, as related under the article ENGLAND, nos 31-44. London fell into the hands of these invaders about the year 457, and became the chief city of the Saxon kingdom in Essex. It suffered much in the wars carried on between the Britons and Saxons: but it soon recovered; so that Bede calls it a principality or mart-town, under the government of a chief magistrate, whose title of portgrave, or portreue (as we find him called by both names), conveys a grand idea of the mercantile state of London in those early ages, that required a governor or guardian of the port. During the civil war of the Saxons with each other, the Londoners had always the address to keep themselves neuter; and about the year 819, when all the seven Saxon kingdoms fell under the power of Egbert, London became the metropolis of England, which it has ever since continued.

During the invasions of the Danes, London suffered greatly. In 849, these invaders entered the Thames with 250 ships, plundered and burnt the city, and massacred the inhabitants; and two years after they returned with a fleet of 350 sail, fully determined to destroy every thing that had escaped their barbarity in the former expedition. At this time, however, they were disappointed; most of their troops being cut in pieces by king Ethelwold and his son Athelbald; yet such was the destruction made by these barbarians at London, that it suffered more from these two invasions than it had done before.

In the reign of king Alfred the Great, London began to recover from its former ruinous state. He rebuilt its walls, drove out the Danish inhabitants who had settled there, restored the city to its former liberties and beauty, and committed the care of it to his son-in-law, Ethelred duke of Mercia, in hopes that this might always be a place of secure retreat within its strong walls, whatever might happen from a foreign or domestic enemy. In 893, however, he had the mortification to see his capital totally reduced to ashes by an accidental fire, which could not be extinguished, as the houses at that time were all built of wood. The walls, however, being constructed of incumbible materials, continued to afford the same protection as before; the houses were quickly rebuilt, and the city divided into wards and precincts for its better order and government. This king also instituted the office of sheriff, the nature of which office made it necessary to have it also in London; so that here we have the glimmerings of the order of magistrates afterwards settled in the city of London; in the person of the portreue, or portgrave, or governor of the city, as supreme magistrate; in the sheriff, and in the officer or subordi-

nate magistrate by what name soever then distinguished, which, being placed at the head of each ward or township, were analogous to the modern title of aldermen and common-councilmen.

Alfred having settled the affairs of England in the Brick and most prudent manner, directed his attention to the or gene namenting, as much as possible, the city of London, houses first. For this purpose, he spirited up the English to an emula
tion in building their houses of stronger and more durable materials than formerly. At that time their houses were mostly of wood; and an house built of any other materials was looked upon as a kind of wonder. But Alfred having begun to raise his palaces of stone and brick, the opulent Londoners, and the mobiility resident in and about London, followed the example, though the custom did not come into general use till some ages after.

In 1015, a foreign enemy again appeared before London. Canute king of Denmark having invaded and plundered the counties of Dorset, Somerset, and Wilts, failed up the Thames with 200 ships, and laid siege to the city. The citizens continued faithful, notwithstanding the defection of the greatest part of the kingdom; and made such a brave resistance, that Canute thought fit to withdraw his army, leaving only his fleet to blockade the city by water; that when he found a fair opportunity he might renew the siege with better success. At last, however, being defeated in several battles by Edward Ironside, he was obliged to call off his ships to cover his own army in case of necessity. In the compromise, however, which was afterwards made between Edmund and Canute, the city of London was given to the latter, and owned him for its lawful sovereign. We have a strong proof of the opulence of London even at this time, from the tax laid upon it by Canute in order to pay his army; this being no less than 10,500l. while the rest of the nation was at the same time taxed only at 72,000l.

In 1046, we have the first intimation of the Londoners sending representatives to parliament. This happened on settling the succession to the throne after Canute's death. The English in general declared for Edward, son of king Ethelred, or, in other words, for Emma, and then absented on a tour to Denmark. The city of London espoused the claim and interest of Harald Harefoot, son of Emma, and then abjured the succession in the name of Edward's party soon declined; and the Londoners agreed, for the peace of the realm, that the two brothers should divide the kingdom between them; but as Hardicanute did not return in proper time to England, a witenage-note was held at Oxford, where earl Leofric, and most of the thanes on the north of the Thames, with the pilots of London, chose Harold for their king. Here, by pilote we are to understand the directors, magistrates, or leading men of the city: and this manifestation shows, that London was then of such consequence, that important national affairs were transacted without the consent of the inhabitants; for the Saxon annals assure us, that none were admitted into this assembly of election but the nobility and the pilots of London.

On the invasion of the Normans under William I. London submitted as well as the rest of the kingdom; and received two charters from that prince, confirming &c.
ing all the privileges they had under the Saxon kings, and adding several new ones. But while the citizens were promising themselves all manner of security and tranquility under the new government, it was almost entirely reduced to ashes by an accidental fire in 1077. It had sorely recovered from this calamity, when it was visited by another of the same kind in 1086, which began at Ludgate, and destroyed the best and most opulent part of the city; consuming, among other buildings, the cathedral of St Paul's, which, however, was soon rebuilt more magnificently than before.

Under the reign of William Rufus, London suffered considerably by fires, hurricanes, and inundations, and seems to have been depressed by the tyranny of that prince; but Henry I. granted large immunities to the city, which again revived its trade, and was favorable to the progress of the arts. The king, however, still retained the privilege of appointing the portreave, or chief magistrate; but the immunities granted to the Londoners secured their affections, and tended much to secure him on the throne. At the same time, there was much money in the exchequer, and the city of London was much favored by King Henry. The Londoners, to additional power of their hands or feet cut off, were at last stopped by the execution of John Senex, who, though a very rich and reputable citizen, had engaged in these enterprises. He offered 500 lb. weight of silver, a prodigious sum in those days, for his pardon, but was refused. The king, however, still continued to drain the citizens of their money by free gifts, and at last fined every separate guild, fraternity, or company, that had professed to sell as bodies corporate without the royal letters-patent.

On the death of Henry II. the title of the first mayor of London was conferred by a charter of that time, and at the coronation of Richard I. in 1199, this monarch permitted the bailiff, named Henry Fitz Alwine, to assume the title of mayor. For, in 1192, we find certain orders of the mayor and aldermen to prevent fires; whereby it was ordained, that "all houses thereafter to be erected in London and the liberties thereof, should be built of stone, with party-walls of the same; and covered either with slates or tiles, to prevent those dreadful calamities by fire, which were frequently and chiefly occasioned by houses of wood, and thatched with straw or reeds." And for this purpose, it was also provided by the discretionary men of the city, "that 12 aldermen of the city should be chosen in full hustings, and there sworn to assist the mayor in appealing contentions that might arise between neighbours in the city upon inclosure betwixt land and land, and to regulate the dimensions of party-walls, which were to be of stone, 16 feet high and three feet thick, and to give directions about girders, windows, gutters, and wells." Such confidence also did Richard put in the wisdom and faithfulness of the city of London, that when it was resolved to fix a standard for weights and measures for the whole realm, his majesty committed the execution thereof to the sheriffs of London and Middlesex, whom he engaged in these enterprizes. He offered a standard for measures, gallons, yards, and weights for standards, to be sent to the several counties of England. This happened in 1198, at which time corn was advanced to the enormous price of 18s. 4d. per quarter.

The city of London was much favored by King John, who granted them three charters soon after his accession. The first was a recital and confirmation of the charter granted by Henry I. and II. with the farther privilege of being free from toll and every other duty or custom in his majesty's foreign dominions; for which they paid the sum of 3000 marks. The second was a confirmation of one granted by King Richard. By this the citizens of London had the jurisdiction and conservancy of the river Thames; with a clause to extend that jurisdiction, and the powers therewith granted, to the river Medway; and with another clause to enable the said city, as conservators of the rivers Thames and Medway, to inflict a penalty of 10l. upon any person that should presume to erect a weir in either of these rivers. The third charter contains a fee-farm-rent of the sheriffs of London and Middlesex at the ancient rent, of which they had been deprived by Queen Maud; granting them also the additional power of choosing their own sheriffs. This charter was given by way of conveyance from the crown to the citizens for a valuable consideration, by which the sheriffs became their freehold; and this is the first covenant or conveyance we find on record.
In the year 1212, on St. James's day, the citizens of London having carried off the victory from the people of Westminster, and other neighbouring villages, the steward of the abbot of Westminster, mediating revenge against the Londoners, proposed another wrestling-match with them, and gave a ram for the prize. The citizens reforted to the place at the time appointed, but were unexpectedly attacked by a great number of armed men, who killed and wounded many, and dispersed the rest. This raised a great commotion in the city. The populace breathed revenge; and, by the instigation of Constance Fitz-Arnulf, a great favourite of the French party during the troubles in king John's reign, they proceeded to Westminster, and pulled down the houses both of the steward and abbot. Hearing afterwards that the abbot was come into the city with his complaint to Philip Daubrey the king's counsellor, they pursuaded him, beat his servants cruelly, took away 12 of his horses, and would have murdered himself, had he not escaped by a back-door. Upon this tumult, Hubert de Bury, then chief justice, summoned the mayor and many of the principal citizens to attend him in the tower of London; and enquiring for the authors of the riot, Constance, the ringleader, boldly answered, that "he was one; and that they had done no more than they ought; and that they were resolved to avow what they had done, let the consequence be what it would." In this he was seconded by his nephew and one Geoffrey; but the judicature, having dismissed all the rest, detained these three, and ordered them to be hanged next morning, though Constance offered 15,000 marks for his pardon. Hubert then coming into the city with a strong guard, caufed the hands and feet of most of the principal rioters he could seize to be cut off; all which was executed without any legal proceedings or form of trial. After these arbitrary cruelties, he degraded the mayor and all the magistrates; placed a curfew over the city, and oblgd 30 persons of his own choosing to become securities for the good behaviour of the whole city. Several thousand marks were also exacted by the king, before he would consent to a reconciliation.

This arbitrary behaviour alarmed the whole nation. The parliament of 1224 began to be uneasy for themselves, and addressed his majesty that he would be pleased to confirm the charter of liberties which he had sworn to observe; and the commons, in imitation of the senatus consultum of the magna charta in the full parliament at Westminster in the year 1225. At this time also, the rights and privileges of the citizens were confirmed. They were exempted from procurations for barrels, i.e. a luted cloth; and were granted the right of having a common feal. The melancholy circumstances of this monarch, however, made him often exact money arbitrarily as long as he lived.

Under the succeeding reigns, as the liberty of the people in general was augmented, so the liberty, privilege, and power of the citizens of London increased till they became a kind of balance to the power of the crown itself, which in some measure they still continue to be. Riots indeed, for which they generally suffered, were by no means unfrequent; the city often suffered by fires and plagues. Nothing, however, happened which materially affected the welfare of the city, till the reign of Charles II. in 1665. This year London was ravaged by the most violent plague ever known in Britain. The whole summer had been remarkably mild and warm, so that the weather was sometimes suffocating even to people in perfect health; and by this unusual heat and sultry atmosphere, people were undoubtedly prepared for receiving the infection, which appeared in the persons of John Arundel and others in September. A violent plague had raged in Holland in the year 1663; on which account the importation of merchandize from that country was prohibited by the British legislature in 1664. Notwithstanding this prohibition, however, it seems the plague had actually been imported; for in the clofe of the year 1664, two or three persons died suddenly in Westminster, with marks of the plague on their bodies. Some of their neighbours, terrified at the thoughts of their danger, removed into the city; but their removal proved too late for themselves, and fatal to those among whom they came to reside. They soon died of the plague, and communicated the infection to so many others, that it became impossible to extinguish the seeds of it by separating those that were infected from such as were not. It was confined, however, through a hard frosty winter, till the middle of February, when it again appeared in the parish of St. Giles's to which it had been originally brought; and after another long rest till April, showed its malignant force afresh, as soon as the warmth of the spring gave it opportunity. At first, it took off one here and there, without any certain proof of their having infected each other, and houses began to be shut up, with a design to prevent its spreading, but it was too late; the infection gained ground every day, and the shutting up of houses only made the diseases spread wider. People, afraid of being shut up, and fequestered from all communications with society, concealed their illness, or found means to escape from their places of confinement; while numbers expired in the greatest torments, destitute of every assistance, and many died both of the plague and other diseases, who would in all probability have recovered, had they been allowed their liberty, with proper exercise and air.—A houfe was shut up upon account of a maid servant, who had only spots, and not the gangrenous plague-blotches, upon her, so that her master was probably a petechial fever. She recovered; but the people of the house obtained no liberty to fly, either for air or exercise, for 40 days. The bad air, the anger and vexation, attending this injurious treatment, cast the misfortunes of the family into a fever. The visitors appointed to search
fire in 1666

London.

search the houses, said it was the plague, though the physicians were of a different opinion: the family, however, were obliged to begin their quarantine anew, though it had been almost expired before; and this second confinement affected them so much, that most of the family fell sick, some of one distemper and some of another. Many examples of a similar kind happened, and this was one of the worst conflagrations of blighting up houses. A means of putting a stop to the infection were evidently ineffectual. Multitudes fled into the country; many merchants, owners of ships, &c., shut themselves up, on board their vessels, being supplied with provisions from Greenwich, Woolwich, and single farm-houses on the Kentish side. Here, however, they were safe; for the infection never reached beyond Deptford, though the people went frequently on shore to the country-towns, villages, and farm-houses to buy fresh provisions. As the violence of the plague increased, the ships which had families on board removed farther off; some went quite out to sea, and then put into such harbours and roads as they could best get at.

In the mean time, the distemper made the most rapid progress within the city. In the last week of July, the number of burials amounted to 2010; but the first week of August it rose to 3817; thence to 3880; then to 4227; the next week to 5238; and at last to 7000 and 8000 weekly. In the last week of September, however, the fury of the disease began to subside; though vast numbers were sick, yet the number of burials decreased from 7155 to 5738; the next week there was a further decrease to 4929, then to 4227, next to 2665, then to 1421, and the next week to 1037.

All this while the poor people had an immense way up into the air, and their reflection from the smoke, which in the night-time seemed also like flame, made the appearance still more terrible. The atmosphere was illuminated to a great extent, and this illumination is said to have been visible as far as Jedburgh in Scotland. Some of the light ashes also have been carried far from the city, at a distance of 16 miles. Guildhall exhibited a singular appearance. The oak with which it was built was so solid that it would not flame, but burnt like charcoal, so that the building appeared for several hours like an enchanted palace of gold or burnished brass.

At last, on Wednesday morning, when every one expected that the suburbs as well as the city were to be consumed, it began of itself to subside by reason of the wind having ceased, and some other changes no doubt taken place in the atmosphere. It was observed by the great building in Leadenhall-street, and in other streets by the blowing up several houses with gunpowder, and on Thursday the flames were quite extinguished. The following is a calculation of the damage done by this extraordinary conflagration.

Thirteen thousand two hundred houses, at 12 years purchase, supposing the rent of each 25l. Sterling, 3656000 0 0
Eighty-seven parish-churches, at 800l. each, 665000 0 0

Carried forward, 4656000 0 0

Six.
Six consecrated chapels, 2000 l. 12,000 0 0
The royal exchange 50,000 0 0
The custom-house 10,000 0 0
Fifty-two halls of companies, at 1500 l. each 78,000 0 0
Three city-gates at 3000 l. each 9000 0 0
Jail of Newgate 15,000 0 0
Four stone-bridges 6000 0 0
Schooners, &c. 7000 0 0
Guildhall, with the courts and offices belonging to it 40,000 0 0
Blackwell-hall 3000 0 0
Bridewell 5000 0 0
Poultry Compter 5000 0 0
Woodstreet Compter 3000 0 0
St Paul's church 2,000,000 0 0
Wares, household-fluff, money, and moveable-goods lost or spoiled 2,000,000 0 0
Hire of porters, carts, waggons, barges, boats, &c. for removing goods 200,000 0 0
Printed books and paper, in farms and ware-houses 150,000 0 0
Wine, Tobacco, sugar, &c. of which the town was at that time very full 1,500,000 0 0
10,689,000 0 0

It was never certainly known whether this fire was accidental or design'd. A suspicion fell upon the Papists; and this gained such general credit, that it is affirmed for a truth on the monument which is erected in memory of the conflagration. Of the truth of this aff'rmation, however, though there was not sufficient proof, it had the effect of making the Papists most violently suspected and abhorred by the Protestants, which some time after proved very prejudicial to the city itself.

From this calamity, great as it was, London soon recovered itself, and became much more magnificent than before; the streets which were formerly crooked and narrow, being now built wide and spacious; and the industri of its inhabitants repaired the losses they had sustained. In 1679, the city was again alarmed by the discovery of a design to destroy it by fire a second time. Elizabeth Oxly, servant to one Rind in Fetter-lane, having set her master's house on fire, was apprehended on suspicion, and confessed, that she had been hired to do it by one Stubbs a Papist, for a reward of 51. Stubbs being taken into custody, acknowledged that he had persuaded her to it; and that he himself had been prevailed upon by one father Gifford his confessor, who had assured him, that by burning the houses of heretics he would do a great service to the church. He also owned that he had several conferences with Gifford and two Irishmen on the affair. The maid and Stubbs also agreed in declaring, that the Papists intended to rise in London, expecting to be powerfully supported by a French army. In consequence of this discovery, the Papists were banished from the city and ten miles round, and five Jesuits were hanged for the abovementioned plot.

The Papists thought to revenge themselves, by forging what was called the meat-tub plot, in which the Presbyterians were supposed to hatch treacherous designs against the life of the king. Sir Edmonbury Godfrey also, who had been very active in his proceedings against the Papists, was murdered by some unknown persons; and this murder, together with their discovering the falsehood of the meal-tub plot, a quarrel to exasperate the Londoners, that they resolved to show their detestation of Popery, by an extraordinary exhibition on the 17th of November, Queen Elizabeth's accession to the throne, on which occasion the town had usually burnt the Pope in effigy. The procession began with a person on horseback prostrating Sir Edmondbury Godfrey, attended by a bell-man, proclaiming his execrable murder. He was followed by a person carrying a large silver cros, with priests in cope, Carmelites, and Gray-friars, followed by six Jesuits; then proceeded divers wavers, and after them some bishops with lawn-sleeves, and others with cope and mitres. Six cardinals preceded the pope, enthroned in a flately pageant, attended by divers boys with pots of incense, and the devil whispering in his ear. In this order they marched from Bishopsgate to Fleet-street; and there, amidst a great number of spectators, committed his holiness to the flames.

This procession gave great offence to the court, at which the duke of York, afterwards James II. had a great influence. This breach was farther widened by the choice of sheriffs for that year. The candidates set up by the court were rejected by a majority of almost two to one; but this did not deter their party from demanding a poll in their behalf, upon which a tumult ensued. This was represented by the Popish party in such colours to the king, that he issued out a commission that same evening for trying the rioters; which, however, was so far from intimidating the rest, that they grew more and more determined, not only to oppose the Popish party, but to exclude the duke of York from his succession to the throne.

In the mean time, the king prorogued the parliament, to prevent them from proceeding in their inquiry concerning the Popish plot, and the exclusion-bill. Upon this the lord-mayor, aldermen, and common-council, presented a petition to his majesty, in which they requested, that he would permit the parliament to sit in order to complete their salutary measures and councils. This petition was highly recommended by the king; who, instead of granting it, dissolved the parliament, and could never afterwards be reconciled to the city. From this time it was determined to feize their charter; and fresh provocations having been given about the election of sheriffs, a warrant was at last produced by the attorney-general, in order to overthrow their charter, and thereby deprive the citizens of the power to choose sheriffs, against the city. This information set forth, That the mayor and commonalty and citizens of the city of London, by the space of a month then past and more, used, and yet do claim to have and use, without any lawful warrant or regal grant, within the city of London abovefoald, and the liberties and privileges of the same city, the liberties and privileges following, viz. 1. To be of themselves a body corporate and politic, by the name of mayor and commonalty and citizens of the city of London. 2. To have sheriffs civil and criminal. 3. To have house of commons. 4. To have a form of government and laws of the city, and to name, make, and elect, and constitute
Though nothing could be more unjust than this proceeding, the mischief were determined at all events to ruin the Londoners; rightly judging, that it would be an easy matter to make all other corporations surrender their charters into the king's hands, and that they had no other body in the nation to fear. Accordingly they displaced such judges as would not approve of their proceedings, and, on the 12th of June 1683, Justice Jones pronounced the following sentence: "That a city might forfeit its charter; that the malversation of the common-council were acts of the whole city; and that the points let forth in the pleadings were just grounds for the forfeiting of a charter."

Notwithstanding the sentence, however, the attorney-general, contrary to the usual custom in such cases, was directed to move that the judgment might not be recorded; being afraid of the consequences. Yet it was judged that the king might seize the liberties of the city. A common-council was immediately summoned to deliberate on this exigency. The country party moved to have the judgment entered; but they were over-routed by the city party, who insisted upon an absolute sublimation to the king before judgment was entered; and though this was in effect a voluntary surrender of the city liberties, and depriving themselves of the means of getting the judgment reversed, the act of sublimation was carried by a great majority: and in a petition from the lord-mayor, aldermen, and common-council, they "acknowledged their own misgovernment, and his majesty'sjustice; begged his pardon, and promised constant loyalty and obedience; and humbly begged his majesty's commands and directions." To this his majesty answered, that he would not reject their suits, if they would agree upon the following particulars. 1. That no boro-, sheriff, recorder, common-serjeant, town-clerk, coroner, of the city of London, or steward of the borough of Southwark, shall be capable of, or admitted to, the exercise of their respective offices before his majesty shall have approved of them under his sign manual. 2. That if his majesty shall disapprove the choice of any person to be lord mayor, and signify the same under his sign manual to the lord-mayor, or, in default of a lord mayor, to the recorder or senior alderman, the citizens shall, within one week, proceed to a new choice, and if his majesty shall in like manner disapprove the second choice, his majesty may, if he pleases, nominate a person to be lord mayor for the year ensuing. 3. If his majesty shall, in like manner, disapprove the persons chosen to be sheriffs, or either of them, his majesty may appoint sheriffs for the year ensuing. 4. That the lord mayor and court of aldermen may, with the leave of his majesty, displace any alderman, recorder, &c. 5. Upon the election of an alderman, if the court of aldermen shall judge and declare the person preferred to be unfit, the ward shall choose again; and upon a disapproval of a second choice, the court may appoint another in his room. 6. That the justices of the peace should be by the king's commission; and the settling of those matters to be left to his majesty's attorney-general, and council learned in the law."}

To these the lord keeper added, in the king's name, "That these regulations being made, his majesty would not only pardon this proceeding, but would confirm their charter in such a manner as should be consistent with them; concluding thus: "My lord mayor, the term draws towards an end, and Midsummer-day is at hand, when some of the officers used to be chosen; whereas his majesty will reserve the approbation. Therefore, it is his majesty's pleasure, that you return to the city, and confirm the common-council, that he may speedily know your resolutions thereupon, and accordingly give his directions. That you may see the king is in earnest, and the matter is not capable of delay, I am commanded to let you know he hath given orders to his attorney-general to enter upon judgment on Saturday next; unless you prevent it by your compliance in all these particulars."

A common council was summoned, when the friends of liberty treated those bills with conditions as they deserved; and even declared, that they were ready to sacrifice all that was near or dear them, rather than submit to such arbitrary impositions; but when it was put to the vote, there appeared a majority of 18 for sublimation. Thus the king got the government of the city into his own hands, though he and his brothers entirely lost the affection of the Londoners. But, not content with their sublimation, his majesty departed from his promise; commanded the judgment upon the quo warranto to be entered; and commissioned Sir William Pritchard, the lord mayor, to hold the same office during his majesty's pleasure. In the same manner he appointed or displaced the other magistrates as he thought proper; after which the ministers, having nothing to fear, proceeded in the most arbitrary manner.

In this sucession to the will of the court, the city of London continued till the Revolution; but, in 1689, the immediate reformation of the Londoners to their privileges of the city was ordered; and in such a manner and form, as to set it out of the power of an arbitrary minister and a corrupt judge and jury to deprive them of their chartered liberties for the time to come. Accordingly a bill was brought into parliament, and passed, for reversing the judgment of the quo warranto against the city of London, and for restoring the same to its ancient rights and privileges. Since that time the city of London hath enjoyed tranquility; its commerce hath been carried to the highest pitch; and for the politeness, riches, and number of its inhabitants, as well as its extent and the magnificence of its buildings, is inferior to no city in Europe, if not superior to every one.

That part of this immense capital which is distinguished by the name of the city, stands on the north shore of the river, from the Tower to the Temple, occupying only that space formerly encompassed by the wall, which in circumference measures but three miles and 165 feet. In this wall are seen seven gates by land, viz. Ludgate, Aldgate, Cripplegate, Alderigate, Moorgate, Bishopsgate, which were all taken down in September, 1760; and Newgate, the county gaol, which was also taken down in 1776, and a massive building...
building erected a little south of it, which by the rioters in 1780 received damage to the amount of £80,000. On the side of the water there were Dowgate and Billingsgate, long since demolished, as well as the poferina-gate near the Tower. In the year 1670 there was a gate erected called Temple-Bar, which terminates the bounds of the city westward. The liberties, or those parts of this great city which are subject to its jurisdiction and lie without the walls of London, are bounded on the east, in White-chapel, the Minories, and Bishopsgate, by bars, which were formerly poles, and chains, that were frequently taken away by arbitrary power, when it was thought proper to seize the franchises of the city of London: on the north, they are bounded in the same manner in Pickaxe street, at the end of Pan-alley, and in St John's street; on the west, by bars in Holborn: at the east end of Middle Row, and at the west end of Fleet-street, by the gate called Temple-Bar, already mentioned: on the south, we may include the jurisdiction which the city holds on the river Thames, and over the borough of Southwark. The city, including the borough, is at present divided into 36 wards.

1. Aldergate ward takes its name from a city-gate which lately stood in the neighbourhood. It is bounded on the east by Cripplegate ward, on the west, by Farrington ward within and without; and on the south, by Farrington ward within. It is very large, and is divided into Aldergate-within and Aldergate-without. Each of these divisions consists of four precincts, under one alderman, eight common-council men, of whom two are the alderman's deputies, eight constables, fourteen inquest-men, eight scavengers, and a beadle; exclusive of officers belonging to the liberty of St Martin's-le-Grand, which contains 168 houses.

2. Aldgate takes its name also from a gate, which was of great antiquity, being mentioned in king Edgar's charter to the knights of the Knighton Guild about the year 967; and was probably of a much more ancient foundation, for it was the gate through which the Roman Vicinal way lay to the ferry at Oldford. In the time of the wars between king John and his barons, the latter entered the city through this gate, and committed great devastations among the houses of the religious. Aldgate was rebuilt by the leaders of the party after the Roman manner. They made use of stone which they brought from Caen, and a small brick called the Flanders tile, which Mr Pennant thinks has been often mistaken for Roman. The new gate was very strong, and had a deep well within it. In 1477 this gate was assaulted by the Baffard of Falconbridge, who got possession of it for a few hours; but the portcullis being drawn up, the troops which had entered were all cut off, and the citizens, headed by the alderman of the ward and recorder, having made a sally, defeated the remainder with great slaughter. In 1606 Aldgate was taken down and rebuilt; and many Roman coins were found in digging the foundations.—The ward of Aldgate is bounded on the east by the city-wall, which divides it from Portfoken-ward; on the north, by Bishopsgate-ward; on the west, by Lime-street and Langbourn wards; and on the south, by Tower-street ward. It is governed by an alderman, six common-council men, six constables, twenty inquest men, seven scavengers, and a beadle; besides the officers belonging to St James's, Duke's Place.—It is divided into seven precincts.

3. Bishopsgate or Bassingbolt ward is bounded on the east and south by Coleman-street ward, on the north by part of Cripplegate, and on the west by part of the wards of Cheap and Cripplegate. On the south, it begins at Blackwell-hall; and runs northward to London-wall, pulled down some time ago to make way for new buildings in Fore-street, and spreads 88 feet east, and 54 feet west against the place where that wall stood. This is a very small ward, and consists only of two precincts; the upper precinct contains no more than 66, and the lower only 76 houses. It is governed by an alderman, four common council men, of whom one is the alderman's deputy, three constables, seventeen inquest-men, three scavengers, and a beadle. It has its name from Basing-hall, the mansion-house of the family of Basing, which was the principal house in it, and flood in the place of Blackwell hall.

4. Billingsgate ward is bounded on the east by Tower-street ward, on the north, by Langbourn ward; on the west, by the ward of Bridge-within; and on the south, by the river Thames. There have been many conjectures concerning the origin of the name of Billingsgate, none of which seems to be very well authenticated. It is, for instance, supposed to have derived its name from a British king named Belinus, said to have been an affiant of Brennus, the Gauls, at the taking of Rome, and is the same with the Beli-Maur mentioned in the Welsh genealogies. The name of Ludgate is said to be derived from his son Lud.—It is divided into 12 precincts; and is governed by an alderman, ten common-council men, one of whom is the alderman's deputy, 11 constables, 14 inquest-men, six scavengers, and a beadle. The situation of Billingsgate, on the river, gives it great advantages with respect to trade and merchandize; so that it is well inhabited, and is in a constant hurry of business at the several wharves or quays.

5. Bishopsgate ward is bounded on the east by Aldgate ward, Portfoken-ward, and part of the Tower liberty, or Norton-falgate; on the west, by Broad-street ward and Moorfields; and on the south, by Langbourn ward. It is very large, and divided into Bishopsgate-within and Bishopsgate-without. The first contains all that part of the ward within the city-wall and gate, and is divided into five precincts; the second lies without the wall, and is divided into four precincts. Bishopsgate-without extends to Shoreditch, taking its name from one Sir John de Sordich, an eminent lawyer much in favour with king Edward III. both on account of his knowledge in the law, and of his personal value. In the time of Henry VII. one Barlo, a citizen and inhabitant of this place, was named duke of Shoreditch, on account of his skill in archery; and, for a number of years after, the title belonged to the captain of the London archers. This ward is governed by an alderman, two deputies, one within and the other without, 12 common-council men, seven constables, 13 inquest-men, nine scavengers, and two beadles. It took its name from the gate, which has been pulled down to make that part of the city more airy and commodious. This gate was built by Erkenwald
Erkenwald bishop of London in 675; and it is said to have been repaired by William the Conqueror soon after the Norman conquest. In the time of Henry III, the Hanfe merchants had certain privileges confirmed to them, in return for which they were to support this gate; and in consequence of this they rebuilt it elegantly in 1479. There were two statues of bishops, in memory of the founder and first repairer; other two were also put up, which are supposed to have been designed for Alfred and Elder earl of Mercia, to whose care the gate had been committed.

6. Bread-street ward is encompassed, on the north and north-west, by the ward of Pardingdon-within; on the east, by Cordwainer’s ward; on the south by Queenhithe-ward; and on the west, by Castle-Baynard ward. It is divided into 14 precincts; and is governed by an alderman, 12 common council-men, of whom one is the alderman’s deputy, 13 constables, 13 inquest-men, 13 scavengers, and a beadle; and yet contains no more than 331 houses. It takes its name from the ancient bread-market, which was kept in the place now called Bread-street; the bakers being obliged to sell their bread only in the open market and not in shops.

7. Bridge-ward within is bounded on the south by the river Thames and Southwark; on the north, by Langbourn and Bishopsgate ward; on the east, by Billingsgate; and on the west, by Candlewick and Dowgate wards. It is divided into 14 precincts, three of which are on the bridge, and is governed by an alderman, 15 common council-men, one of whom is the alderman’s deputy, 14 constables, 15 inquest-men, 14 scavengers, and a beadle. It takes its name from its connection with London-bridge.

8. Bread-street ward is bounded, on the north and east, by Bishopsgate ward; on the south, by Cornhill and Wallbrook ward; and on the west, by Coleman-street ward. It is divided into 10 precincts; and is governed by an alderman, 10 common council-men, one of whom is the alderman’s deputy, 10 constables, 13 inquest-men, 8 scavengers, and a beadle. It has its name from that part of it now distinguished by the name of Old Bread-street; and which, before the fire of 1666, was accounted one of the broadest streets in London.

9. Candlewick ward, Candlewick-street, or Candlewright street ward, as it is called in some ancient records, is bounded on the east by Bridge ward; on the south, by Dowgate and part of Bridge ward; on the west, by Dowgate and Wallbrook; and on the north, by Langbourn ward. It is but a small ward, consisting of about 216 houses; yet is divided into seven precincts. It is governed by an alderman, eight common council-men, of whom one is the alderman’s deputy, seven constables, seven inquest-men, seven scavengers, and a beadle. It has its name from a street, formerly inhabited chiefly by candle wrights or candlemakers, both in tallow and wax; a very profitable business in the times of Popery, when incredible quantities of wax-candles were consumed in the churches. That street, however, or at least its name, Candlewick, is lost since the great conflagration, for which the name Cannon-street is substituted, the candle wrights being at that time burnt out and dispersed through the city.

10. Castle-Baynard ward is bounded by Queen-street; Active and Bread-street wards on the east; on the south, by the Thames; and on the west and north, by the ward of Pardingdon-within. It is divided into 10 precincts, under the government of an alderman, 10 common council-men, one of whom is the alderman’s deputy, nine constables, 14 inquest-men, seven scavengers, and a beadle. It takes its name from a castle built on the bank of a river by one Baynard, a follower of fortune, who came in with William the Conqueror, and was by that monarch raised to great honours and authority.

11. Cheap ward is bounded on the east by Broad-street and Wallbrook wards; on the north, by Coleman-street, Bishopsgate, and Cripplegate; and on the south, by Cordwainer’s ward. It is divided into nine precincts; and is governed by an alderman, 12 common council-men, of whom one is the alderman’s deputy, 11 constables, 13 inquest-men, nine scavengers, and a beadle. It has its name from the Saxon word æche, which signifies a market, kept in this division of the city, now called Cheapside; but then known by the name of Wesleheap, to distinguish it from the market then also kept in Eastcheap, between Canon and Candlewick street and Tower-street.

12. Coleman-street ward is bounded on the east by Bishopsgate, Broad-street, and Cheap wards; on the north, by Cripplegate, Bishopsgate, and Middle Moorfields, and Bishopsgate; on the south, by Cheap ward; and on the west, by Bishopsgate ward. It is divided into six precincts; and is governed by an alderman, six common council-men, one of whom is the alderman’s deputy, six constables, six inquest-men, six scavengers, and a beadle. The origin of the name is not certainly known.

13. Cordwainers ward is bounded on the east by Wallbrook, on the south by Vintner ward, on the west by Bread-street, and on the north by Cheap ward. It is divided into eight precincts; and is governed by an alderman, eight common council-men, one of whom is the alderman’s deputy, eight constables, 14 inquest-men, eight scavengers, and a beadle. Its proper name is Cordwainers-street ward; which it has from Cordwainers street, now Bow-lane, formerly occupied chiefly by shoemakers and others that dealt or worked in leather.

14. Cornhill ward is but of small extent. It is bounded on the east by Bishopsgate, on the north by Broad-street, on the west by Cheapside, and on the south by Moorfields. It is divided into four precincts, which are governed by one alderman, six common council-men, of whom one is the alderman’s deputy, four constables, 16 inquest-men, four scavengers, and a beadle. It takes its name from the principal street in it, known from the earliest ages by the name of Cornhill, because the corn-market was kept there.

15. Cripplegate ward is bounded on the east by Moorfields, Coleman-street ward, Bishopsgate ward, and Cheap ward; on the north by the parish of St. Luke’s, Old street; on the west, by Aldermary ward; and on the south, by Cheapside. It is divided into 12 precincts, nine within and four without the wall; and is governed by an alderman, 12 common council-men, of whom two are the alderman’s deputies, 12 constables, 34 inquest-men, 16 scavengers, and three beadles.
London: takes its name from Cripplegate, which stood on the north-west part of the city-wall. It was an old plain structure, void of all ornament, with one portern; but had more the appearance of a fortification than any of the other gates. It was removed in order to widen the entrance into Wood-street, which, by the narrowness of the gateway was too much contracted and rendered dangerous for passengers and great wagons.

16. Dowgate ward is bounded on the east by Candlewick and Bridge wards, on the north by Wallbrook ward, on the west by Vintry ward, and on the south by the Thames. It is divided into eight precincts, under the government of an alderman, eight common-council men, of whom one is the alderman’s deputy, eight constables, 15 inquest-men, five scavengers, and a beadle. It has its name from the ancient water-gate, called Dowgate, which was made in the original wall that ran along the north side of the Thames, for the security of the city against all attempts to invade it by water.

17. Farringdon ward within is bounded on the east by Cheap ward and Baynard-castle ward, on the north, by Alderbury and Cripplegate wards, and the liberty of St Martin’s le Grand; on the west, by Farringdon-without; and on the south, by Baynard-castle ward, and the river Thames. It is divided into 18 precincts; and governed by one alderman, 17 common-council men, of whom one is the alderman’s deputy, 19 constables, 17 inquest-men, five scavengers, and two beadles. It takes its name from William Farringdon citizen and goldsmith of London, who, in 1279, purchased all the aldermary with the appurtenances, within the city of London and suburbs of the same, between Ludgate and Newgate, and also without those gates.

18. Farringdon ward without is bounded on the east by Farringdon within, the precinct of the late priory of St Bartholomew near Smithfield, and the ward of Alderbury; on the north, by the charter-houfe, the parish of St John’s Clerkenwell, and part of St Andrew’s parish without the Freedom; on the west, by High Holborn and St Clement’s parish in the Strand; and on the south by the river Thames. It is governed by one alderman, 16 common-council men, of whom two are the alderman’s deputies, 23 constables, 48 inquest-men, 24 scavengers; and four beadles. It takes its name from the same goldsmith who gave name to Farringdon-within.

19. Langbourn ward is bounded on the east by Aldgate ward; on the north, by part of the same, and Limestreet ward; on the south, by Tower-street, Billingsgate, Bridge, and Candlewick wards; and on the west by Wallbrook. It is divided into 12 precincts. It had its name from a rivulet or long bourn of fresh-water, which anciently flowed from a spring near Mappye alley adjoining to St Catherine Coleman’s church.

20. Limestreet ward is bounded on the east and north by Aldgate ward, on the west by Billingsgate, and on the south by Langbourn ward. It is divided into four precincts; and governed by an alderman, four common-council men, one of whom is the alderman’s deputy, four constables, 13 inquest-men, four scavengers, and a beadle. It is very small; and has its name from some lime-kilns that were formerly built in or near Lime-street.

21. Portfoken ward is bounded on the east by the parishes of Spitalfields, Stepney, and St George’s in the east; on the south, by Tower-hill; on the north, by Billingsgate ward, and on the west by Aldgate ward. It is divided into five precincts; and is governed by an alderman, five common-council men, one of whom is the alderman’s deputy, five constables, 19 inquest-men, five scavengers, and a beadle. Its name signifies the franchise of the liberty gate. This Portfoken was for some time a guild; and had its beginning in King Edgar, when 13 knights, “well beloved of the king and realm, for services by them done,” requested to have a certain portion of land on the east part of the city, left desolate and forsaken of the inhabitants by reason of too much servitude. They bought the king to have this land, with the liberty of a guild for ever. The king granted their request on the following conditions, viz. that each of them should victoriously accomplish three combats, one above the ground, one under ground, and the third in the water: and after this, at a certain day, in East Smithfield, they should run with spears against all comers. All this was gloriously performed; upon which the king named it Knighten Guild, and extended it from Aldgate to the places where the bars now are on the east, and to the Thames on the south, and as far into the water as an horfeman could ride at low water, and throw his spears.

22. Queenhithe ward is bounded on the east by Dowgate, on the north by Bread-street and Cordwainers wards, on the south by the Thames, and on the west by Castle-Baynard ward. It is divided into nine precincts; and is governed by one alderman, six common-council men, one of whom is the alderman’s deputy, and nine constables. It has its name from the hithe, or harbour for large boats, barges, and lighters; for which, and even for ships, it was the anchoring place, and the key for lading and unloading vessels almost of any burden used in ancient times. It has the name of green, because the queens of England usually poled the vessels that unloaded goods here at this hithe, which were very considerable.

23. Tower ward, or Tower-street ward, is bounded on the north by the river Thames, on the east by Tower-hill and Aldgate ward, on the north by Langbourn ward, and on the west by Billingsgate ward. It is governed by one alderman, 12 common-council men, of whom one is the alderman’s deputy, 12 constables, 13 inquest-men, 12 scavengers, and one beadle. It takes its name from Tower street, so called because it leads out of the city in a direct line to the principal entrance of the Tower of London.

24. Vintry ward is bounded on the east by Dowgate, on the south by the Thames, on the west by Queenhithe ward, and on the north by Cordwainers ward. It is a small ward, containing only 418 houses; but is divided into nine precincts, and governed by an alderman, nine common-council men, one of whom is the alderman’s deputy, nine constables, 13 inquest-men, three scavengers, and a beadle. It takes its name from the vintners or wine-merchants of Bourdeaux, who formerly dwelt in this part of the city, and were obliged to land their wines on this spot, and to sell them in 40 days, till the 28th of Edward I.
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conveniences, can
of London.

The city and liberties of London are under an ecclesiastical, a civil, and a military government.

As to its ecclesiastical government, London is a bishop's see, the diocese of which comprehends not only Middlesex, Essex, and part of Hertfordshire, but the British plantations in America. The bishop of London takes precedence next to the archbishops of Canterbury and York; but the following parishes of this city are exempt from his jurisdiction, being peculiar under the immediate government of the archbishop of Canterbury, viz. All-hallows in Bread-street, All-hallows Lombard-street; St Dionys Back-church, S Dunfan in the East, St John Bapift, St Leonard East-cheap, St Mary Aldermar, St Mary Bothaw, St Mary le Bow, St Michael Crooked-lane, St Michael Royai, St Pancras Soper-lane, and St Vedast Foster-lane.

The civil government of London divides it into wards and precincts, under a lord-mayor, aldermen, and common-council.

The mayor, or lord-mayor, is the supreme magistrate, chosen annually by the citizens, pursuant to a charter of King John. The current manner of electing the lord-mayor is by the concurrence of the several companies assembled in Guildhall annually on Michaelmas-day, according to an act of common-council in A. D. 1476, where, and when, the liverymen choose, or rather nominate, two aldermen below the chair, who have served the office of sheriff, to be returned to the court of Aldermen, who may choose either of the two; but generally declare the tenor of the two, so returned, to the lord-mayor elected. The election being over, the lord-mayor elected, accompanied by the recorder and divers aldermen, is soon after presented to the lord-chancellor (as his majesty's representative in the city of London) for his approbation; and on the 9th of November following is sworn into the office of mayor at Guildhall; and on the day after, before the barons of the exchequer at Westminister; the procession on which occasion is exceedingly grand and magnificent.

The lord-mayor sits every morning at the munificence-house, or place where he keeps his mayorality, to determine any difference that may happen among the citizens, and to do other business incident to the office of a chief magistrate. Once in six weeks, or eight times in the year, he sits as chief judge of Oyer and Terminer, or gaol-delivery of Newgate for London, and the county of Middlesex. His jurisdiction extends all over the city and suburbs, except some places that are exempt. It extends also from Colney-ditch, above Staines-bridge in the west, to Yeoule, or Yewtree; and the mouth of the river Medway, and up that river to Uptor-castle, in the east: by which he exercises the power of punishing and correcting all persons that shall annoy the streams, banks, or fish. For which purpose his lordship holds several courts of consuancy in the counties adjacent to the said river, for its conservation, and for the punishment of offender's. See the article Mayors Court.

The title of dignity, alderman, is of Saxon original, Aldermen, and of the greatest honour, answering to that of Earl, though now it is no where to be found but in chartered societies. And from hence we may account for the reason why the aldermen and commonalty of London were called barons after the conquest. These magistrates are properly the subordinate governors of their respective wards under the lord-mayor's jurisdiction: and they originally held their aldermanries either by inheritance or purchase; at which time the aldermanries or wards changed their names as often as their governors or aldermen. The oppressions, to which the citizens were subject from such a government, put them upon the means to abolish the perpetuity of that office; and they brought it to an annual election. But that manner of election being attended with many inconveniences, and becoming a continual bone of contention amongst the citizens, the parliament, 17 Richard H. A. D. 1394, enacted, That the aldermen of London should continue in their several offices during life or good behaviour. And so it still continues: though the manner of electing has several times varied. At present it is regulated by an act of parliament, passed in the year 1724-5: and the person so elected is to be returned by the lord-mayor (or other returning officer in his stead, duly qualified to hold a court of wardmote) to the court of lord-mayor and aldermen, by whom the person so returned must be admitted and sworn into the aldermanry before he can act. If the person chosen refused to serve the office of alderman, he is fined 500l.

These high officers constitute a second part of the city legislature when assembled in a corporate capacity, and exercise an executive power in their respective wards. The aldermen who have passed the chair, or served the high office of lord-mayor, are justices of the quorum: and all the other aldermen are not only justices of the peace, but by the statute of 43 Eliz. intituled, An act for the relief of the poor, every alderman of the city of London within his ward, shall and may do and execute, in every respect as much as is appointed and allowed by the said act to be done or executed by one or two justices of peace of any county within this realm. They every one keep their wardmote, or court, for choosing ward-officers and settling the affairs of the ward, to redress grievances, and to prevent all defaults found within their respective wards.

The next branch of the legislative power in this city
city is the common-council. The many inconveniences that attended popular assemblies, which were called jolkoures, determined the commonalty of London to choose representatives to act in their name and for their interest, with the lord-mayor and aldermen, in all affairs relating to the city. At first these representatives were chosen out of the several companies; but that not being found satisfactory, nor properly the representatives of the whole body of the inhabitants, it was agreed to choose a certain number of different men out of each ward: which number has from time to time increased according to the dimensions of each ward; and at present the 25 wards, into which London is divided, being subdivided into 236 precincts, each precinct sends a representative to the common-council, who are elected after the same manner as an alderman, only with this difference, that as the lord-mayor presides in the Wardrobe, and is judge of the poll at the election of an alderman, so the alderman of each ward is judge of the poll at the election of a common-council man.

Thus the lord-mayor, aldermen, and common-council, when assembled, may be deemed the city parliament, resembling the great council of the nation. For it consists of two houses; one for the lord-mayor and aldermen, or the upper house; another for the commoners or representatives of the people, commonly called the common-council-men. And they have power in their incorporate capacity to make and repeal hystaws; and the citizens are bound to obey or submit to those laws. When they meet in their incorporate capacity, they wear deep blue silk gowns: and their aldermen are called the court of common-council, and their ordinances acts of common-council. No act can be performed in the name of the city of London without their concurrence. But they cannot assemble without a summons from the lord-mayor; who, nevertheless, is obliged to call a common-council, whenever it shall be demanded, upon extraordinary occasions, by six reputable citizens and members of that court.

This corporation is assisted by two sheriffs and a recorder. The sheriffs are chartered officers, to perform certain suits and services, in the king's name, within the city of London and county of Middlesex, chosen by the livemen of the several companies on Midsummer-day. Their office, according to Camden, in general, is to collect the public revenues within their several jurisdictions; to gather into the exchequer all fines belonging to the crown; to serve the king's writs of process; to attend the judges, and execute their orders; to impound juries; to compel headright and oblinate men by the pofta conitatus, to submit to the decisions of the law; and to take care that all condemned criminals be duly punished and executed. In particular, in London, they are to execute the orders of the common-council, when they have resolved to address his majesty, or to petition parliament.

The sheriffs, by virtue of their office, hold a court at Guildhall every Wednesday and Friday, for actions entered at Woodstreet Compter; and on Thursdays, and Saturdays for those entered at the Poultry Compter: of which the sheriffs being judges, each has his affidavit, or deputy, who are called the judges of those courts; before whom are tried actions of debt, trespass, covenant, &c., and where the testimony of any absent witnesses in writing is allowed to be good evidence. To each of these courts belong four attorneys, who, upon their being admitted by the court of aldermen, have an oath administered to them.

To each of these courts likewise belong a secondary, a clerk of the papers, a prothonotary, and four clerks-fitters. The secondary's office is to allow and return all writs brought to remove clerks out of the said courts; the clerk of the papers files and copies all declarations upon actions; the prothonotary draws and ingrosses all declarations; the clerk-fitters enter actions and attachments, and take bail and verdicts. To each of the comtours, or prisons belonging to these courts, appertain 16 serjeants at mace, with a yeoman to each, besides inferior officers, and the prison-keeper.

In the sheriffs court may be tried actions of debt, cause, trespass, account, covenant, and all personal actions, attachments, and sequestrations. When an erroneous judgment is given in either of the sheriffs courts of the city, the writ of error to reverse this judgment must be brought in the court of husting before the lord-mayor; for that is the superior court. The sheriffs of London may make arrests and serve executions on the river Thames.

We do not read of a recorder till 1504, who, by the nature of his office, seems to have been intended as an affiant to, or securer with, the lord-mayor, in the execution of his high office, in matters of justice and law. He is chosen by the lord-mayor and aldermen only; and takes place in all courts, and in the common-council, before any one that hath not been mayor. Of whom we have the following description in one of the books of the chamber. "He shall be, and is wont to be, one of the most skilful and virtuous apprentices of the law of the whole kingdom; whose office is always to sit on the right hand of the mayor, in recording pleas, and passing judgments; and by whom records and precedents, had before the lord-mayor and aldermen at Great St Martin's, ought to be recorded by word of mouth before the judges assigned there to correct errors. The mayor and aldermen have therefore used commonly to fet forth all other businesses, touching the city, before the king and his council, as also in certain of the king's courts, by Mr Recorder, as a chief man, and was with wisdom eminent for eloquence." — Mr Recorder is looked upon to be the mouth of the city, to deliver all addresses to the king, &c. from the corporation; and he is the first officer in order of precedence that is paid a salary, which originally was no more than 101. Sterling per annum, with some few perquisites; but it has from time to time been augmented to 1000l. per annum, and become the road to preferment in the law. This office has sometimes been executed by a deputy.

The next chartered officer of this corporation is the Chamber-chamberlain; an office of great reputation and trust, and fame in the choice of the livery annually. This officer, though chosen annually on Midsummer-day, is never displaced during his life, except some very great crime can be made out against him. He has the keeping of the monies, lands, and goods, of the city-orphans, or takes good security for the payment thereof when the parties come to age. And to that end he is deemed in the law a sole corporation, to him and his successors,
The other officers under the lord-mayor are, 1. The common sergeant. He is to attend the lord-mayor and court of aldermen on court days, and to be in council with them on all occasions, within or without the precincts or liberties of the city. He is to take care of orphans estates, either by taking account of them, or to sign their indentures, before their palling the lord-mayor and court of aldermen. And likewise he is to let, set, and manage the orphans estates, according to his judgment, to the best advantage. 2. The town-clerk; who keeps the original charter of the city, the books, rolls, and other records, wherein are registered the acts and proceedings of the city; so that he may not be improperly termed the city-regifter; he is to attend the lord-mayor and aldermen at their courts, and signs all public instructions. 3. The city remembrancer; who is to attend the lord-mayor on certain days, his business being to put his lordship in mind of the fœleœ days, he is to go abroad with the aldermen, &c. He is to attend daily at the parliament-house, during the session, and to report to the lord-mayor their transactions. 4. The sword-bearer: who is to attend the lord-mayor at his going abroad, and to carry the sword before him, being the emblem of justice. This is an ancient and honourable office, representing the state and princely office of the king's most excellent majesty in his representative the lord-mayor; and, according to the rule of armoury, "He must carry the sword upright, the hilts being held under his bulk, and the blade directly up the midst of his breast, and so forth between the sword-bearer's brows." 5. The common hunt; whose business is it to take care of the pack of hounds belonging to the lord mayor and citizen owners, and to prevent them in hunting in those grounds to which they are authorized by charter. 6. The common-crier. It belongs to him and the sergeant at arms, to summon all executors and administrators of freemen to appear, and to bring in inventories of the personal estates of freemen, within two months after their decease; and he is to have notice of the appraisements. He is also to attend the lord-mayor on fet days, and at the courts held weekly by the mayor and aldermen. 7. The water-bailiff; whose office is to look after the preservation of the river Thames against all encroachments; and to look after the fishermen for the preservation of the young fry, to prevent the destroying them by unlawful nets. For that end, there are juries for each county, that hath any part of it lying on the fides or shores of the said river; which juries summon, by the water-bailiff at certain times, do make inquiry of all offences relating to the river and the fish, and make their presentments accordingly. He is also bound to attend the lord-mayor on days in the week.—These seven purchase their places; except the town-clerk who is chosen by the livery.

There are also three sergeants-carvers; three sergeants of the chamber; a sergeant of the channel; four yeomen of the water-side; an under water-bailiff; two yeomen of the chamber; two meal-weighers; two yeomen of the wood wharfs; a foreign take; city marshals. There are besides these, seven gentlemen men; as, the sword-bearer's man, the common-hunt's two men, the common crier's man, and the carver's three men.

Nine of the foregoing officers have liverys of the lord-mayor, viz the sword-bearer and his man, the three carvers, and the four yeomen of the water-side. All the rest have liverys from the chamber of London.

The following officers are likewise belonging to the city; farmer of the markets, auditor, clerk of the chamber, clerk to the commissioners of the several clerks to the court of conscience, beadle of the same court, clerk of the city-works, printer to the city, justice of the Bridge-yard, clerk-comptroller of the Bridge-house, steward of the Borough, bailiff of the Borough.

There is also a coroner, called so from corona, i. e. a crown, because he deals principally with the crown, or in matters appertaining to the imperial crown of England. See the article CORONER.

Besides these officers, there are several courts in this city for the executing of justice, viz. the court of husting, lord-mayor's court, &c. In the city there are also two subordinate kinds of government. One executed by the alderman, deputy, and common-council men, and their representatives, who have a court peculiarly for themselves; and the other, by the officers of the king's household, which form are comprehended all the inhabitants free or not free of the city. Every ward is therefore like a little free state, and at the same time subject to the lord-mayor as chief magistrate of the city. The house keepers of each ward elect their representatives the common-council, who join in making bye-laws for the government of the city. The officers and servants of each ward manage the affairs belonging to it, without the assistance of the rest; and each has a court called the wardmote, as has been already described, for the management of its own affairs. The other, by the mayor, wardens, and court of aldermen, of the incorporeal companies; whose power reaches no further than over the members of their respective guilds or fraternities; except that in them is invested the power to choose representatives in parliament for the city, and all those magistrates and officers elected by a common hall; which companies are invested with distinct powers, according to the tenor of their respective charters.

The military government of the city is lodged in a military lieutenant, consisting of the lord-mayor, aldermen, and other principal citizens, who receive their authority by a commission from the king. Those have under their command the city trained bands, consisting of six regiments of foot, distinguished by the names of the white, orange, yellow blue, green, and red, each containing eight companies of 50 men, amounting in all to 7200. Besides those six regiments, there is a corps called the artillery company, from its being taught the military exercise in the artillery-ground. This company is independent of the rest, and consists of 700 or 800 volunteers. All these, with two regiments of foot of 800 men each commanded by the lieutenant of the Tower of London, make the whole militia of this city; which...
which, exclusive of Westminster and the borough of Southwark, amounts to about 10,000 men.

The trading part of the city of London is divided into 89 companies; though some of them can hardly be called so, because they have neither charters, halls, nor livery. Of these 89 companies 45 have each a hall for transacting the business of the corporation; and this consists of a master or prime warden, a court of assistants, and livery. Twelve of these companies are superior to the rest both in antiquity and wealth; and of one of those, i.e., the lord mayors have generally made themselves freemen for their election. These companies are the mercers, grocers, drapers, fishmongers, goldsmiths, skinners, merchant-tailors, haberdashers, falters, ironmongers, vinters, and clothworkers. The principal incorporated societies of the merchants of this city are the Hamburgh Company, the Hudsons Bay Company, the Russian Company, the Turkey Company, the East India company, the Royal African Company, the South Sea Company, and some Insurance Companies. The most of these companies have erected houses for transacting their business, particularly the East India and South Sea companies. See Company.

The streets and public buildings in London and its liberties being far too numerous for a particular description in this work, we shall only select the most remarkable, beginning with London-bridge as the most ancient, and proceeding in our survey through the wards into which the city is divided.

1. Remarkable buildings, &c. in the Girr.—The original bridge, which stands in Bridge-ward, was of wood, and appears to have been first built between the years 993 and 1016; but being burnt down about the year 1156, it was rebuilt of wood in 1163. The expense, however, of maintaining and repairing it became so burdensome to the inhabitants of the city, that they resolved to build a stone bridge a little westward of the wooden one. This building was begun in 1176, and finished in 1209; and was 915 feet long, 44 feet high, and 73 feet wide; but houses being built on each side, the space between was only 23 feet.

This great work was founded on enormous piles driven as closely as possible together; on their tops were laid long planks 10 inches thick, strongly bolted; and on these were placed the bands of the piles, the lowermost stones of which were bedded in pitch, to prevent the water from damaging the work; round all were the piles which were called the sterlings, designed for the preservation of the foundation piles. These contrived the space between the piers so greatly, as to occasion at the retreat of every tide a fall of five feet, or a number of temporary cataracts, which since the foundation of the bridge have occasioned the loss of many thousand lives. The number of arches was 19, of unequal dimensions, and greatly deformed by the sterlings and the houses on each side, which overhung and leaned in a most terrific manner. In most places they hid the arches, and nothing appeared but the rude piers. Within recollection, frequent arches of strong timber crossed the street from the top of the houses to keep them together, and from falling into the river (A). Nothing but the craft of the inhabitants, who soon grew deaf to the noise of the falling waters, the clamours of watermen, or the frequent shrieks of drowning wretches, in one part had been a drawbridge, useful either by way of defence or for the admission of ships into the upper part of the river. This was protected by a strong tower. It forced to repulse Fauconbridge the Ballard in his general assault on the city in 1471, with a fleet of banditti, under pretence of rescuing the unfortunate Henry, then confined in the Tower. Sixty houses were burnt on the bridge on the occasion. It also served to check, and in the end amputate, the ill-conducted insurrection of Sir Thomas Wyatt, in the reign of Queen Mary. The top of this tower, in the wild and turbulent days of this kingdom, used to be the shambles of human flesh, and covered with heads or quarters of unfortunate partizans. Even so late as the year 1598, Henszner the German-traveller, with German accuracy, counted on it above 30 heads.

The old map of the city in 1597 represents them in a most horrible cluster. An unparalleled calamity happened on this bridge within four years after it was finished. A fire began on it at the Southwark end; multitudes of people rushed out of London to extinguish it; while they were engaged in this charitable design the fire flamed on the opposite end, and hemmed in the crowd. Above 3000 persons perished in the flames, or were drowned by overloading the vessels which were hardly enough to attempt their relief.

The narrowness of the passage on this bridge having occasioned the loss of many lives from the number of carriages continually passing; and the frightfulness of the arches, with the enormous size of the sterlings, which occupied one-fourth part of the water-way, having also occasioned frequent and fatal accidents as already mentioned; the magistrates of London in 1756 obtained an act of parliament for improving and widening the passage over and through the bridge, which granted them a toll for every carriage and horse passing over it: but these tolls proving insufficient, were abolished by an act made in 1758, for explaining, amending, and rendering the former act more effectual; and for granting the city of London money towards carrying on

(A) The gallant action of Edmund Osborne, ancestor to the duke of Leeds, when he was apprentice to Sir William Hewet cloth-worker, may not improperly be mentioned in this place. About the year 1536, when his master lived in one of these tremendous houses, a servant-maid was playing with his only daughter in her arms in a window over the water, and accidentally dropped the child. Young Osborne, who was witness to the misfortune, instantly sprang into the river, and, beyond all expectation, brought her safe to the terrrace, and perished in the attempt. Several persons of rank paid their addresses to her when she was marriageable, among others the earl of Shrewsbury; but Sir William gratefully decided in favour of Osborne: Osborne, says he, saved her, and Osborne shall enjoy her. In her right he possessed a great fortune. He became sheriff of London in 1575, and lord-mayor in 1582.
Near the north side of London bridge stands the Monument, a beautiful and magnificent circular column of the Doric order, built with Portland stone, and erected in memory of the conflagration 1666. It was begun by Sir Christopher Wren in 1671, and finished by him in 1677. Its height from the pavement is 202 feet; the diameter of the shaft or body of the column, is 15 feet; the ground, plinth, or lowest part of the pedestal, is 28 feet square; and the pedestal is 40 feet high. Over the capital is an iron balcony encompassing a cone 32 feet high, which supports an alternating urn of gilt bracts. Within is a large hollow core of black marble, containing 345 steps, each 10 inches and a half broad, and six inches thick. The west side is adorned with a curious table in relief denoting the destruction and restoration of the city. The first figure represents London lying in ruins, in a languishing posture, with her head dejected, her hair dishevelled, and her hand carelessly laying her sword. Behind is Time, gradually raising her up; at her side is a woman touching her with one hand, while a winged seer in the other directs her to regard the godesses in the clouds; one with a cornucopia, denoting Plenty; the other with a palm branch, the emblem of Peace. At her feet is a herculean flout, hollow, that by industry and application the greatest misfortunes are to be overcome. Behind the figure of Time are citizens exulting at his endeavours to restore her; and beneath, in the midst of the ruins is a dragon, who as the supporter of the city arms, with his paw endeavours to preserve the same. Opposite to the city, on an elevated pavement, stands the king, in a Roman habit with a laurel on his head, and a truncheon in his hand, and approaching her, commands three of his attendants to defend her to her relief. The first represents the Sciences with a winged head, and a circle of naked boys dancing thereon; and holding Nature in her hand, with her numerous breasts, ready to give assistance to all. The second is Architecture, a plan in one hand, and square and a pair of compasses in the other; and the third is Liberty, waving a flag in the air, showing her joy at the pleasing prospect of the city's speedy recovery. Behind the king stands his brother the duke of York, with a garland in one hand to crown the ruler, and a sword in the other for her defence. The two figures behind are Justice and Fortitude; the former with a coronet, and the latter with a reined lion; and under the royal pavement lies Every, growing a heart and immediately emitting puffed-up fumes from her mouth. On the plinth the reconstruction of the city is represented by builders and labourers at work upon houses. On the north, south, and east sides, are inscriptions relating to the destruction occasioned by the conflagration, the regulations about rebuilding the city, and erecting the monument; and round it is the following one:—"This pillar was set up in perpetual remembrance of the most dreadful burning of this Protestant city, begun and carried on by the treachery and malice of the Popish faction, in the beginning of Sept. 1666, to their carrying on their horrid plot for extirpating the Protestant religion and old English liberty, and introducing Popery and slavery." Dr. Wandesborn, in his account of London, observes, that the monument, though not much above 100 years old, bears visible marks of decay already; and it will not probably be long before it must be pulled down. Some are of opinion that this is occasioned by the fault of the archdeacon, others by the continual shaking of the ground by coaches; but the Doctor inclines to the latter opinion.

Eastward from the bridge and monument stands the Tower, which gives name to another ward. It is the chief fortress of the city, and supposed to have been originally built by William the Conqueror. It appears, however, to have been raised upon the remains of a more ancient fortress, erected probably by the Romans; for in 1720, in digging on the fourth side of what is called Cesar's Chapel, there were discovered some old foundations of stone, three yards broad, and so strongly cemented that it was with the utmost difficulty they were forced up. The first work (according to Mr. Pennant) seems to have been suddenly flung up in 1606 by the Conqueror, on his taking possession of the capital; and included in it a part of the ancient wall.

The great square tower, called the White Tower, was erected in the year 1078, when it stood in the directions of Gundulph bishop of Rochester, who at that time was a great military leader. This building was originally flung up by itself. FitzStephen gives it the name of Arcus Palatina, "the Palatine Tower;" the commander who had the title of Palatine bestowed on him. Within this tower is a very ancient chapel for the use of such of the kings and queens who wished to pay their devotions here. In 1092 a violent tempest did great injury to the Tower; but it was repaired by William Rufus and his successor. The first added another castellated building on the fourth side between it and the Thames, which was afterwards called the Thomas's Tower.

The tower was first inclosed by William Longchamp, bishop of Ely and chancellor of England, in the reign of Richard I. This haughty prelate having a quarrel with John, third brother to Richard, under pretence of guarding against his designs, surrounded the whole with walls embattled, and made on the outside a vast ditch, into which, in after times, the water from the Thames was introduced. Different princes added other works. The present contents within the walls...
wells are 12 acres and 5 rods, the circuit on the outside of the ditch 1052 feet. It was again inclosed with a mud-wall by Henry III. this was placed at a distance from the ditch, and occasioned the taking down part of the city wall, which was restored by the citizens; who pulling down this precinct of mud, were punished by the king with a fine of a thousand marks.

The Lions Tower was built by Edward IV. it was originally called the Bulwark, but received the former name from its use. A menagery had very long been a piece of regal state: Henry I. had his at his manor of Woodloch, where he kept lions, leopards, lynxes, porcupines, and several other uncommon beasts. They were afterwards removed to the Tower. Edward II. commanded the sheriffs of London to pay the keepers of the king's leopards aixpence a day for the sustenance of the leopards, and three halfpence a day for the diet of the keeper out of the fee-farm of the city. The royal menagery is to this day exceedingly well supplied.

In 1758 the Tower ditch was raised all round. New barracks were some years ago erected on the Tower-wharf, which parts it from the river; and upon the wharf is a line of 16 pieces of cannon, which are fired upon state holidays. On this side of the Tower the ditch is narrow, and over it is a draw-bridge. Parallel to the wharf, within the walls, is a platform 70 yards in length, called the Ladies Line, because much frequented by the ladies in the summer; it being shaded in the inside with a row of lofty trees, and without it is a delightful prospect of the shipping with boats paying and repassing on the river Thames. You ascend this line by stone steps, and being once upon it you may walk almost round the walls of the Tower without interruption.

The principal entrance into the Tower is by a gate to the west, large enough to admit coaches and heavy carriages but there are first admitted through an outward gate, situated without the ditch upon the hill, and must pass a stout stone-bridge built over the ditch before they can approach the main entrance. There is, besides, an entrance near the very south-west corner of the tower outward wall, for persons on foot, over the draw-bridge already mentioned to the wharf. There is also a water-gate, commonly called Traitor's gate, through which it has been customary to convey traitors and other state-prisoners to or from the Tower which is seldom opened on any other occasion:

In the Tower (the curiosities of which are more particularly described in the note (a)), are a church, the

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(a) In examining the curiosities of the Tower of London, it will be proper to begin with those on the outside of the principal gate. The first thing a stranger usually goes to visit is the wild beasts; which, from their situation first present themselves: for having entered the outer gate, and passed what is called the four-guard, the keeper's house presents itself before you, which is known by a painted lion on the wall, and another over the door which leads to their dens. By ringing a bell, and paying sixpence each person, you may easily gain admittance.

The next place worthy of observation is the Mint, which comprehends near one-third of the Tower and contains houses for all the officers belonging to the coinage. On paying the principal gate you see the White Tower, built by William the Conqueror. This is a large, square, irregular stone building, situated almost in the center, no one side answering to another nor any of its watch-towers, of which there are four at the top, built alike. One of these towers is now converted into an observatory. In the first story are two noble rooms, one of which is a small armory for the sea-service, it having various sorts of arms, very curiously laid up, for above 10,000 seamen. In the other room are many closets and presleys, all filled with warlike engines and instruments of death. Over this are two other floors, one principally filled with arms; the other with arms and other warlike instruments, as spades, shovels, pick-axes, and chevaux de frise. In the upper story are kept match, hexepkins, tanned hides, &c. and in a little room called Julius Caesar's chapel, are deposited some records, containing perhaps the ancient usages and customs of the place. In this building are also preserved the models of the new-invented engines of destruction that have from time to time been presented to the government. Near the south-west angle of the White Tower is the Spanish Armory, in which are deposited the spoils of what was vainly called the Invincible Armada; in order to perpetuate to the latest posterity the memory of that signal victory obtained by the English over the whole naval power of Spain in the reign of Philip II.

You are now come to the grand store-house, a noble building to the northward of the White Tower that extends 245 feet in length and 60 in breadth. It was begun by king James II. who built it to the first floor, but it was finished by king William III. who erected that magnificent room called the New or Small Armory, in which that prince, with queen Mary his consort, dined in great form, having all the warrant workmen and labourers to attend them, drested in white gloves and aprons, the usual badges of the order of montery. To this noble noble room you are led by a folding door, adjoining to the east end of the Tower chapel, which leads to a grand stair-case of 50 easy steps. On the left side of the uppermost landing-place is the work-floors in which are constantly employed about 180 workmen, in cleaning, repairing, and new-placing the arms. On entering the armory, you see what they call a wildernets of arms, so artfully disposed, that at one view you behold arms for near 80,000 men, all bright, and fit for service; a sight which it is impossible to behold without astonishment; and beside exposed to view, there were before the late war, 16 chiefs
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London. -

48 Custom-house.

In the Tower ward is also the Custom house, a large, handsome, and commodious building of brick and stone. It stands upon the banks of the Thames, and is accompanied with large wharfs, keys, and ware-houses. On this spot is the busy concourse of all nations, who pay their tribute towards the support of Great-Britain. About the year 1559, the loss of the revenue, by collecting it in different parts of the city, was first discovered, and an act passed to compel people to land their goods in such places as were appointed by the commissioners of the revenue; and this was the spot fixed on: A custom-house was erected; which being destroyed by the great fire, was rebuilt by Charles II. In 1718 it underwent the same fate, and was restored in its present form. Before the custom-house was established here, the principal place for receiving the duties was at Billingsgate. In 1628 the half year's customs for foreign merchandise in the city of London came only to L. 75: 6: 10; the annual produce of the customs, ending in April 1789, amounted to L. 3,711,126.

In Water-lane, a little to the north-west of the custom-house, is the Trinity House; a society founded in 1515, at a period in which the British navy began to assume a system. The founder was Sir Thomas Spert commodore of the navy, and commander of the great ship Henry Grace de Dieu. It is a corporation, consisting of a master, four wardens, eight assistants, and eighteen elder brethren; elected from commanders in the navy and the merchants service: and now and then a compliment is paid to one or two of the first nobility. They may be considered as guardians of the ships, military and commercial. Their powers are very extensive: they examine the mathematical children of Christ's hospital, and the masters of his majesty's ships; they appoint pilots for the river Thames; settle the general rates of piloting; erect light-houses and sea-marks; grant licences to poor seamen, not free of the city, to row on the Thames; prevent foreigners from serving on board the ships without licence; punish seamen for mutiny and defection; hear and determine complaints of officers and men in the merchants service, but liable to appeal to the judge of the court of admiralty, superintend the deepening and cleansing of the river Thames, and have under their jurisdiction the bailiff office: have powers to buy lands, and receive donations for charitable uses; and, in consequence, relieve annually many thousand of poor seamen, their widows, and orphans. It is in this house the business of the incorporation is carried on: but the mother house is at Deptford, the corporation being named, the matter, wardens, and assistants of the guild or fraternity of the Dartmouth, and undivided Trinity, and of St. Clement, in the parish of Deptford Strond, in the county of Kent.

Between Aldgate and the Tower is the street called the Minority, from four poor ladies of the order of St. Clare, or minoresses. They had been invited to London by Blanch queen of Navarre, and wife to Edmund earl of Lancaster, who founded a convent for them in 1293. On the suppression of the monasteries it was converted into a dwelling-house for some of the nobility, and is now in the possession of the Dartmouth family. Till of late years, the Minorities were but a debitable street; but have now been excellently rebuilt, and are as elegant as any in the city.

On the west side of the city-walls at this place, stood the house of the Crooked or Grasped Friars, an order instituted at Bologna in 1169, and of which a branch settled in England in 1244, where they were accommodated with an house in this place by two citizens named Ralph Hotser and William Skenor, who became members of the fraternity, in form like the square White Tower, and so exquisitely wrought, that the workmanship of modern times is in no degree equal to it. It is of gold, and used only on the king's table at the coronation. 14 A noble silver font, double gilt, and elegantly wrought, in which the royal family are dipled in England in foreign wars; the achievements of England in foreign wars; the settlements of Ireland, as to law and dominion; the forms of subdivision of some Scotch kings for territories held in England; ancient grants of the kings to their subjeets; privileges and immunities granted to cities and corporations during the period above mentioned; inquisitions of charters and deeds made before the Conquest; the bounds of all the forests in England, with the several respective rights of the inhabitants to common paturage, and many other important records, all regularly disposed, and referred to in near a thousand folio indexes. This office is kept open, and attendance constantly given, from seven o'clock till one, except in the months of December, January, and February, when it is open only from eight till one, Sundays and holidays excepted. A search here is half a guinea, for which you may perceive any one subject a year.
London.

Henry VIII. granted his house to Sir Thomas Wyatt the elder, who built a handsome mansion on part of the ground where it now stands. This mansion became afterwards the residence of John Lord Lumley, a celebrated warrior in the time of Henry VIII. In process of time, it was converted into a navy-office; but this office being removed to Somerset-house, the India Company have erected in its place a most magnificent warehouse, in form of an oblong square of about 250 feet by 160, including a court of 150 by 60 feet, the entrance to which is by an arched gateway.

Billingham gate is distinguished by its market. Billingham gate was a small port for the reception of shipping, and for a considerable time the most important place for the hånding of almost every article of commerce. In the time of King William, Billingham gate began to be celebrated as a fish-market. In 1699 it was by act of parliament made a free port for fish to be sold there every day except Sunday; but Mr Pennant informs us, that the officers of this has been long since been rendered nugatory, and that fish are now no longer to be had there in perfection. The same author gives a lift of the fish which in the time of Edward III. were brought to London market; the monarch himself having comdecided to regulate the prices, that his subjects might not be imposed upon by those who sold them. Among these were the eger-cel and porpoife, neither of which is now admitted to any table. A pile at that time cost 6s. 8d.; whence our author concludes, that it was an exotic fish, and brought over at a vast expense. Some fishes are mentioned in his list with which this naturalist owns himself unacquainted, viz. the barkey, bran, bortle, carving, and ruwh. In Archbishop Neville's great feast is mentioned also a fish named thrice-poole, unknown at present. Seals were formerly accounted a precious article, and of the church of St. Paul's. There, in the year 1733, the architect George Sampson. Before that time the building was transferred to Grocers-hall. The front is a fort of veslible; the base raftic, the ornamental columns above Ionic. Within is a court leading to a second elegant building, which contains a hall and offices, where the debt of above 250 millions is punctually discharged. Of late years two wings of uncommon elegance, designed by Sir Robert Taylor, have been added to the council of a few houses, and of the church of St. Christopher's le Stocks. The palladium of Britain was in 1780 saved from the fury of an infamous banditti by the virtue of its citizens, who formed suddenly a volunteer company, and over-awed the miscreants; while the chief magistrates skulked, trembling in his manfon-houfe, and left his important charge to its fate. This important building has ever since been very properly guarded by the military; who, in palling through the city, have often given offence to many busy characters who would strive to preserve the city rights at the expense of the national destruction. A lord mayor was the last who interested himself by applying to Mr Grenville, who gave him to understand, that if the guards were not quietly permitted to discharge their duty, the bank would be removed to Somerset-houfe."

At the extremity of Three-needle street is Merchant-Taylors Hall. In this street also is the South-Sea Housè, first established in 1711 for the purpose of an exclusive trade to the South Sea, and for supplying Spanish America with negroes. Near the junction of Throgmorton street with Broad-street stood a magnificent house built by Cromwell earl of Essex; after whole, the house and gardens were bought by the Drapers company. The house was destroyed in the great fire, but rebuilt for the use of the company in a magnificent manner.

Mr Pennant informs us, that St Giles's church in the fields, and a few houses to the west of it, in the year 1600, was barely separated from Broad-street. The church was supposed to have belonged to an hospital for lepers, found about the year 1117, by Matilda queen to Henry I. In ancient times it was customary here to present to malefactors, on their way to the gallows (which, about the year 1413, was removed from Smithfield, and placed between St. Giles's high-street and Hog-lane (c), a great bowl of ale, as the last refreshment they were to receive in this life. On the

(c) This late place of execution, according to Mr Pennant, was called in the time of Edward III. when the
London. the door to the church-yard is a curious piece of sculpture, representing the last day, containing an amazing number of figures, set up about the year 1686. This church was rebuilt in 1624. By the amazing railing of the ground by fifty and various adventitious matter, the floor in the year 1730 was eight feet below the surface acquired in the intervening time. This alone made it necessary to rebuild the church in the present century. The first stone was laid in 1730; it was finished in 1734, at the expense of 10,000l. In the church-yard is a great square pit, with many rows of coffins piled upon the other, all exposed to sight and smell, the latter of which is highly offensive if not dangerous.

On the west side of Broad-street flooded the house of the Augustines, founded by Humphrey Bohun Earl of Somerset in 1253, for friars and hermits of the Augustine order. On the dissolution of the monasteries, great part of the house was granted to William Lord St John, afterwards Marquis of Winchester, and Lord Treasurer, who founded a magnificent house named Winchester-house.

The west end of the church was granted in 1550 to John Lacco for the use of the Germans and other fugitive Protestants, and afterwards to the Dutch as a place for preaching. A part of it was also converted into a glass-house for Venice glass, in which the manufacture was carried on by artists from that city, and patronized by the duke of Buckingham. The place was afterwards converted into Pinnier-ball, belonging to the company of pin makers.

To the eastward of Winchester-street flooded the house of that very eminent merchant Sir Thomas Gresham, afterwards known by the name of Gresham college (See Gresham). It has been pulled down not many years ago; and the Excise Office, a most magnificent and at the same time simple building, rose in its place.

Mr Pennant informs us, that from the 9th of January 1786 to January 5th 1787, the payments into this office amounted to no less than L. 5,321,114.6.110.

The Royal Exchange, which is the meeting place of the merchants of London, stands in the ward of Cornhill, and is the finest and strongest fabric of the kind in Europe. It was founded in the year 1566. Sir Thomas Gresham, merchant in London, made an offer to the lord mayor and citizens, to build at his own expense a commodious edifice for merchants to meet and transact business, provided the city would find him a convenient situation for the same. Mr Pennant informs us, that one Richard Clough a Welshman, originally Sir Thomas's servant, first put him on the design by a letter from Antwerp, in which he reproached the London merchants with having no place to transact their business, but walking about in the rain, more like pedlars than merchants.

Citizens, in compliance with Sir Thomas's desire, purchased, for the sum of L. 3532. 80 houses in the two alleys called New St Christopher's, and Swan-alley, leading out of Cornhill into Three-needle street. The materials of those houses were sold for L. 475, and the ground, when cleared, was conveyed to Sir Thomas Gresham, who accompanied by several aldermen, laid the first brick of the new building on the 7th of June that year. Each alderman also laid his brick, and left a piece of gold for the workmen; who set about it with such fidelity and resolution, that the whole fabric was crowned by the month of November 1567, and was soon after completed under the name of the Burse.

This building was totally destroyed by the fire in 1666; and in its place the present magnificent structure was erected at the expense of L. 80,000, which stands upon a plat of ground 203 feet in length and 171 in breadth, containing an area in the middle, of 67 square perches, surrounded with a substantial and regular stone building, wrought in rufh. It has two fronts, north and south, each of which is a piazza; and in the centre are the grand entrances into the area, under a very lofty and noble arch. The south front in Cornhill is the principal, on each side of which are Corinthian demi-columns, supporting a compas pediment; and, in the intercolumniation on each side, in the front next the street, is a niche, with the statues of King Charles I. and II. in the Roman habits, and well executed. Over the aperture, on the cornice between the two pediments, are the king's arms in relief; on each side of this entrance is a range of windows placed between demi-columns, and pilasters of the composite order, above which runs a balustrade. This building is 56 feet high; and from the centre, in this front, rises a lantern and turret 178 feet high, on the top of which is a range of gilt vases made in the shape of a glassshopper, the crest of Sir Thomas Gresham's arms. The north front in Three-needle-street is adorned with pilasters of the composite order; but has neither columns nor flates on the outside; and has triangular, instead of compas, pediments. The inside of the area is also surrounded with piazzas, forming ambulatories for merchants, &c. to shelter themselves from the weather, when met there upon business. Above the arches of this piazza is an entablature with curious ornaments; and on the cornice a range of pilasters with an entablature extending round, and a compas pediment in the middle of the cornice of each of the four sides. Under the pediment on the north side of the king's arms; on the south, the city's arms; on the east, Sir Thomas Gresham's arms; and on the west, the mercer's arms, with their respective enrichments. In these intercolumns are 24 niches, 20 of which are filled with the statues of the kings and queens of England.

The gentle Mortimer finished his days here, the Elms: but the original as well as the present name was Ty-bourne; not from tye and burn, as if it were called so from the manner of capital punishments; but from bourns, the Saxon word for a "Brook," and tye the name of that brook, which joined gave name to a manor before the conquest. Here was also a village and church denominated St John the Evangelist, which fell to decay, and was succeeded by that of Mary bourn, corrupted into Mary-in-bowme. In 1656, Queen Henrietta Maria was compelled by her priests to take a walk by way of penance to Tyburn. What her offense was we are not told; but Charles was so disguised at this interview, that he soon after sent them and all her maids and French servants out of the kingdom.
In building this expensive structure there was an eye not only to magnificence, and to accommodate the merchants, but also to reimburse the expense. For this reason a gallery was built on the four sides of the royal exchange. This was divided into 200 shops which were let out to haberdashers, milliners, &c. and which for several years were well occupied. But these shops have now for a long time been deserted, and the galleries are let out to the Royal Exchange Assurance-office, the Merchant-iemens office, the Marine Society, and to auctioneers, &c. Under the whole area there are the finest dry vaults that can be found anywhere, which are let out to the East-India company to deposit their pepper. The turret is a good clock with four dials, which is well regulated every day, so that it becomes a standard of time to all the mercantile part of the town; and it goes with chimes at three, six, nine, and twelve o'clock, playing upon twelve bells. The outside of this grand fabric suffers very much in its elegance from the shops that surround it, and are built within its walls; and which are occupied by bookfellers, toymen, cutlers, hosiers, watch-makers, &c.

South of the Royal-Exchange, and near the west extremity of Lombard-street, is the General Post Office, which is a handsome and commodious building.

In Walbrook ward is the Mansion-house, for the residence of the lord-mayor. This edifice was begun in 1739, and finished in 1753. It is built of Portland stone, with a portico of six fluted columns, of the Corinthian order, in the front. The basement story is very agreeable, and consists of rustic work; in the centre of it is the door, which leads to the kitchens, cellars, and other offices. On each side rises a flight of steps, leading up to the portico, in the middle of which is the principal entrance. The stone balustrade of the stairs is continued along the front of the portico, and the columns support a large angular pediment, adorned with a group of figures in bas relief, representing the dignity and opulence of the city of London. It is an extremely heavy building, of an oblong form, and its depth is the long side, having several magnificent apartments, which are not, however, well lighted, on account of housetops that surround it.

Behind the mansion-house is St Stephen's Church, St Stephen in Walbrook, justly reputed the master-piece of the period, celebrated Sir Christopher Wren, and is said to excel every modern structure in the world in proportion and elevation.

The mansion-house, and many adjacent buildings, stand on the place where the Stocks market once stood. This took its name from a pair of flocks erected...
In this ward is situated one of the most remarkable pieces of antiquity in London. It is a great stone, formerly standing on the north side of Canon-street, close under the south wall of St Swithin's church. It is called London-stone, and was formerly pitched edgewayson the other side of the street, opposite to where it now stands, fixed deeply in the ground, and strongly fastened with iron bars; but for the convenience of wheel-carriages it was removed to its present situation. This stone is mentioned so early as the time of Athelstan, king of the West Saxons, and has been carefully preserved from age to age. Of the original cause of its erection no memorial remains; but it is conjectured, that as London was a Roman city, this stone might be the centre, and might serve as an object from which the distance was computed to the other considerable cities or stations in the province.

In Dowgate ward is a noted academy, called Merchant-taylors School, from its having been founded by the merchant-taylors company, in the year 1561. It was destroyed by the fire of London in 1666, but was rebuilt, and is a very large structure, with commodious apartments for the masters and scholars, and a fine library. Sir Thomas White, lord mayor of this city, having founded St John's college in Oxford in 1357, appointed this school as a seminary for it, and established at Oxford 46 fellowships for scholars elected from this school.

The church of St Mary le Bow, in Cordwainers-street ward, is the most eminent parochial church in the city. It was originally built in the reign of William the Conqueror; and being the first church the free people of London were paved for, was burnt down in the fire of 1666. It was burnt down in the fire of 1666, but soon afterwards rebuilt. The steeple of this church is reckoned the most beautiful of its kind in Europe.

In Cheap ward is Guildhall, or the town-houfe of London. This was originally built in 1441, but so damaged by the great fire already mentioned, as to be rebuilt in 1690. The front has a Gothic appearance. The sign of this character is also due to the two gigantic effigies which stand within the hall. The hall is 153 feet long, 50 broad, and 55 high, adorned with the royal arms, and thole of the city and its companies, as well as with several portraits of English sovereigns and judges. In this building are many apartments for transacting the business of the city, besides one for each of the judicial courts, namely, that of the King's-Bench, the Common-Pleas, and the Exchequer.

In the year 1246 Cheapside was an open field, named Crown field, from an inn with the sign of the crown. At that time, and even for 200 years afterwards, none of the streets of London were paved excepting Thames-street, and from Ludgate-hill to Charter Cross.

Goldsmiths Hall. Goldsmiths Hall stands in Foster-lane, which opens into the west end of Cheapside. In this lane also is St Martin's le Grand, which, though surrounded by the city, was yet subject, near three centuries, to Westminster Abbey. A fine college was built here in 700 by Wycliffe king of Kent, and, about the year 1056, rebuilt and chiefly endowed by Ingelric and Edward, two noble brothers. In 1668, it was confirmed and made independent of every ecclesiastical jurisdiction, even that of the pope himself not excepted; and its privileges were confirmed by succeeding monarchs. It was governed by a dean, and a number of secular canons. In this jurisdiction a magnificent church was erected, but pulled down in 1568, when the college was surrendered, after which a tavern was erected on the spot.

A little to the westward of Mary-le-Bow church the Crosses (in the adjoining ward), stood the Crosses and Conduit and Conduit in the middle of the street. The former was built by Edward I. in 1290, in memory of his queen Eleanor, whose body was reposed on that spot in its way to be buried. Originally it had the statue of the queen at full length, resembling exactly that at Northampton. Having at length fallen to decay, it was rebuilt in 1441 by John Hetherby mayor of the city, at the expense of several citizens, being now ornamented with various images, as those of the Resurrection, the Virgin Mary, &c. As the magnificent proceedings took this road, it was new-gilt at every public entry. After the Reformation, the images gave so much offence, that it was thought proper to substitute that of Diana in place of the Virgin Mary. This, however, was refented by Queen Elizabeth, who offered a reward for the discovery of the offenders. As she imagined that a crofs, the symbol of the Christian religion, could not justly give offence to any professor of that religion, the order was given not to be placed on the summit, and gilt; but in 1643, the parliament ordered the demolition of all crosses and other marks of Romish superstition.

Splendid tournaments were held between the Crosses and Sopers-lane in the year 1331; but as Queen Philippa and a great number of other ladies, drested in rich attire, were sitting on the upper scaffolding to behold the sports, the feats gave way, and they suddenly fell down among the knights and others who stood below; many of whom were grievously hurt. The carpenters were saved from punishment by the intercession of the queen; but the king, to prevent access of the like nature, ordered a building of stone to be erected near Bow church, from whence the queen and other ladies might behold such spectacles in safety. This was used for the same purpose till the year 1410, when Henry IV. granted it to certain merchants, who converted it into shops, warehouses, and other places necessary for their trade.

A small distance eastward from the Crosses stood the Conduit, which served to fill the lefter ones with water brought by pipes from Paddington. This stood on the spot where the old conduit was situated, which was founded in 1283, constructed of stone lined with lead, and rebuilt in 1479 by Thomas Iain one of the sheriffs. On some grand occasions, these conduits have been made to run with clarer; as at the coronation of Anna Bullen.

On the north side of Cheapside stood the Hospital of St Thomas of Acon, founded by Fitz-Theobald de Hallé, and his wife Agnes, sister to the famous Thomas a Becket. The hospital was built 20 years after the murder of Thomas; and such was his reputation for
LON [255] LON

74 Old Jewry. 

for sanctity, that it was dedicated to him even before he was canonized, and that in conjunction with the Virgin Mary herself. The whole was granted by king Henry VIII. to the company of mercers. It was destroyed by the great fire in 1666; but rebuilt by the mercers company, who have their hall here. — Immediately to the east is a narrow street called the Old Jewry, which took its name from a great synagogue which stood here till the Jews were expelled the latter part of the 13th century. After them an order of friars named Fratres de fucca, or de penitentia, took possession of the synagogue, and in 1305, Robert Fitzwalter, the great banner-bearer of the city, requested that the friars might assign it to him; the reason of which probably was, that it stood near to his house, which was situated in the neighbourhood of the present Grocers-hall. The chapel was bought by the grocers from Fitzwalter in 1411 for 320 marks.

75 Blackwell Hall. 

In Billingshaw or Basing-hall ward, is Blackwell or Bakewell hall, which adjoins to Guildhall, and is the greatest mart of woollen cloth in the world. It was purchased of King Richard II. by the city; and has been used as a weekly market for broad and narrow woollen cloths, brought out of the country. Formerly proclamations were issued to compel people to bring their goods into the hall, to prevent deceit in the manufactures, which might be productive of dishonesty in foreign markets, and likewise be the means of depriving poor children of Christ's hospital of part of the revenue which arose from the sale of this great magazine. It suffered in the general devastation in 1666; but was rebuilt in 1672, and is now a spacious edifice, with a stone front adorned with columns.

76 Sion College. 

Cripplegate-ward is remarkable for a college, called Sion-college, founded in 1627, on the site of Elings-hospital (for priory, by Dr Thomas Wight, vicar of St Dunstan's in the West, for the improvement of the London clergy; and with alms-houses, under their care, for 20 poor persons, 10 men and 10 women. In the year 1631, a charter was procured for incorporating the clergy of London, by which they were constituted fellows of the college; and out of the incumbents are annually elected, on Tuesday three weeks after Easter, a president, two deans, and four suffragans, who are to meet quarterly, to hear a Latin sermon, and afterwards be entertained at dinner in the college-hall at the expense of the foundation. John Simpson rector of St Olaves, who superintended the building, added, at his own expense, for the use of the Rudens part of the London clergy, a library in feet long, and amply filled with books.

In this ward is a hall which belonged to the company of barber-surgeons, the professors of barber and surgeon being formerly exercised by the same person. It was built by the celebrated Inigo Jones, and the upper end is formed out of one of the towers or barbacins of London wall. The anatomical theatre is elliptical, and very finely contrived. This hall is now called Barbers Hall; the surgeons, who disdained to be any longer associated with their ancient brethren, having obtained a separate charter, and built themselves a new hall in the old Bailey.

Farringdon-ward Within, is distinguished by the St Paul's most magnificent Protestant church in the world, the cathedral of St Paul. The body authority we have for the origin of this church, is from its great reformer Sir Christopher Wren. His opinion that there had been a church on this spot built by the christians in the time of the Romans, was confirmed: when he searched for the foundations for his own design, he met with those of the original prefbyterium, or semicircular chancel, of the old church. They consisted only of Kenilworth-stone, artfully worked, and confoliated with exceedingly hard mortar, in the Roman manner, much excelling the superstructure. He exploits the notion of there being here a temple of Diana, and the discovery of the horns of animals used in the sacrifices to that goddess, on which the opinion had been founded, no such having been discovered in all his searches.

The first church was supputed to have been destroyed in the Doicletian persecution, and to have been rebuilt in the reign of Constantine. This was again demolished by the pagan Saxons; and restored in 603, by Sebert, a petty prince, ruling in these parts, under Ethelbert king of Kent, the first Christian monarch of the Saxon race; who, at the instance of St Augustine, appointed Melitus the first bishop of London. Erkenwald, the son of king Offa, fourth in succession from Melitus, ornamented his cathedral very highly, and improved the revenues with his own patronymy. He was moft defervedly canonized: for the very litter, in which he was carried in his last illness, contained many centuries to cure fevers by the touch; and the very chips, carried to the sick restored them to health.

When the city of London was destroyed by fire, in 1666, this church was built; the bishop Mauritius began to rebuild it, and laid the foundations, which remained till its second destruction, from the flames, in the last century. Notwithstanding Mauritius lived twenty years after he had begun this pious work, and bishop Beauvais enjoyed the see twenty more, yet such was the grandeur of the design, that it remained unfinished. The first had the ruins of the Palantine Tower bestowed on him, as materials for the building; and Henry I. bestowed on Beauvais part of the ditch belonging to the Tower, which, with purchases made by himself, enabled him to enclose the whole with a wall. The same monarch granted besides, that every ship which brought stone for the church, should be exempted from toll; he gave him also the great fish taken in his precincts, except the tongue; and, lastly, he secured to him and his successor the delicious tythes of all his venison in the county of Essex.

The style of the ancient cathedral was a most beautiful Gothic; over the east end was an elegant circular window; alterations were made in the ends of

(p) This was founded by William Elling mercer in 1299 (on the site of a decayed monastery), for the support of 100 blind men. He afterwards changed it into a priory, and became himself the first prior, who with four canons-regular were to superintend the miserable objects.
The two transepts, so that their form is not delivered down to us in the ancient plans; and from the central tower rose a lofty and most graceful spire. The dimensions, as taken in 1509, were these: The length six hundred and ninety feet; the breadth a hundred and twenty; the height of the roof of the west part, from the floor, one hundred and two; of the east part, a hundred and eighty-eight; of the tower, two hundred and fifty; of the spire, which was made of wood covered with lead, two hundred and seventy-four. The whole space the church occupied was three acres and a half, one road and a half, and six perches.

We may be astonished at the amazing building, and naturally inquire what fund could supply money to support so vast an expense. But monarchs resigned their revenues resulting from the customs due for the materials, which were brought to the adjacent wharfs; they furnished wood from the royal forests; prelates gave up much of their revenues; and, what was more than all, the pious spirit of indulgences, brought in from the good people of the realm most amazing sums. Pope Innocent III. in 1252, gave a release of sixty days penance; the archbishop of Cologne gave, a few years before, a relaxation of fifty days; and Boniface, archbishop of Canterbury, forty days.

The high altar dazzled with gems and gold, the gifts of its numerous vortaries. John King of France, when prisoner in England, first paying his respects to St Erkenwald's shrine, offered four basons of gold; and the gifts at the obsequies of princes, foreign and British, were of immense value. On the day of the conversion of the tutelar saint, the charites were prodigious, first to the founts, when an indulgence of forty days pardon was given, _vocem profanationis, contritis et confessis_; and, by order of Henry III. fifteen hundred tapers were placed in the church, and fifteen thousand poor people fed in the church-yard.

The holiness of this place did not prevent thieves and profligates of all denominations, from lurking within the precincts, and committing, under the favour of the night, murders and every sort of crimes. Edward gave the dean and canons permission to inclose the whole within a wall; and to have gates to be shut every night, to exclude all disorderly people. Within these walls, on the north-west side, was the bishop's place. Froissart tells us, that after the great tournament in Smithfield, king Edward III, and his queen lodged there, on occasion of their nuptials. In 1561, the noble spire was totally burnt by lightning, and never restored.

In consequence of the resolutions taken in 1620, by James I. to repair the cathedral, the celebrated Inigo Jones was appointed to the work. But it was not attempted till the year 1633, when Laud laid the first stone, and Inigo the fourth. That great architect began with a most notorious impropriety, giving to the west end a portico of the Corinthian order, beautiful indeed, to this ancient gothic pile; and to the ends of the two transepts, gothic fronts in an odd horrible style. The great hire made way for the reforing of this magnificent pile in its present noble form by Sir Christopher Wren, an architect worthy of a great design. It is built of fine Portland stone, in form of a cross. On the outside are two ranges of pilasters, consisting of an hundred and twenty each; the lower range of the Corinthian order, and the upper of the composite. The spaces between the arches of the windows and the architrave of the lower order, are filled with a great variety of curious enrichments, as are also those above. On the north side is a portico, the acent to which is by twelve steps of black marble, and its dome supported by six very large columns. Over the dome is a pediment, the face of which is engraved with the royal arms, regalia, and other ornaments. On the south is a portico, the acent to which is by twenty-five steps, and its dome supported by six columns, corresponding with those on the north side. The west front is graced with a most magnificent portico, supported by twelve lofty Corinthian columns: over these are eight columns of the compositive order, which support a noble pediment, crowned with its acroteria, and in this pediment is the history of St Paul's conversion, boldly carved in bas relief. The acent to this portico is

(e) Before this cathedral was the famous _Paul's Crof_, a pulpit formed of wood, mounted upon steps of stone, and covered with lead, in which the most eminent divines were appointed to preach every Sunday in the forenoon. To this place, the court, the mayor, and aldermen, and principal citizens, used to resort. The greatest part of the congregation sat in the open air; the king and his train had covered galleries; and the better sort of people were also protected from the injury of the weather; but the far greater part exposed in the open air; for which reason the preacher went in very bad weather to a place called the Shrouds; a covered space on the side of the church, to protect the congregation in inclement seasons. Considerable contributions were raised among the nobility and citizens, to support such preachers as were (as was often the case) called to town from either of the universities. In particular, the lord mayor and aldermen ordered that every preacher, who came from a distance, should be freely accommodated, during five days, with sweet and convenient lodgings, fire, candle, and all necessaries. And notice was given by the bishop of London, to the preacher appointed by him, of the place he was to repair to.

We hear of this being in use as early as the year 1259. It was used, as Mr Pennant observes, not only for the instruction of mankind by the doctrine of the preacher, but for every purpose political or ecclesiastical; for giving force to oaths, for promulgating laws, or by the royal pleasure, for the emission of papal bulls, for confinuating sinners, for benedictions, for exposing of penitents under the care of the church, for recantations, for the private ends of the ambitious, and for the depriving of those who had incurred the displeasure of crowned heads.

It was demolished in 1643 by order of parliament, executed by the willing hands of Isaac Pennington, the fanatical lord mayor of that year, who died in the tower a convicted regicide.
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London. is by a flight of steps of black marble, extending the whole length of the portico; and over each corner of the west front is a beautiful turret. A vast dome, or cupola, rises in the centre of the building. Twenty feet above the roof of the church is a circular range of thirty-two columns with niches, placed exactly against others within. These are terminated by their entablature, which supports a hand-fome gallery, adorned with a stone balustrade. Above the columns last mentioned is a range of pilasters, with windows between them; and from the entablature of these, the diameter of the dome gradually decreases. On the summit of the dome is an elegant balcony, from the centre of which runs a beautiful lantern, adorned with Corinthian columns. The whole is crowned with a copper ball, supporting a crofs, both finely gilt. Within, the cupola stands on eight stupendous pillars, curiously adorned: the roof of the choir is supported by six pillars, and that of the church by two ranges, consisting of twenty more. The roof of the church and choir is adorned with arches and spandrils, perpendicularly erected, admirably carved in stone. Quire round the inside of the cupola, there is a whispering iron balcony, or gallery, the top of which is richly painted by Sir James Thornhill.

The first stone of this superb edifice was laid on June 21, 1673; and the building was completed in 1722; but the whole decorations were not finished till 1732. It was a most singular circumstance, that, notwithstanding it was 35 years in building, it was begun and finished by one architect, and under one prelate Henry Compton bishop of London. The church of St Peter's was 195 years in building, in the reigns of 19 popes, and went through the hands of twelve archbishops, and was finally finished by Sir Christopher Wren.

In the east side of the cathedral is St Paul's School, founded in 1509 by Dr John Collet dean of this church who endowed it for a principal-mister, an under-mister, a chaplain, and 153 scholars.

In Warwick-lane, in the same ward, stands the Coll: of Physicians, erected in 1682 by Sir Christopher Phyfician, erected.

Adjoining to Christ-church in Newgate-street is Christ's Hospit: of Physicians, erected in 1681 by Sir Christopher Phyfician, erected.

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and the bishop of London. The college has an excellent library, every bishop at his consecration giving L. 20 or L. 50 towards purchasing books for it.

Near Doctors’ Commons, on St Benedict’s Hill, is the College of Heralds, who were incorporated, by King Richard III. Before the college, who is the earl-marshall of England, here are three kings at arms, viz. Garter, Clarencieux, and Norroy, with six heralds, four purveyors, and eight stents. Garter attends the infallible of knights of that order, carries the garter to foreign princes, regales the ceremonies at coronations, and the funeral of the royal family and nobility: Clarencieux directs the funeral ceremonies of those under the degree of peers south of Trent, and Norroy performs the like office for those north of Trent. This building was originally the house of the earl of Derby. It is a spacious quadrangle, built of brick and has convenient apartments. Here are kept records of the coats of arms of all the families and names in England, with an account when they were granted, and on what occasion.

In Farringdon-ward Without is a large building called Bridewell, from a spring formerly known by the name of St Bridget’s or St Bride’s-Well. It was originally a royal palace, and occupied all the ground from Fleet-ditch on the east to Water-lane on the west. That part of it now called Salisbury-court was given to the bishops of Salisbury for their town residence; and the east part, which was rebuilt by King Henry VIII. in the present Bridewell. It was granted to the city by Edward VI. as a hospital; and he endowed it for the lodging of poor travellers, and for the correction of vagabonds, runnymen, and idle persons, as well as for finding them work. In one part of the building 200 artificers have houses; and about 150 boys, distinguished by white hats and blue doublets, are put apprentices to glaziers, fletcherers, weavers, &c. and when they have served their time are intitled to the freedom of the city, with L. 10 towards carrying on their respective trades. The other part of Bridewell is a receptacle for disorderly persons, who are kept at work in hemp and other hard labour.

Near Bridewell is St Bride’s Church, a flatly fabric 117 feet long, 57 broad, and 41 high, with a beautiful spire 244 feet in altitude, and has a ring of 12 bells in its tower.

Blackfriars Bridge.

Opposite to Fleet-ditch, over this part of the river, stands Blackfriars Bridge; a most elegant structure built after the design of Mr Robert Mylne. The situation of the ground on the two shores obliged the architect to employ elliptical arches; which, however, have a very fine effect. The number of arches nine; of which the centre one is 100 feet wide. The whole length is 995 feet: the breadth of the carriage-way is 28 feet, and that of the two foot-ways 7 each. Over each pier is a recet; an apology for the beautiful Ionic pillars which support them, and which have a most beautiful effect from the river. This bridge was begun in 1760; and finished in 1768, at the expense of L. 152,840, to be discharged by a toll upon the passengers. It is situated almost at an equal distance between those of Westminster and London, commands a view of the Thames from the latter to Whitehall, and discovers the majesty of St Paul’s in a very striking manner.

West Smithfield. In this ward is an area containing three acres of ground, called in old records Smithfield-Pond or Horfepool, it having been formerly a watering-place for horses. It was in ancient times the common place of execution, and at the south-west corner there is a gallows called the Elms, from a number of elms trees that grew in the neighbourhood. It was likewise the issue of public juts and tournaments, and has been a market-place for cattle above 500.

On the south side of this area, and contiguous to St Bartholomew’s hospital, is St Bartholomew’s Hospital. It was originally founded soon after the accession of Henry 1. by Rahere the king’s jester, was an infirmary for the priory of St Bartholomew the Great, which then stood near the spot. But upon the dissolution of religious houses, Henry VIII. refounded it, and endowed it with 500 marks a year, on condition that the citizens should pay the same sum annually for the relief of 100 lame and infirm patients. The endowments of this charity have since been so much enlarged, that it now receives the diffret of all denominations. In 1702, a beautiful frontispiece was erected towards Smithfield adorned with pilasters, entablature, and a pediment of the Ionic order, with a statue of King Henry VIII. standing in a niche in full proportion, and those of two cripples on the top of the pediment over it. In 1729, a plan was formed for rebuilding the wrift of this hospital, in consequence of which a magnificent edifice has been erected.

Among many other privileges granted by Henry I. to the prior and canons of the monastery of St Bartholomew the Great, and to the poor of the infirmary, was that of keeping a fair in Smithfield on the eve, day, and morrow, of St Bartholomew. This fair, called Bartholomew-fair, has been held annually ever since; and by the indulgence of the magistrates of London, to whom the privilege of keeping it devolved upon the dissolution of the priory, it used to continue a fortnight. A great number of booths were erected in it by the actors of the theatres, for the exhibition of dramatic performances of various kinds; and it became at length a scene of much licentiousness and riot that Sir John Barnard when lord-mayor of London reduced the time of the fair to its original duration of three days. This laudable example has been followed ever since; and the magistrates have likewise prohibited all public exhibitions which had been formerly accompanied with so much disorder.

In a street in this ward, called the Old Bailey, is a court named Justice-hall, or the Sessions’ houses, where a court is held eight times a year by the king’s commission of oyer and terminer for the trial of criminals for offences committed within the city of London and county of Middlesex. The judges of this court are the lord-mayor, the aldermen that have served that office, and the recorder, who are attended by the sheriffs and by one or more of the national judges.

In this street is also the great criminal prison, lately built in a much more convenient situation, and on a more enlarged plan than the former prison, called Newgate; by which name it is still distinguished. Here the unfortunate debtor will no longer be annoyed by the dreadful rattle of chains, or by the more horrid sounds issuing from the lips of those wretched beings who yet defy all laws divine and human: and
In this ward was likewise a priory called the Fleet-prison, from a small river named the Fleet which formerly ran by it: this building is large, and reckoned the best in the city for good rooms and other conveniences. It has the benefit of a large yard which is enclosed with a very high wall. This priory is as ancient as the reign of Richard I. and belongs to the court of chancery, &c.

In Chancery-lane, in this ward, is an office consisting of a house and chapel, called the office and chapel of the Rolls, from being the great repository of the modern public rolls and records of the kingdom. This building was originally the house of an eminent Jew; but being forfeited to the Crown, King Henry III. in the year 1223 converted it into an hospital for the reception and accommodation of Jewish and other profelytes. In 1377, Edward III. granted this hospital and its chapel to William Burntall master of the rolls, to whose successors in that office it has ever since belonged. Round this office there is a small district consisting of about 200 houses, called the Liberty of the Rolls, over which the magistrates of London have no authority, it being under the government of the master of the rolls.

In this ward are several Inns of court and chancery, particularly the inner and Middle-Temple, Serjeant's Inn, Clifford's-Inn, Barnards'-Inn, and Farnival's-Inn.

The Temple received its name from being originally founded by the Knights-Templars, who settled here in 1187. It was at first called the New Temple, to distinguish it from the former house of the Knight's Templars, which stood in Holborn near Chancery-lane.

The original building was divided into three parts the Inner, the Middle, and the Outer Temple. The Inner and the Outer Temple were so called, because one was within and the other was without the Bar; and the Middle derived its name from being situated between them. Upon the dissolution of the order of Knights-Templars, the New Temple devolved to the Knights-Hospitallers of St John of Jerusalem, who granted a lease of it to the students of the common law, and converted part of it into the Inner and Middle Temple into two Inns of court for the study and practice of the common law. The Outer Temple became a house for the Earl of Ely.

The buildings of the Temple escaped the fire in 1666, but were most of them destroyed by subsequent fires, and have since been rebuilt. The two Temples are each divided into several courts, and have pleasant gardens on the banks of the Thames. They are appropriated to distinct societies and have separate halls, where the members dine in common during term-time. The Inner-Temple hall is said to have been built in the reign of Edward III. and the Middle-Temple hall which is a magnificent edifice, was rebuilt in 1572 in form of a college hall. The Middle-Temple gate, Mr Pennant informs us, was erected by Sir Amias Poulter on a singular occasion. It seems that Sir Amias, about the year 1531, thought fit to put Cardinal Wolsey, then archbishop of York, into the stocks. In 1535, being sent for to London by the cardinal on account of that ancient grudge, he was commanded not to quit town till farther orders. In consequence, he lodged five or six years in this gateway, which he rebuilt; and to pacify his eminence, adorned the front with the cardinal's cap, badges, cognizance, and other devices of this bucher's son; so low were the great men obliged to stoop to that meteor of the times! Each temple has a good library, adorned with paintings and well furnished with books. An assembly, called a parliament, in which the affairs of the society of the Inner-Temple are managed, is held there every term. Both temples have one church, first founded in 1185 by the Knights-Templars; but the present edifice is supposed to have been built in 1420. It is supported by neat slender pillars of Sufex marble, and is one of the most beautiful Gothic structures in England. In this church are many monuments, particularly of nine Knights-Templars cut in marble in full proportion, some of them seven feet and a half long: six are crofs-legged, and therefore supposed to have been engaged in the crusades. The minister of this church, who is usually called the Master of the Temple is appointed by the benchers or senior members of both societies, and preferred by a patent from the crown. Shakespeare (whether from tradition or history) makes the temple garden the place in which the badge of the white and red rose originated; the distinctive badge of the houses of York and Lancaster, under which the respective parties of each arranged themselves in the fatal quarrel which caused such torrents of English blood to flow.

Near Temple-bar is the Devil's-tavern, so called from its sign of St Dunstan rearing the evil spirit by the nose with a pair of hot tongs. Ben Jonson has immortalized it by his Leges Convivales, in which he wrote for the regulation of a club of wits held here in a room he dedicated to Apollo; over the chimney-piece of which they are preferred. The tavern was in his days kept by Simon Wadling, whom in a copy of verses over the door of the Apollo, he dignified with the title of King of Skiers.

Serjeant's Inn is a small Inn in Chancery-lane, Inn of where the judges and serjeants have chambers, but Chancery, not houses, as they had in another Inn of this name in Fleet-street, which they abandoned in 1730; but in each of them there is a hall and a chapel. Clifford's Inn is an Inn of chancery belonging to the Inner Temple. It was originally a house granted by Edward II. to the family of the Cliffords, from which it derived its name; but was afterwards let upon lease to the students of the law, and in the reign of Edward III. sold to the members of this society. Barnard's Inn is likewise an Inn of Chancery belonging to Gray's-Inn. It stands in Holborn, and was the house of John Mackworth dean of Lincoln, who gave it to the professors of the law. Staple's Inn belongs also to Gray's-Inn, and is situated in Holborn. It was once a hall for the merchants of the staple for wool, whence it derives its name; but it was purchased by the benchers of Gray's-Inn, and has been an Inn of chancery since the year 1431. Furnival's Inn is an Inn of chancery belonging to Lincoln's-Inn, and was once the house of the family of the Furnivals, by whom it was let out to the professors of the law. It is a large old building with a hall and a pleasant garden.
In Colman-street ward on the south side of a large square called Moorfields, stands Bethlem-hospital, founded in 1675 by the lord-mayor and citizens of London for the reception and cure of poor lunatics. It is a noble edifice, built with brick and stone, and adorned with pillars, entablatures, and sculpture; particularly with the figures of two lunatics over the grand gate, which are well executed. This building is 540 feet long and 40 broad, exclusive of two wings of a later erection, intended for the reception of such lunatics as are deemed incurable. This hospital contains a great number of convenient cells or apartments where the patients are maintained and receive all medical assistance without any other expense to their friends than that of bedding. The structure is divided into two stories, through each of which runs a long gallery from one end of the house to the other. On the south side are the cells, on the north the windows that give light to the galleries, which are divided in the middle by handsome iron gates, to keep the men and women separate. This hospital being united to that of Bridewell, both are managed by the same president, governors, treasurer, clerk, physician, surgeon, and apothecary; and each has a ward and inferior officers peculiar to itself.

Opposite to Bethlem-hospital stood that of St Luke, along plain building, till of late appropriated to the same purposes, but wholly independent of the former. It was founded on the humane consideration that Bethlem was incapable of receiving all the miserable objects which were offered. Of late years the patients were removed from the old hospital to a new one erected under the same name in Old-street, on the plan of the former, extending in front 393 feet. The old hospital is now pulled down, and replaced by a handsome row of houses. Uncured patients may be taken in again, by a very liberal regulation, on the payment of five shillings a week, so that their friends may if they choose, try a second time the force of medicine on their unhappy relations or acquaintances.

Besides the three markets already mentioned at Smithfield for cattle and hay, at Leadenhall for butcher's meat, wool, hides, and Colchester bairne, and at Billingsgate for fish; there are in this city the following other markets, which are all very considerable, viz. Honey-lane, Newgate, and Fleet-market, chiefly for flesh, though with separate divisions for fish, butter, eggs, poultry, herbs, and fruit; and the Three-Cranes market, for apples and other fruit. The principal corn-market is held in a neat exchange situated in Mark-lane, and that for flour at Queenhithe. In Thames-street, near Billingsgate, there is an exchange for dealers in coals and masters of vessels in that trade to transact their business.

II. The Borough of Southwark. It was called by the Saxons Suth, or the "South work," in respect to some fort or fortification bearing that aspect from London. It was also called the Borough, or Burg, probably from the same reason. It was long independent of the city of London: but in consideration of the inconveniences arising from the escape of malefactors from the great capital into this place, it was in 1327 granted by Edward III. to the city on payment of L. 10 annually. It was then called the village of Southwark; it was afterwards styled the Baldwin, of Southwark, and the mayor and commonalty of London appointed the bailiff. This power, however, not being sufficient to remedy the evil, a more intimate connection was thought necessary; and in the reign of Edward VI. on a valuable consideration paid to the crown, it was formed into a 26th ward, by the title of Bridge-Ward Without, with a reversion of certain privileges enjoyed there by the archbishop of Canterbury and some other ecclesiastics. In consequence of this, it was subjected to the lord-mayor of London, with the find and bailiff. But Southwark being divided into two parts, this is to be understood of the division called the Borough Liberty, which consists of three of the parishes belonging to the town, with the greater part of a fourth part. For the city division, the lord-mayor by his warrant holds a court of record every Monday at the feilions-house on St Margaret's Hill in this borough for all debts, damages, and trespasses, within the limits of his jurisdiction. The other division is called the Clink, or the Manor of Southwark, and is subdivided into the Great Liberty, the Guildhall, and the King's Manor: for each of which subdivisions a court-leet is held, where the constables, ale- and flesh-tasters, are chosen, and other business of this kind transacted. A court-leet, called Union-Hall, has lately been built in the new street called Union-street, which leads in a direct line from the high-street in the Borough to Great Surrey-street Blackfriars-road. The Clink liberty is under the jurisdiction of the bishop of Winchester, who, besides a court-leet, keeps here a court of record on the Bank-side near St Saviour's church by his warrant or bailiff, for pleas of debt, damages, and trespasses. Court-leets are also kept at Lambeth, Bermondsey, and Rochester, three small districts adjoining to the Borough — there is a counter for the imprisonment of offenders in the bailiwick and another for the Clink liberty — to which may be added the Surry workhouse for vagrants. Besides, there is the marshall-prison which is the county-gaol for felons, and the admiralty-gaol for pirates (a); in which is a court first erected for trials of causes between the king's domestics or ministerial servants, of which the knight marshal is president, and his warder, to whom belong four counsellors and six attorneys; and the court is held every Friday by him or his deputy, for debt, damages, and trespasses in causes for 10 miles round Whitehall, excepting London. In this quarter is also the king's-bench prison, the rules of which are above two miles in circuit, and comprise the greatest part of St George's Fields. Here was committed Henry prince of Wales, afterwards King Henry V. by the spirited and honest judge Gafcoigne, for striking or insulting him on the bench.

(a) In 1377 this prison was broke open by a mob of sailors, who murdered a gentleman confined in it for killing one of their comrades, and who had been pardoned by the court. It was again broke open by Wat Tyler and his followers in 1381. It escaped in the infamous riots of 1780; while the King's Bench, the Borough-prison, and the Clink-prison, were nearly at the same instant sacrificed to their fury.
In this prison the allowance is somewhat better than that of the common prisons; for which reason, many debtors remove themselves hither by habeas corpus. It is properly a place of confinement in all cases triable in the King’s-bench court.—The first time that Southwark is mentioned in history is on occasion of Earl Goodwin’s falling up the river to attack the royal navy of 30 ships lying before the palace of Westminster; this was in 1052, when we are told he went ad Southwark, and stayed there till the return of the tide.

Southwark consists of the parishes of St Olave, St Saviour, St George, and St Thomas; the parish of Christ-church, though contiguous to the borough, is in the county of Surrey.

The principal church in Southwark is that of St Saviour, which was formerly a priory of regular canons. Being dedicated to the Virgin Mary, and situated near the bank of the Thames, it was called St Mary Over Regis, by which appellation it is commonly known. This church is built in the manner of a cathedral, with three aisles from east to west and a crof aisles. It is reckoned the largest parish-church in England, the three aisles first mentioned measuring 269 feet, in length, and the crofs aisles 109 feet. The height within, is 47 feet and it has a tower with four spires 150 feet high.

Not far from St George’s church stood the magnificent palace of Charles Brandon duke of Suffolk, the beloved favourite of Henry VIII. After his death, in 1545, it came into the King’s hands, who established here a royal mint. At that time was called Southwark Place, and in great meaure preferred its dignity to Edward VI. once dined in it. His tither and successor presented it to Heath archbishop of York as an inn or residence for him and his successors when ever they repaired to London. As to the mint, it became a seductive for insolvent debtors; at length becoming the pest of the neighbourhood, by giving shelter to villains of every species that awakened the attention of parliament: which, by the statutes 8 and 9 Will. III. 9 George I. and 11 George I. entirely took away its abusive privileges.

In the parish of Christ-church, near the water on Bankside flood, Paris-garden, one of the ancient play houses of the metropolis. Ben Jonson is reproached by one Decker, an avocat er, with his ill success of the stage, and in particular with having performed the part of Zuliman at Paris-garden. It seems to have been much frequented on Sund.ys. This profanation (Mr Pennant observes) was at length fully published by the dire accident which befel the spectators in 1582, when the scaffolding suddenly fell, and multitudes of people were killed or miserably maimed. The occasion seems to have been accepted; for in the next century the manor of Paris-garden was erected into a parish, and a church founded under the name of Christ’s.

Beyond this place of amusement were the Bear-garden and place for baiting of bulls, the Brittan circus: “Herein (says Stow) were kept bears, bulls, and other beastes to be baited; and also maffives in several kennels nourished to bate them. These beares and other beastes are there kept in plots of ground castfould for the beholders to stand safe.” This was then an amusement for persons of the first rank: the great, if not good, Elizabeth caused the French ambasadores to be carried to this theatre, to divert them with these bloody spectacles.

Not far from these scenes of cruel pastime was the Stews, Bordello or Stew, permitted and openly licensed by government, under certain laws or regulations. They were formed out. Even a lord-mayor did not disdain to own them; but rented them to the Fnoes, that is “the bawds,” of Flanders. Among other singular regulations, no stewholder was to admit married women; nor were they to keep open their houses on Sundays; nor were they to admit any women who had on them the perilous infirmity of burning. These infamous houses were very properly suppressed in the reign of Henry VIII.

The bishop of Winchester had formerly a palace here with a park (the fame that is now called Southwark-Park), which is since converted into warehouses and tenements, held by lease from the bishops of that see.

Southwark also contains several almshouses, of which there are here St Thomas’s and Guy’s hospitals, known under the names of Southwark hospitals in England. The former was erected in 1515 by Peter de Ruphus bishop of Winchester, who endowed it with land to the amount of L. 343 a year; from which time it has been the object of the abbots of Bermondsey, one of whom in 1428 granted a right to the master of the hospital to hold all the lands it was then in possession of belonging to the said abbots and convent, the whole revenue of which did not exceed L. 266:17:6 per annum. In the year 1557, after the citizens of London had purchased of Edward VI. the manor of Southwark and its appurtenances, of which this hospital was a part, they expended L. 1100 in repairing and enlarging the edifice, and immediately received into it 260 patients; upon which the king in 1553 incorporated this hospital with those of Christ-church and Bridewell in the city of London. The building bring much decayed, three beautiful squares adorned with colonades were erected by voluntary subscription in 1693, to which in 1752 the governors added a magnificent building, consisting of several wards with proper offices. The annual disbursements of this hospital have for many years amounted to L. 8000. The house is divided into 19 wards, and is said to contain 474 beds.

Adjoining to St Thomas’s stands Guy’s hospital, perhaps the most extensive charitable foundation that ever was established by one man in private life. The founder of this hospital was Thomas Guy, a bookseller in Lombard-street, London, who lived to see the edifice roofed in; and at his death, in 1724, left L. 283,292, 1s. including the expense of the building, to mind and endow it. This hospital consists of two capacious squares, containing 12 wards and 435 beds. It was incorporated by charter from parliament, and the first governors were appointed in 1725.

In St George’s Fields, westward of the King’s-bench prison, is the Magdalen Hospital for the reception of penitent prostitutes; a little farther is situated the Asylum for orphan girls; and not far distant is the Westminster Lying-in hospital: Institutions, of which the following feeling and animated account is given by Mr Pennant.
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The Magdalen Hospital.

The Magdalen Hospital is an institution of a most heavenly nature, calculated to save from perdition soul and body the brighter part of the creation; such as whom Providence hath betrothed angelic faces and elegant forms, designed as blessings to mankind, but too often dedicated to the vilest lusts. The hazard that these innocents contantly are liable to from a thousand temptations, from poverty, from death of parents, from the diabolical persecures, and often from the stupendous wickedness of parents themselves who have been known to sell their beautiful girls for the purpose of prostitution, induced a worthy band to found in the year 1758 the asylum or House of Refuge. Long may it flourish, and eternal be the reward of those into whose minds so amiable a conception entered!

To afford means of salvation to those unhappy beings who had the ill fortune to lose the benefits of this divine institution, the Magdalen Hospital was instituted for the reception of the penitent prostitutes. To live from vice is one great merit. To reclaim and restore to the dignity of honest rank in life, is certainly not less meritorious. The joy at the return of one daughter to repentance is experienced by the highest authority worthy of the heavenly host. That ecstasy I trust this institution has often occasioned. Since its foundation in the same year with the former, to December 25th, 1786, not fewer than 2471 have been admitted. Of these (it is not to be wondered that long and evil habits are often incurable) 300 have been discharged, uneasy under constraint; 45 proved lunatics, and afflicted with incurable fits; 60 have died; 52 never returned from Hospitals they were sent to; 328 discharged for faults and irregularities. How to be dreaded is the entrance into the bounds of vice; this palace suffers greatly; but at the same time it is not intended to increase the number; the retreat from Hospitals they have died; the retreat from Hospitals they have been induced a worthy band to found in the year 1758, the asylum or House of Refuge. Long may it flourish, and eternal be the reward of those into whose minds so amiable a conception entered!

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Lying-in Hospital.

Akin to those charities is that of the Lying in Hospital: which is not intended merely for the reception of those the honofest matron who can deposit her burden with the conciunction of lawful love; but also for the unhappy wretches whom fate villain in the unguarded moment has seduced, and then left a prey to defection of friends, to poverty, want and guilt. Left such may be driven to despair by such complicated misery, and be tempted to destroy themselves and murder their infants, here was founded in 1705 this humane preventative the Weftminifer New Lying-in Hospital, in which every assistance and accommodation requisite in such situations are provided in the most attentive and liberal manner. To obviate all objection to its being an encouragement to vice, no one is taken in a second time: but this most excellent charity is open to the worthy distressed matron as often as necessity requires. None are rejected who have friends to recommend. And of both descriptions upwards of 4000 have experienced its salutary effect.

St. George's Fields are now almost covered with the new-created buildings, from the ditch at the end of Fields. Great Savoy-street, or Burrow's buildings, to the Fifhmongers' almshouses, in one direction, and from the Marshalsea-prison to the Dog and Duck, in the other direction, with several irregular indentations in its circumference; and where the principal roads meet an obelisk has been erected, pointing out the distance it stands from different parts of London, Weftminifer and Blackfriars bridges. Among the buildings which serve to embellish and improve this entrance to London, Chatham square and and Bridge-street Blackfairs may be particularly specified.

At Lambeth, the archbishops of Canterbury have Lamberth had a palace. According to Mr. Pennant, it was in palace.

the earlier times a manor, possibly a royal one; for the great Hardiknauu died here in 1642, in the midst of the jollity of a wedding dinner; and here, without any formality, the usurper Harold is said to have received the crown and placed it on his own head. At that period it was part of the estate of God, wife to Walter Earl of Mantes, and Enstatcr Earl of Boulogne; who presented it to the church of Rochefet but referred to herself the patronage of the church. It became in 1197 the property of the see of Canterbury, by exchange transferred between Clanville Bishop of Rochefet, and the Archbishops Hubart Walter. The building was improved by Langton the seeceffor of Walter; but it was afterwards neglected and became ruinous. No pious zeal (says Mr. Pen­nant) restored the place, but the madness of prieftly pride. Boniface, a wrathful and turbulent primate, elected in 1244, took it into his head to become a vic­tor of the priory of St. Bartholomew, to which he had no right. The monks met him with reverential respect, but assured him the office did not belong to the bishop. The neek prelate rushed on the sub­prior, knocked him down, kicked, beat, and buffeted him, tore the cope of his back, and stamped on it like one policed, while his attendants paid the same complimients to all the poor monks. The people enraged at his unpriestly conduct would have torn him to pieces; when he retired to Lamberth, and, by way of expanion, rebuilt it with great magnificence. At a subsequent period it was very highly improved by the munificent Henry Chichley, who restored the vic­primacy from 1414 to 1442. I lament to find so worthy a man to have been the founder of a building so reproachful to his memory as the Lollards tower, at the exence of near L. 280. Neither Protestants or Catholics should omit visiting this tower, the cruel prilen of the unhappy followers of Wickliffe. The vast staples and rings to which they were chained before they were brought to the stake, ought to make Protestants bles the hour which freed them from so bloody a religion. During the civil wars of the last century, this palace suffered greatly; but at the restora­tion, the whole was repaired by Archbishop Juxton. The parish church of Lambeth (a), which is a small distance

(n) In describing this church, Mr. Pennant takes occasion to mention the sad example of fallen majesty in the person of Mary d'Este, the unhappy queen of James II.; who flying with her infant prince from the ruin
distance from the place, has a plain tower; and the architecture is of the Gothic of the time of Edward IV. It has very little remarkable in it, except the figure of a pedlar and his dog, painted in one of the windows; and tradition says, that the parson was obliged to this man for the bequest of a piece of land, which bears the name of the Pedlar’s Acre. In the churchyard is the tomb of old Tradescant. Both father and son were great travellers; and the former is supposed to have visited Russia and most parts of Europe, Turkey, Greece, many of the eastern countries, Egypt, and Barbary; out of which he introduced multitudes of plants and flowers, unknown before in the gardens, emblematical sculptures; and bearing the following inscription, which is both singular and historical:

Know, stranger, ere thou pass beneath this stone
Lyce Tradescant, grandfater, father, son;
The last dy’d in his spring, the other two
Lived till they had travel’d art and Nature through,
As by their choice collections may appear,
Of what is rare, in land, in sea, in air;
Wittliy they (as Homer’s Iliad in a nut)
A world of wonders in one cleft shut.
Thefe famous Antiquarians, that had been
Both gardener to the Rose and Lily Queen,
Transplanted now themselves, sleep here; and when
Angels shall with their trumpets wake men,
And fire shall purge the world, these hence shall rise,
And change this garden for a paradise.

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From Lambeth, eastward along the river side, was
once a long tract of dreary marsh, and till in some parts called
Lambeth-marsh; about the year 1560, there was
not a house on it from Lambeth palace as far as
Southwark. In a street called Narrow-wall (from
one of the ancient embankments), is Mrs Conde’s noted
manufactory of artificial stone (1); And at a small
distance, Melf. Beaunoy’s great work for making
wines (x), and that for making vinegar (y).

This ground, so profitable to the proprietors, and Great ma-
fo productive of revenue to the state, was within me-
ory the scene of low dilipation. Here stood Cuper’s
garden, noted for its fire-works, and the great retort
of the prodigal of both sexes. This place was orna-
mented with several of the mutilated statues belonging
to Thomas Earl of Arundel, which had been for that
purpose begg’d from his lordship by one Boyder Cuper,
a gardener in the family. The great timber-
yards beneath which these antiquities were found, are
very well worthy of a visit. One would fear that the
forests of Norway and the Baltic would be exhausted,
to supply the want of the overgrown capital, were
we not assured that the resources will successively be
increasing equal to the demand for succeeding ages.—
In this parish are also the vail distilleries, till of late
the property of Sir Joseph Mawbey; where are seldom
less than 2000 hogs constantly granting, and
kept entirely on the grains.

III. City and Liberties of WESTMINSTER. The city City and
of Westminster derives its name from a minster or ab-
beys, and west, on account of its situation with respect
St Paul’s cathedral, which was formerly called East-
minster. In ancient times this district formed upwards
of a mile from the city of London, and contained only
two parishes, which were those of St Margaret and
st John, with two chapels of ease, but at present it
has seven other parochial churches, viz. St Clement’s-
Danes, St Paul’s Covent-garden, St Mary’s le-Strand,
St Martin’s in the Fields, St Anne’s, St James’s, and
St George’s Hanover-square.

Westminster

rain impending over their house after crossing the Thames from the abdicated Whitehall, took shelter beneath
the ancient walls of this church a whole hour, from the rain of the inclement night of December 6th, 1688.
Here she waited with aggravated misery, till a common coach procured from the next inn, arrived, and con-
voyed her to Gravesend, from whence she failed, and bid an eternal adieu to these kingdoms.

(1) "Where (says Mr Pennant) the foreign wines are most admirably mimicked. Such is the prodi-
gality and luxury of the age, that the demand for many sorts exceeds in a great degree the produce of the
native vineyards. We have skillful fabricators who kindly supply our wants. It has been estimated, that
half of the port, and five sixths of the white wines consumed in our capital, have been the produce of our
home wine presses. The product of the duty to the state from a single house was in one year, from July
4th 1785, to July 5th 1786, not less than L 7,365; 9: 8:�. The generall banks of the Thames opposite to
our capital, yield almost every species of white wine; and by a wondrous magic, Melf. Beaunoy pourr fort
the materials for the rich Frontiniacs, to the more elegant tables; the Madeira, the Calavalla, and the Lig
bon, into every part of the kingdom."

(2) "There is a magnificence of buildings (our author remarks) in this ocean of sweets and fous, that
cannot fail exciting the greatest admiration: whether we confider the number of vessels or their fize. The
boatful at Heydelberg does not surpass them. On first entering the yard, two rice before you, covered
at the top with a thatched dome; between them is a circular turret, including a winding staircase, which
brings you to their fumitories, which are above 4 feet in diameter. One of these conservatories is full of fweet
wine, and contains 53,799 gallons, or 1,185 barrels of Winchefer measure. Its fuperficial is full of
vinegar, to the amount of 56,799 gallons, or 1,774 barrels of the fame standard as the former. The fa-
famous German veffel yields even to the laft by the quantity of 40 barrels.—Besides thefe, is an avenue of
fifer veffels, which hold from 12,500 to 16,974 gallons each. After quitting this Brobdingnagian feene,
we prf to the acres covered with common barrel-yards, cannot diminish our ideas. fuddenly, but at firft we
imagined we could quaff them off as easily as Gulliver did the little hogheads of the kingdom of Lilliput."
London

Westminster was anciently called Thorny-island, from its having been covered with thorn-brushes, and encompassed by a branch of the Thames, which is said to have run through the ground now called St James's park, from west to east, and to have rejoined the river at Whitehall.

Till the general dissolution of religious houses, Westminster was subject to the ordinary rules of its abbot and monks; but in 1541, upon the surrender of William Benfon the last abbot, Henry VIII. not only turned it into an honour, but created the fee of a bishop, and appointed for a diocese the whole county of Middlesex, except Fulham, which belonged to the bishop of London. This bishopric, however, soon after its institution, was dissolved by Edward VI.

The city of Westminster is governed by an high steward, an officer of great dignity, who is usually one of the first peers in the realm; and is chosen for life by the dean and chapter of the collegiate church of St Peter. There is also a deputy steward and a high bailiff, who also hold their offices for life; being nominated by the dean and chapter, and confirmed by the high steward.

The dean and chapter are invested with an ecclesiastical and civil jurisdiction within the liberties of Westminster, St Martin's-le-Grand, near Cheapside, in the city of London, and some towns in Essex, which are exempted from the jurisdiction of the bishop of London and the archbishop of Canterbury.

St Margaret's church was founded by Edward the Confessor, since which time it has been frequently rebuilt. In the east end of this church is a window curiously painted, with the history of the crucifixion, and with the figures of several apostles and saints finely executed. It formerly belonged to a private chapel at Coth-hall, near Epping in Essex, and was purchased by the officers of this parish some years ago for 400 guineas. In this church the house of commons attends divine service on state holidays.

The church of St John the Evangelist was erected in 1275, and having sunk considerably whilst it was building, occasioned an alteration of the plan. On the north and south sides are magnificent porticoes, supported by vast stone pillars, as is also the roof of the church; at each of the four corners is a beautiful stone tower and pinnacle, which were added with the view of making the whole structure sink equally. The parts of this building are held together by iron bars, which run across even the aisles.

The most remarkable structure in Westminster is the abbey-church of St Peter. On its site stood once a temple of Apollo, which according to tradition was thrown down by an earthquake in the time of Antoninus Pius; and from the ruins of which, Sebert king of the west Saxons raised a Christian church, which was ruined by the Danes. It was repaired by Edward the Confessor, and given to a few monks; and this spot he chose for his burial-place. Henry III. 150 years after, took down this fabric of Edward's, and erected a new church, which was 50 years in building. It suffered much by fire in 1274, but was repaired by Edward I. Edward II. and the abbots. In 1700 this church being much decayed, the parliament granted money for repairing it, and has frequently repeated the bounty since that time. The form of the abbey is that of a long cross; its greatest length is 489 feet, and the breadth of the west front 66 feet; the length of the cross aisle is 189 feet, and the height of the roof 92 feet. At the west end are two towers: the nave and cross aisle are supported by 30 slender pillars of Suffolke marble, exclusive of pilasters. In the upper and lower ranges there are 94 windows, all which, with the arches, roofs, and doors, are in the Gothic taste. The inside of this church is much better executed than the outside; and the perspective is good, particularly that of the grand aisle. The choir, from which there is an ascent by several steps to a fine altar-piece, is paved with black and white marble; having 28 stalls on the north, the same number on the south, and eight at the west end. The altar is made of a beautiful piece of marble, the gift of Queen Anne, inclosed by a curious balustrade, and upon a pavement of porphyry, jasper, Lydian, and serpine stones laid in the Mosaic style, at the expense of abbot Ware, A.D. 1572; and is said to be one of the most beautiful of its kind in the world. On each side of this altar a door opens into St Edward's chapel; round which are 10 other chapels, ranging from the north to the south cross aisles, and are dedicated, 1. To St Andrew. 2. To St Michael. 3. To St John Evangelist. 4. Hip's chapel. 5. To St John Baptist. 6. To St Paul. 7. Henry V.'s chapel. 8. To St Nicholas. 9. To St Edmund. 10. To St Benedict.

In St Edward's chapel are still to be seen the remains of his shrine, which, though now in obscurity, and robbed of all its riches and luster, was once esteemed the glory of England, so far as it aids and riches could make it. Here are the tombs of King Edward I. and several other kings and queens of England; and here also is shown the famous chair in which the kings of Scotland used to be crowned at Scoon. Henry V.'s chapel is divided from St Edward's by an iron screen, on each side of which are statues as big as life.—St Andrew's chapel, which is next to the north cross, and the others which surround the choir are crowded with the monuments of noble personages, worthy the attention of the curious—At the corner of St Benedict's chapel, an iron gate opens into the south cross aisle; which from the number of monuments erected therein to celebrate English poets, has obtained the name of the poet's corner: there we find a most magnificent monument erected at the south end in memory of the late John duke of Argyle and Greenwich; another to William Camden the antiquarian; and others to the celebrated divine Dr Isaac Barrow, to Thomas Parr who died at the age of 152 years; &c.—The south aisle is adorned with 19 curious monuments of the pious, the brave, and the learned; and turning northward from the west door, we view a great number more.

On the east of the abbey, and which, though sepulchre of Henry's rate from the other chapels in the choir, seems to be one and the same building with the abbey, stands the chapel of King Henry VII. which was built according to the year 1524, and was at that time called the Wonder of the world; and is now one of the most expensive remains of the ancient English taste and magnificence. There is no looking upon it without admiration:
On the north-east side of the abbey is an old Gothic building called Westminster Hall, first built by William Rufus as an addition to a royal palace, and afterwards rebuilt by Richard II. in the year 1397. It is reckoned one of the largest rooms in Europe, being 200 feet long, 70 broad, and 90 high, supported only by buttresses. The roof is of timber, and was formerly thatched; the old covering of lead being reckoned too heavy. It is paved with stone.

In this spacious room the kings of England have generally held their coronation and other solemn feasts; and it is used for the trial of peers. Since the reign of Henry III. the three great courts of Chancery, King's Bench, and Common Pleas, have been held in separate apartments of this hall; and the court of Exchequer above stairs.

Adjoining to the south-east of Westminster Hall is a building formerly called St Stephen's Chapel, from its having been dedicated to that saint. It was founded by King Stephen; and in 1347 was rebuilt by King Edward III. who converted it into a college church; but it was separated from the abbey church by King Edward VI. It has been used for the assembly of the representatives of the commons of England, and is now generally called the House of Commons. The benches, which are behind another as in a theatre, are covered with green cloth; the floor is matted; and round the room are wainscot galleries, supported by canopies adorned with carved work, in which strangers are often permitted to sit and hear the debates.

On the south side of the hall is the House of Lords, formerly called from being the place where the peers of Great Britain assemble in parliament. It is an oblong room, not quite so large as the house of commons; and is hung with fine old tapestry, representing the defeat of the Spanish Armada in 1588. The design was drawn by Cornelius Vroom, and the tapestry executed by Francis Spiering. It was not put up till the year 1650, two years after the extinction of monarchy, when the house of lords was used as a committee-room for the house of commons. The heads of the naval heroes who commanded on the glorious day form a matchless border round the work, animating peltory to emulate their illustrious example. Here is a throne for the king, with seats on the right and left for such peers of the realm as are of the blood royal. Before the throne are three broad seats; and on the first of these, next the throne, sits the Lord Chancellor, or keeper of the great seal, who is speaker of the house of peers; and on the other two sit the judges, the master of the rolls, and the masters of chancery, who attend occasionally to give their opinions on points of law. The two archbishops sit at some distance from the throne on the right hand, and the other bishops in a row under them. All the benches are covered with red cloth studded with wool. Here likewise, by a late order of the house, a gallery for strangers has been erected.

Adjoining to the house of lords is the Prince's Prince's Chamber, where the king is robed when he comes to chamber, the parliament. On the other side is the Privy Council Chamber, which is said to have been Edward the Conserver's bed-chamber, and the room in which the parliaments were anciently opened. Here conferences are

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are often held between the two houses, or their committees. Contiguous to these is an apartment called the Court of Requests, where such as have business in either house may attend.

Near these buildings is a bridge over the Thames, called Westminster Bridge, accounted one of the most complete and elegant structures of the kind in the known world. It is built entirely of stone, and extends over the river at a place where it is 1233 feet broad; which is about 350 feet broader than at London Bridge. On each side is a fine balustrade of stone, with places of shelter from the rain. The width of the bridge is 44 feet, having on each side a fine footway for passengers. It consists of 14 piers, and 13 large and two small arches, all semicircular, that in the centre being 76 feet wide, and the rest decreasing four feet each from the other, so that the two largest arches of the 13 great ones are each 52 feet. It is computed that the value of 40,000l. in stone and other materials is always under water. This magnificent structure was begun in 1739, and finished in 1750, at the expense of 389,000l. defrayed by the court. It was built after the design of Mr. Labelye, an ingenious architect, a native of France.

On the bank of the Thames, at the east confines of St. Margaret's parish, was a palace called Whitehall, originally built by Hubert de Burgh earl of Kent, before the middle of the 13th century. It afterwards devolved to the archbishop of York, whence it received the name of York Place, and continued to be the city residence of the archbishops till it was purchased by Henry VIII. of cardinal Wolsey in 1530. At this period it became the residence of the court; but in 1597 was destroyed by accidental fire, all except the banqueting-house, which had been added to the palace of Whitehall by James I. according to a design of Inigo Jones. This is an elegant and magnificent structure of hewn stone, adorned with an upper and lower range of pillars, of the Ionic and Composite orders; the capitals are enriched with fruit and foliage, and between the columns of the windows. The roof is covered with lead, and surmounted with a balustrade. The building chiefly consists of one room of an oblong form, 40 feet high, and a proportionable length and breadth. The ceiling is painted by the celebrated Sir Peter Paul Rubens. It is now used only as a chapel royal, and the other part of the house is occupied with state-offices.

Opposite to the banqueting-house stands the Horseguards, so called from being the stables where that part of his majesty's troops usually do duty. It is a strong building, of hewn stone, consisting of a centre and two wings. In the former is an arched passage into St. James's Park; and over it, in the middle, rises a cupola. In a part of the building is the War-office. Near the Horse-guards is the Treasury; a large building, which fronts the Parade in St. James's Park; and where the board of treasury is kept.

Eastward of the Horse-guards is the Admiralty-office, a large pile, built with brick and stone. The front towards Whitehall has two deep wings, and a loftily portico supported by four large stone pillars. A piazza, consisting of beautiful columns, runs almost from one end to the other. The wall before the court has been lately built in an elegant manner, and each side of the gate is ornamented with naval emblems. Besides a hall, and other public apartments, here are spacious houses for seven commissiories of the admiralty.

At a little distance from the admiralty, where three Charing-crofs, from one of the croffes which King Edward I. caused to be erected in memory of his queen Eleanor, and Charing the name of a village in which it was built. The crofs remained till the civil wars in the reign of Charles I. when it was destroyed by the fanatics, as a monument of popish superstition; but after the Restoration, an equesrian statue of Charles I. was set up in its stead. This, which is of brass, and finely executed, continues to be an ornament to the place. It was made in 1633, at the expense of the Howard-Arundel family. The parliament fold it to a brazier in Holborn, with strict orders to break it to pieces; but he concealed it under ground till the Restoration, when it was set up in 1678.

At the west end of the Mall, in St. James's Park, Queen's house, a which begins near Charing-crofs, stands the Queen's Palace. It was originally known by the name of Arlington-house; but being purchased by the late duke of Buckingham's father, who rebuilt it from the ground in 1703, it was called Buckingham-house, till the year 1762, when it was purchased by his majesty for a royal residence. It is built of brick and stone, having in the front two ranges of pilasters of the Corinthian and Tuscan orders. It has a spacious court-yard, inclosed with iron rails, fronting St. James's Park, with offices on each side, with two pavilions, separated from the mansion-house by colonades of the Tuscan, Doric, and Ionic orders. Its majesty has here built a fine library, in an octagonal form, besides several other additions.

Eastward of the queen's palace stands St. James's, St. James's, an old building, which, till the former was purchased by the crown, had been the town-residence of the royal family since the burning of Whitehall in 1697. This palace was built by Henry VIII. and obtained its name from an hospital which formerly stood on the spot. It is an irregular building, of mean appearance without, but contains several magnificent apartments. Here the court and levees are still kept, and most of the persons belonging to the household have their residence. The chapel of the hospital was converted to the use of the royal family, as it now remains, and is a royal peculiary, exempted from all episcopal Jurisdiction. When this palace was built, it abutted in the Mall ground, which the king inclosed and converted into a park, called from the palace St. James's Park. He also laid it out into walks, and collected the water into one body. It was afterwards much enlarged and improved by king Charles II. who planted it with lime-trees, and formed a beautiful villa, near half a mile in length, called the Mall, from its being adapted to a play at bowls distinguished by that name. He also formed the water into a canal 100 feet broad and 280 feet long; and furnished the park with a decoy, and other pond for water-fowls; but these have lately been
In a line with St. James's palace, on the east side, is Marlborough House; which belongs to the duke of Marlborough, and is a large brick edifice, ornamented with fountains.

The Strand, from Charing-cross, runs that fine street the Strand, which terminates at Temple-bar. In the year 1533 the whole of it was an open highway, with gardens to the water-side. In that year it was so ruinous, that Edward III. by an ordinance directed a tax to be raised upon wool, leather, wine, and goods carried to the staple at Westminster, from Temple-bar to Westminster abbey, for the repair of the road; and that all owners of houses adjacent to the highway should repair as much as lay before their doors. Before the above period, it entirely cut off Westminster from London; nothing intervened except the scattered houses, and a village which afterwards gave it the name of St. Giles. As the court withdrew part of the site of Snow-hill, Convent-garden, and upon the Thames where this street stands, is that noble palace called Whitehall, which took its name from a place built originally by the illustrious Thomas de Catfield, elected bishop of Durham in 1245; designed by him for the town residence of him and his successors. At this place, in 1540, was held a most magnificent feast, given by the challengers of England, who had caused to be proclaimed, in France, Flanders, Scotland, and Spain, a great and triumphant Jubilee to be held at Westminster, for all comers that would undertake them. But both the challengers and defendants were English. After the gallant sports of each day, the challengers rode unto this Durham-house, where they kept open household, and tainted the king and queen (Anne of Cleves) with her ladies, and all the court. In the reign of Edward VI. the mint was established in this house, under the management of Sir William Sharrington, and the influence of the aspiring Thomas Seymour, lord admiral. Durham-house was reckoned one of the royal palaces belonging to queen Elizabeth, who gave the use of it to the great Sir Walter Raleigh.

Durham-yard is now filled with a most magnificent and comprehensive building, called the Adelphi, in honour of the two brothers, the ingenious Adams, its architects. Besides its fine lodgings, it is celebrated for its enchanting prospect, the utility of its wharfs, and its subterranean apartments answering a variety of purposes of general benefit.

Farther on, the ruins of the Savoy. Henry III. had granted to Peter of Savoy, uncle to his queen Eleanor, daughter of Berenguer of Provence, all the gardens upon the Thames where this building now stands, to hold to him and his heirs, yielding yearly at the Exchequer three barbed arrows for all services. This prince founded the Savoy, and bestowed it on the foreign hospital of Montjoy. Queen Eleanor purchased it, and bestowed it on her son Edmund earl of Lancaster. It was rebuilt in a most magnificent manner by his son Henry. It was made the place of confinement of John king of France in 1356, after he was taken prisoner at the battle of Poitiers. In 1381 it was entirely destroyed by Wat Tyler, out of spleen to the greater owner John of Gaunt. Henry VII. began to rebuild it, with a design of forming it into an hospital for a hundred distressed people, and Henry VIII. completed the design. The revenues, at the suppression by Edward VI. amounted to above 500 l. a year. Queen Mary restored it; and her maids of honour, with exemplary piety, furnished it with all necessaries. It was again suppressed by Queen Elizabeth; and at present part serves as lodgings for private people, for barracks, and a scandalous infectious prison for the foldery and for transport-convicts.

A little to the eastward flooded Somerset-house, a palatial pile built by Somerset the Protector in the time of house. Edward VI.; and to make way for which he demolished a great number of buildings without making any recompense to the owners. Part of the church of St. John of Jerusalem and the Tower were blown up for the

The Strand, when first formed.

Northumberland House,
London. The site of the materials, and the cloisters on the north side of St Paul's, with the charnel-house and chapel, were not the same; the tombs being destroyed, and the bones thrown into Finsbury-fields. This happened in 1549; but it is probable that he did not live to inhabit the palace he built, as he was executed in the year 1552. After his death the palace fell to the crown; and it became an occasional place of residence first to Queen Elizabeth, and afterwards to Catherine queen to king Charles II. It was built in a style of architecture compounded of the Grecian and Gothic; and the back, front, and water-gate, were done from a design of Inigo Jones, about the year 1623. A chapel was begun the same year by that architect, and finished some time after. The whole of this structure was demolished in 1775, in consequence of an act of parliament; and a most magnificent edifice, from a design by Sir William Chambers, has been erected for the accommodation of all the public offices,—those of the Treasury, the Secretary of State, the Admiralty, the War, and the Excise, excepted. The Royal Society, and the Society of Antiquaries, hold their meetings here, in apartments which have been allotted to them by royal munificence; and here also are annually exhibited the works of the British painters and sculptors. The terrace on the fourth side is a walk bordered by the Thames, and unparalleled for grandeur and beauty of view.

The church of St Martin is distinguished by the name of St Martin's in the Fields, from its situation, which was formerly a field, with only a few scattered houses. The church being decayed, was rebuilt by Henry VIII. and again by James I. but not being large enough to accommodate the inhabitants of the parish it was augmented in 1667, at the charge of Prince Henry, eldest son of James I. and several of the nobility. After many expensive repairs, however, it was entirely taken down in 1720, and a new church began, which was finished in 1726. This is an elegant edifice, built of stone. On the front is a noble portico of Corinthian columns, supported a pediment, in which are represented the royal arms in bas-relief. The ascent to the portico is by a flight of very long steps. The length of this church is about 140 feet, the breadth 60, and height 45. It has a fine arched roof supported by stone columns of the Corinthian order. The steeple has a beautiful spire, and one of the best rings of bells in London.

St James's Church was built in the reign of Charles II., at the expense of Henry earl of St Alban's, and other neighbouring inhabitants. The building is of brick and stone, about 24 feet long, 60 broad, and 45 feet high, with a handsome steeple 150 feet in height.

St George's Church, near Hanover-square, is a beautiful structure. This was one of the fifty new churches erected within the bills of mortality, by act of parliament, in the reign of Queen Anne. The ground for the edifice was given by the late lieutenant-general Stewart, who also left 4000l. to the parish, towards erecting and endowing a charity school; which, by additional benefactions and subscriptions, is become very considerable.

The greater part of the parish of St Paul's Covent-garden, was anciently a garden, belonging to the abbot and convent of Welfminder, and was then called Covent-Garden, a name corrupted into Covent, and more generally Common-garden. In 1552, Edward VI. gave it to the earl of Bedford, with an adjoining field, formerly called the Seven Acres, but now, being turned into a long street, called Long-aca. The church of St Paul's, Covent-garden, was built by Inigo Jones, and is esteemed one of the most simple and perfect pieces of architecture in England. In the front is a plain portico of the Tuscan order, with masonry columns. Before the church is a square area, containing about three acres of ground, called Covent-garden market, and is the beef in England for herbs, fruit, and flowers. On the north, and part of the east side, is a magnificent piazza, designed by Inigo Jones.

Next to the parish of St Paul, Covent-garden, is St Mary-le-Strand. This is also one of the fifty new churches built in the reign of Queen Anne, and is a handsome piece of architecture, though not very extensive. At the entrance, on the west side, is an ascent by a flight of steps, in a circular form, which leads to a similarly shaped portico of Ionic columns, covered with a dome, that is crowned with a vase. The columns are continued along the body of the church, with pilasters of the same order at the corners; and in the intercolumniations are niches handsomely ornamented. Over the dome is a pediment supported by Corinthian columns, which are also continued round the body of the structure, over those of the Ionic order. A handsome balustrade is carried round the top of the church, and adorned with vases.

A little eastward from the preceding church is that of St Clement's Danes, situated like wise in the Strand. A church is said to have stood in this place since about the year 700; but the present structure was begun in 1680, designed by Sir Christopher Wren. It is built of stone, with two rows of windows, the lower plain, but the upper ornamented; and the termination is by an aisle, the pilasters of which are covered with vases. On the fourth side is a portico, covered with a dome, supported by Ionic columns; and opposite to this is another. The steeple is beautiful, and of a great height.

The church of St George, Bloomsbury, is also one of the fifty new churches erected by act of parliament. It is distinguished from all the rest by standing south and north, and by the statue of King George I. at the top of its pyramidal steeple.

In Lamb's Conduit-fields, on the north side of the town, is a large and commodious structure, called the Foundling-hospital, for the reception of exposed and deserted children. This laudable charity was projected by several eminent merchants in the reign of Queen Anne; but was not carried into execution till many years afterwards, when a charter for its establishment was obtained, through the indefatigable assiduity of Mr Thomas Coram, the commander of a merchant vessel, who spent the remainder of his life in promoting this design. From the time of its institution, the parliament has occasionally granted considerable sums for its support; and in some years upwards of 6000 infants have been received.

Not far from hence is an Hospital for the Small-pox; and
and in different parts of the town there are others, either for the sick of all kinds, or those in particular circumstances. Of the latter are several Lying-in hospitals, and the Lock-hospital for female patients in the venereal disease. Of the former are St George's and the Middlesex hospitals, besides several infirmaries. Gray's Inn is one of the four principal inns of court; which, though situated within the limits of the parish of St Andrew, Holborn, is yet without the liberties of the city of London. It took its name from an ancient family of the name of Gray, which formerly resided here, and in the reign of Edward III. demised it to some students in the law; but it is said to have been afterwards conveyed to the monks of Shene, near Richmond in Surrey, who leased it to the society of the Inn. It was held by this tenure till the dissolution of the monasteries, when Henry VIII. granted it to the society in fee-farm. This inn consists chiefly of two quadrangles, and has an old hall well built of timber, with a chapel in the Gothic style. Here is also a good library, and The Inn is accommodated with a spacious garden.

Lincoln's Inn, another of the four principal inns of court, was originally the palace of Ralph Neville, bishop of Chichester, and chancellor of England about the year 1260. It afterwards devolved to the earl of Lincoln, who converted it into a court for the students of law about the year 1310. From him it received the name of Lincoln's inn, and consisted only of what is now called the old square, which is entered from Chancery-lane. At present this square contains, besides buildings for the lawyers, a large hall where the lord chancellor hears causes in the fittings after term. To this inn belongs likewise a fine garden, which has lately been diminished by the building of some large and commodious offices, for the use of the six clerks in the court of Chancery, &c.

In the parish of St James, Clerkenwell, is an hospital called the Charter-house, which is a corruption of the word chartres, a name formerly used for a convent or priory of the Carthusians, which place formerly was. After the dissolution of monasteries it fell to the earl of Suffolk, who disposed of it to Thomas Sutton, Esq.; a citizen of London in the time of king James I. for L. 15,000. The purchaser intending it for an hospital, applied to the king for a patent, with letters patent in council, and the grant was confirmed by parliament in 1623. Mr Sutton having expended L. 7000 in fitting up the buildings, gave it the name of king James's hospital, and endowed it with lands to the amount of near L. 4500 a-year, for the maintenance of 80 gentlemen, merchants, or soldiers, who should be reduced to indigent circumstances; and 40 boys to be instructed in classical learning. The men are provided with handsome apartments, and all the necessaries of life except clothes; instead of which each of them is allowed a gown, and L. 7 a-year. Of the boys, 29 are at a proper time sent to the universities, where each has an allowance of L. 25 a-year for eight years. Others who are judged more fit for trade, are put apprentices, and the sum of L. 40 is given with each of them. As a further encouragement to the scholars, there are nine ecclesiastical prefections in the gift of the governors. It is also by the recommendation of the latter that all penioners and youth are received into the hospital. They consist of 16, of which number the king is always one, and the others are generally noblemen of the first rank.

To this hospital belong a master, a preacher, two schoolmasters, a physician, a regent, a receiver, a treasurer, a steward, an auditor, and other officers; and the annual revenues of it being now increased to upwards of L. 6000, five men and four boys have been added to the original number.

In the parish of St Luke stands the haberdashers' almshouse, or Ask's hospital, so called from having been erected by the company of haberdashers, parliamen
tary to the will of Robert Ask, Esq; one of their members, who left 30,000 for the building and the relief of 20 poor members of the company; besides the maintenance and education of 20 boys, sons of decayed freemen of the name company. This is a large edifice of brick and stone, 400 feet long, with a pediment in front 340 feet in length, consisting of four columns of the Tuscan order. In the middle of the building is a chapel adorned with columns, entablatures, and pediment of the Ionic order; and under the pediment is a niche, with a statue of the founder.

In the same parish is the Ironmongers hospital, likewise a large building.

In the parish of St Mary, Whitechapel, stands the London hospital, for the reception of the sick. It is a large building, and was erected a few years since by voluntary contribution. Here are also some considerable almshouses.

Within the precincts of Westminster are several Houses of flaxen houes belonging to the nobility, some of which have been already mentioned. Of the others, the most remarkable are presente, turlington-houe, Devonshire-houe, Egremont-houe, and Bedford-houe, Carleton-houe, the magnificent abode of the prince of Wales, and the superb residence erected by the duke of York between the treasury and the horse-guards. To these may be added Montague-houe (now the British Museum), which was built on a French plan by the first duke of Montagu, who had been ambas
dador in France. The staircases and ceilings were painted by Bouffleau and La Fosse; the apothecaries of Iris, and the assembly of the gods, are by the last. It was purchased of the duke's executors by parliament, forming together the Royal Cottonian, Harlscian, Scotlandian, and other collections of books, MSS., coins, antiques, subjects in natural history, &c., &c., for the public use, for which it is excellently adapted. The list of these libraries contains the books and MSS. of the princes from Henry VII. to Charles II.; the second MSS. collected by Sir Robert Cotton, his son, and grandson Sir John, which left gave it to the public, by act 12 and 13 William III. c. 7. The Harlscian collection of MSS. was formed by Edward earl of Oxford, and purchased by government in 1732, at the same time with the library, MSS., and natural curiosi)
ties of Sir Hans Sloane. This last cost Sir Hans L. 50,000; and he left it, by will, to the public, on condition that the parliament would pay L. 20,000 to his executors. It comprehends an amazing number of curiosities; among which are, the library, including books of drawings, MSS. and prints, amounting,
London, amounting to about 50,000 volumes; medals and coins, ancient and modern, 20,000; cameos and intaglios, about 700; seals, 268; vellums, &c. of agate, Jasper, &c. 542; antiquities, 1125; precious stones, agates, Jasper, &c. 2256; metals, minerals, ores, &c. 2725; crystal, flars, &c. 1864; fossils, flints, flumes, 1275; earths, lands, soils, 1035; bituminous sulphurs, amber, &c. 399; tales, misc., &c. 328; corals, sanples, &c. 1421; teats, or shells, &c. 5843; echini, echiniae, &c. 6591; alterations, trochi, &c. 241; crofica, crabs, lobsters, &c. 363; shells, marine, star-fishes, &c. 1733; fish, and their parts, &c. 1555; birds, and their parts, eggs, and nuts, of different species, 1172 quadrupeds, &c. 1886; vipers, serpents, &c. 524; insects, &c. 5439; vegetables, 12,506; herbs, fucceus, or volumes of dried plants, 534; human, as calculi, anatomical preparations, 756; miscellaneous things, natural, 2068; mathematical instruments, 55. A catalogue of all the above is written in a number of large volumes. It is a large and magnificent building, and has behind it a garden, consisting nearly of nine acres.

Buses a great number of spacious streets, which are daily increasing, this part of the metropolis is ornamented with several magnificent squares, viz. Grosvenor-square, Berkeley-square, Portman-square, Cavendish-square, Hanover-square, St. James's-square, Soho-square, Bloomsbury-square, Queen's-square, Lincoln's-inn-fields, Leicestersquare, Red-Lion-square, some of which have been particularly described; not to mention others that are at present building. In general, the new buildings in the liberty of Westminster have increased to a prodigious degree; in such as they reach as far as Marybone to the north, Piccadilly to the south, and Hyde-park wall to the west.

Before the conflagration in 1666, London (which, like most other great cities, had arisen from small beginnings) was totally inelegant, inconvenient, and unhealthy, of which latter misfortune, many melancholy proofs are authenticated in history, and which without doubt, proceeded from the narrowness of the streets, and the unaccountable projections of the buildings, that confined the putrid air, and joined with other circumstances, such as the want of water, rendered the city seldom free from pestilential devastation. The fire which consumed the greatest part of the city, dreadful as it was to the inhabitants at that time, was productive of confquences which made ample amends for the losses sustained by individuals: a new city arose on the ruins of the old; but, though more regular, open convenient, and healthful than the former, yet, it by no means answered to the characters of magnificence or elegance, in many particulars, and is never to be lamented (such was the infatuation of those times), that the magnificent, elegant, and useful plan of the Great Sir Christopher Wren, was totally disregarded, and sacrificed to the mean and the selfish views of private property which did irreparable injury to the citizens themselves and to the nation in general: for had that great architect's plan been followed, what has often been asserted must have been the result: the metropolis of that kingdom would incontestably have been the most magnificent and elegant city in the universe, and of consequence must, from the predilections of foreign of distinction and taste who would have visited it, have become an inexhaustible fund of riches to that nation. But as the deplorable blindness of that age has deprived them of so valuable an acquisition, it is become absolutely necessary that some efforts should be made to render the present plan in a greater degree answerable to the character of the richest and most powerful people in the world.

The plan of London, in its present state, will in its plan still have many instances appear to very moderate judges to be as injudicious a disposition as can easily be conceived for a city of trade and commerce, on the borders of so noble a river as the Thames. The wharfs and quays on its banks are extremely mean and inconvenient; and the want of regularity and uniformity in the streets of the city of London, and the mean avenues to many parts of it, are also circumstances that greatly lessen the grandeur of its appearance. Many of the churches and other public buildings are likewise thruf up in corners, in such a manner as might tempt foreigners to believe that they were designed to be concealed. The improvements of the city of London for some years past have, however, been very great; and the new streets, which are numerous, are in general more spacious, and built with greater regularity and elegance.

The very elegant and necessary method of paving and enlightening the streets is also felt in the most sensible manner by all ranks and degrees of people. The roads are continued for several miles around upon the same model; and, exclusive of lamps regularly placed on each side, at distant distances, are rendered more secure by watchmen stationed within call of each other. Nothing can appear more brilliant than those lights when viewed at a distance, especially where the roads run across; and even the principal streets, such as Pall-Mall, New Bond-street, Oxford-street, &c. convey an idea of elegance and grandeur.

London, then, in its large sense, including Westminster, Southwark, and part of Middlesex, forms one great metropolis of vast extent and prodigious wealth. When considered with all its advantages, it is now what ancient Rome once was; the seat of liberty, the encourager of arts, and the admiration of the world. It is the centre of trade; has an intimate connection with all the counties in the kingdom; and is the grand mart of the nation, to which all parts send their commodities, from whence they are again sent back into every town in the nation and to every part of the world. From hence innumerable carriages by land and water are constantly employed; and from hence arise that circulation in the national body which renders every part healthful, vigorous, and in a prosperous condition; a circulation that is equally beneficial to the head and the most distant members. Merchants here are as rich as noblemen; winneth their incredible loans to government; and there is no place in the world where the shops of tradesmen make such a noble and elegant appearance, or are better stocked.

The Thames on the banks of which London is situated, is a river which, though not the largest, is the richest and most commodious for commerce in
London. It is continually filled with fleets, failing to or from the most distant climates and its banks from London Bridge to Blackwall, form almost one continued great magazine of naval stores: containing three large wet docks, 32 dry docks, and 33 yards for the building of ships for the use of the merchants besides the places allotted for the building of boats and lighters, and the king's yards lower down the river for the building of men of war. As the city is about 60 miles distant from the sea, it enjoys by means of this beautiful river all the benefits of navigation, without the danger of being surprized by foreign fleets, or of being annoyed by the moist vapours of the sea. It rises regularly from the water-side, and to reach the extent of its length from east to west, it is generally allowed for one million of people for one week 14,383. 6. 8

It inalt and fretfulness, at 1 d. a-day, for half a million of people for one week 14,383 6. 8

In bread of all sorts, white and brown at 1 d. a-day, for one million of people for a week 29,166 13. 4

300 Tons of wine, of all sorts, at 50 l., one ton for another, for one million of people for a week 15,000 0. 0 Weekly consumption of provisions.

In fruit of all sorts, at one farthing a-day, for a million of people for a week 29,166 13. 4

In eggs of hens, ducks, geese, &c. at half a farthing a-day, for a million of people for a week 7,291 13. 4

In beef and mutton, at 2 d. a-day, for a million of people for a week 36,45 16. 8

In bread of all sorts, white and brown at 1 d. a-day, for one million of people for a week 29,166 13. 4

In bread of all sorts, white and brown at 1 d. a-day, for one million of people for a week 29,166 13. 4

In wheat-flour, for pies and puddings, oatmeal and rice, &c. at half a farthing a-day, for a million of people for a week 14,383 6. 8

In salt, oil, vinegar, capers, olives, and other sauces, at half a farthing a-day, for a million of people for a week 36,45 16. 8

In vegetables, at 2 d. a-day, for a million of people for a week 14,383 6. 8

In roasts and herbs of all sorts, both for food and physic, at half a farthing a-day, for a million of people for a week 36,45 16. 8

In fruits and vegetables, at 2 d. a-day, for a million of people for a week 14,383 6. 8

In flowers, at 2 d. a-day, for a million of people for a week 14,383 6. 8

In sea-coal, charcoal, candles, and firewood, of all sorts, at 1 d. a-day, for a million of people for a week 29,166 13. 4

In paper of all sorts (a great quantity being used in printing) quills, pens, ink, and wax, at a farthing a-day, for a million of people for a week 7291 13 4

In tobacco, pipes, and snuff, at half a farthing a-day, for a million of people for a week 3645 16 8

In clothing, as linen and woollen, for men, women, and children; shoes, stockings, &c. at 3s. 6d. per week, for a million of people for a week 175,000 0 0

Expenses for horse-meat, in hay, oats, beans, 1000 load of hay a-week, at 45s. a load, comes to 2001. in oats and beans the like value, 2001.

which is in all, for one week 4000 0 0

Cider, rum, brandy, strong waters, coffee, chocolate, tea, &c. at 1 d. a day, for a million of people for one week 29,166 13 4

The common firiing is pit-coal, commonly called Fire-coal, for which there is consumed upwards of 766,880 chaldrons every year. The annual consumption of oil in London and Westminster for lamps, amounts to 400,0001. In 1737, the quantity of port Lawrence brewed in London for home-consumption and foreign exportation, amounted to 1,176,856 barrels.

This great and populous city is happily supplied with abundance of fresh water from the Thames and the New River; which is not only of inconceivable service to every family, but by means of fire plugs every where dispersed, the keys of which are deposited with the parish officers, the city is in a great measure secured from the spreading of fire; for these plugs are no sooner opened, than there are vast quantities of water to supply the engines. The plenty of water has been attended with another advantage, it has given rise to several companies, who infure houses and goods from fire: another advantage that was not to be met with in any other nation on earth: the premium is small, and the recovery in case of loss is easy and certain. Every one of these offices keep a fist of men in pay, who are ready at all hours to give their assistance in case of fire; and who on all occasions extremely bold, dexterous, and diligent; but though all their labours should prove unsuccessful, the person who suffers by this devouring element has the comfort that must arise from a certainty of being paid the value (upon oath) of what he has injured.

The places for diversion are, Vauxhall, Ranelagh-gardens, the two play-houses, one of them rebuilding, the Pantheon lately burnt down; and the little theatre in the Hay-market, with Saddlers wells, Hughe's Circus, and Astley's Royal-Grove, &c. The fine repositories of rarities and natural history, are Sir Hans Sloane's, in the British museum, already depredated; and another collected by the late Sir Athon Lever, now the private property of Mr Pankinford, and deposited in proper apartments for public inspection, near the south end of Blackfriars bridge.

LONDONDERRY, or COLERAINE, a county of Ireland, in the province of Ulster. It is bounded on the south and south-west by the county of Tyrone; by Antrim on the east, from which it is parted by the river Bann; by Donegal on the west; and that county and the Dacaledonian ocean on the north. Its greatest length is about 36 miles, its breadth 30, containing about 251,510 acres. The bogs and heaths of this county are manured with sea-shells, as those of Donegal. Like that, too, it is pretty champaign and unfruitful. It is particularly noted for a very clear river called the Bann, abounding with salmon, a fish held to delight in limpid streams. This river to distinguish it from a letter of the same name, is called the Greater or Lower Bann. In order to cultivate, settle and civilize this county, King James I. granted it, by letters patent, to a society, by the name of the Governor and Assistants at London, of the new plantation of Ulster in the province of Ireland. It contains fix baronies; and, besides the two knights of the shire, sends to parliament two members for the city of Londonderry, and two each for Coleraine and Newton-Limavady or Lammavady.

LONDONDERRY, or Derry, the capital of the county, and the see of a bishop, stands at the bottom of Lough Foyle. This city has a very good port, to which the greater burden have access, and a considerable trade. It will be ever famous for the gallantry and perseverance of which it defended itself in three memorable sieges, in defiance of the greatest hardships and discouragements, namely, 1st, in 1641, when the rebels could not reduce it either by fraud or force.

2dly, In 1649, when it was besieged by the Lord Ardes, and reduced almost to extremity by famine, till at last relieved by troops sent from England. 3dly, When it held out against the French and Irish from the 7th of December 1688 to the last day of July 1689, though it was neither well fortified nor provided with a garrison or stores of provision and ammunition, and hardly any attempt made to relieve it during so long a time. Though the city is 20 miles up the river, yet very large ships can come up to the quay, where there are four or five fathoms of water. It is now well fortified with a strong wall, besides outworks, and along the banks of the river are several castles and a fort. This city is of no great antiquity having been built and planted in the reign of James I. by a colony sent by the society abovementioned. The Trade of the town is very considerable, having not only a large share in the herring fishery, but sending ships also to the West-Indies, New-England, and Newfoundland, for which they are so advantageously situated, that a vessel bound from thence to America often arrives there before a London ship can get clear of the foundings, or arrive in the latitude of Londonderry. Tho' there are a great many shallows in Lough-Foyle, which serve it instead of a road; yet they are easily avoided, as there are deep channels between them. These points called Emilsheen, Rucherhall, or Golby-head which lie a little to the west of the mouth of the harbour are counted the most northerly of Ireland, lying in lat. 55. 20. The inhabitants of this city are almost all Protestants. It gave title of earl and baron to a branch of the family of Pitt, which became extinct in 1784; but part of the title was revived in Robert Stewart, who was created Baron Londonderry in 1789. A late traveller says, "Derry is per-
happily, the cleanest, best built, and most beautiful situated town in Ireland; and, excepting Cork, as convenient as any for commerce, foreign and rural. The lake of four round is it, and the whole ground plot below it and its liberties belongs to the 12 great companies of London. Great quantities of salmon, salted and barrelled, are exported from hence to America.

LONG, an epithet given to whatever exceeds the usual standard of length. *Long boat*, the largest and strongest boat belonging to any ship. It is principally employed to carry great burdens, as anchors, cables, ballasts, &c. See: Boat.

LONG (Roger), D.D. master of Pembroke-hall in Cambridge. Lowdias’s protreitor of astronomy in that university, rector of Cherryhinton in Huntingdonshire and of Bromwell *sola nox* in Wroxham, was author of a well known and much approved treatise of astronomy and the inventor of a remarkably curious astronomical machine, thus described by himself, ‘I have, in a room lately built in Pembroke-hall, erected a sphere of 18 feet diameter, wherein above 30 persons may fit conveniently; the entrance into it is over the south pole by fix steps; the frame of the sphere consists of a number of iron meridians, not complete meridies, the northern ends of which are screwed to a large round plate of brass, with a hole in the centre of it; thro’ this hole, from a beam in the ceiling, comes the north pole, a round iron rod, about three inches long, and fastens the upper parts of the sphere to its proper elevation for the latitude of Cambridge; the lower part of the sphere, so much of it as is invisible in England, is cut off; and the lower or southern ends of the meridies, or truncated meridies, terminate on, and are screwed down to, a strong circle of oak, of about 13 feet diameter; which, when the sphere is put into motion, runs upon large rollers of lignum vitae in the manner that the tops of some windmills are made to turn round. Upon the iron meridians is fixed a zodiac of tin painted blue, whereon the ecliptic and heliocentric orbits of the planets are drawn, and the constellations and stars traced; the Great and Little Bear and Draco are already painted in their places round the north pole; the rest of the constellations are proposed to follow; the whole is turned round with a small wheel, with as little labour as it takes to wind up a jack, though the weight of the iron, tin, and wooden circle, is about 1000 pounds. When it is made use of, a planetarium will be placed in the middle thereof. The whole, with the floor, is well supported by a frame of large timber.’ Thus far Dr Long, before this curious piece of mechanism was perfected. Since the above was written, the sphere has been completely finished; all the constellations and stars of the northern hemisphere, visible at Cambridge, are painted in their proper places upon plates of iron joined together, which form one concave surface. Dr Long published a commencement *eremon* 1748; and an answer to Dr Galley’s pamphlet on Greek Accents; and died December 16th 1770, at the age of 91.

As the materials for this article are scanty, we shall forbear. For 1783, from the Gentleman’s Magazine, a few traits of him, as delineated in 1769 by Mr Jones. ‘He is now in the 88th year of his age, and for his years vigorous and active. He was lately (in October) put in nomination for the office of vice-chancellor. He executed the work once before. I think in the year 1777; a very ingenious person, and sometimes very facetious. At the public commencement in the year 1713, Dr Greene (master of Bennet-college, and afterwards bishop of Ely) being then vice-chancellor, Mr Long was pitched upon for the tripos-performance; it was witty and humorous, and has passed through divers editions. Some that remembered the delivery of it, told me, that in addressing the vice-chancellor (whom the university wags usually styled Miss Greene), the tripos orator, being a native of Norfolk, and assuming the Norfolk dialect, instead of saying *Domina Vice-Chancellor*, did very archly pronounce the words thus, *Domina Vice-Chancellor*, which occasioned a general jeer in that great auditory. His friend the late Mr Bonfoy of Rypen told me this little in jest, ‘That he and Dr Long walking together in Cambridge in a dicky evening, and coming to a short poll fixed in the pavement, which Mr B. in the midst of chat and inattention, took to be a boy standing in his way, he said in a hurry, ‘Get out of my way, boy.’ ‘That boy, Sir,’ said the Doctor very calmly and flilly, is a poftboy, who turns out of his way for nobody.—I could recollect several other ingenious repartees if there were occasion. One thing is remarkable, he never was a sly and hearty man, always of a tender and delicate constitution; yet took great care of it. His common drink water; he always dines with the fellows in the hall. Of late years he has left off eating flesh-meats; in the room thereof, puddings, vegetables, &c. sometimes a glass or two of wine.’

LONGEY, length of life.

From the different longevitys of men in the beginning of the world, after the flood, and in these ages, Mr Derham draws an argument for the interpolation of a divine Providence.

Immediately after the creation, when the world was to be peopled by one man and one woman, the ordinary age was 900 and upwards.—Immediately after the flood, when there were three persons to stock the whole world, their age was 350 years shorter, and none of those patriarchs but Shem, arrived at 500. In the third century we find none that reached 240: in the third, none but Terah that came to 200 years; the world, at least a part of it, by that time being so well peopled, that they had built cities, and were cantoned out into distant nations. —By degrees, as the number of peopled increased, their longevity dwindled, till it came down at length to 70 or 80 years: and there it flood, and has continued to stand ever since the time of Moses.—This is found a good medium, and by means hereof the world is neither overstocked, nor kept too thin; but life and death keep a pretty equal pace.

That the common duration of man’s life has been the same in all ages since the above period, is plain both from sacred and profane history. To pass by others, Plato lived to 81, and was acquainted an old man; and the instances of longevity produced by Pliny L. vii. c. 48. as very extraordinary, may most of them be matched in modern histories. In the following Tables are collected into one point of view the most memorable instances of long-lived persons of whole age...
Longevity. we have any authentic records. The 1st and 2nd are extracted from Mr. Whitewort's Inquiry into the Origin and State of Earth, with some additions by Dr. Fowler, who inserted them, accompanied by a 3d, toge-
ther with a number of useful observations, in the fullest volume of the Memoirs of the Manchester Literary Society,

<table>
<thead>
<tr>
<th>Names of Persons</th>
<th>Ages</th>
<th>Places of Abode</th>
<th>Living or Dead</th>
</tr>
</thead>
</table>
| Thomas Parry     | 152  | Shropshire      | Died November 16, 1635. 
|                   |      |                 | Phil. Trans. N° 44. |
| Henry Jenkins    | 169  | Yorkshire       | Died December 6, 1670. |
| Robert Montgomery| 126  | Ditto           | Died in 1670. |
| James Sands      | 140  | Staffordshire   | Do Fuller's Worthies |
| His wife         | 120  | Ditto           | p. 476. |
| Countess of Desmonde | 140 | Ireland        | Raleigh's Hist. p. 166. |
| J. Sagar         | 112  | Lancashire      | Died 1691. (A) |
| Laurence         | 140  | Scotland        | Died 1688. (B) |
| Simon Sack       | 141  | Trionia         | Living 1711. |
| Col. Thomas Winlow| 146 | Ireland        | Died May 30, 1764. |
| Francis Condit   | 150  | Yorkshire       | Aug. 26, 1766. |
| Christ. J. Drakenberg | 146 | Norway       | Jan. 1768. |
| Margaret Forster  | 136  | Cumberland      | June 24, 1770. (p) |
| her daughter     | 104  | Ditto           | Both living 1771. |
| Francis Bons      | 121  | France          | Died Feb. 6, 1769. |
| John Brocicky     | 134  | Devonshire      | Living 1777. (E) |
| James Bowels      | 152  | Killingworth    | Died Aug. 15, 1656. (v) |
| John Tice         | 125  | Worcestershire  | March 1774. (G) |
| John Mount        | 136  | Scotland        | Feb. 27, 1766. (H) |
| A. Goldsmith      | 140  | France          | June 1776. (I) |
| Mary Yates        | 128  | Shropshire      | ——— 1776. (x) |
| John Bales        | 126  | Northampton     | ——— 1776. (l) |
| William Ellis     | 130  | Liverpool       | Aug. 16, 1780. (m) |
| Louisa Truxo, a Negress | 175 | Tucoma, S. America | Living Oct. 5, 1780. (n) |
| Magaret Patten    | 138  | Locknagh near Paity | Lynche's Guide to Health |
| Richard Lloyd     | 133  | Montgomery      | Lynche's Guide to Health |
| Susannah Hilliar  | 100  | Piddington, Northampton. | Died Feb. 19, 1781. (o) |
| Ann Cockbott      | 105  | Stoke-Bruerne, b. | ——— April 5, 1775. (p) |
| James Hayley      | 112  | Middlewich, Cheshire | ——— March 17, 1781. (q) |
| William Walker, aged 112, not mentioned above, who was a soldier at the battle of Edge-hill. |

If we look back to an early period of the Christian era, we shall find that Italy has been, at least about that time, peculiarly propitious to longevity. Lord Bacon observes that the year of our Lord 75, in the reign of Vespasian, was memorable; for in that year was a taxing which afforded the most authentic method of knowing the ages of men. From it, there were found in that part of Italy lying between the Appennine mountains and the river Po 124 persons who either equalled or exceeded 100 years of age, namely:

<table>
<thead>
<tr>
<th>Ages</th>
<th>Names of Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Marcus Aponicus.</td>
</tr>
<tr>
<td>10</td>
<td>Mr.</td>
</tr>
<tr>
<td>10</td>
<td>4 persons of 130 Years</td>
</tr>
<tr>
<td>10</td>
<td>In Parma</td>
</tr>
<tr>
<td>10</td>
<td>In Brussels</td>
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<tr>
<td>10</td>
<td>In Placentia</td>
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<td>10</td>
<td>In Faventia</td>
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<td>10</td>
<td>In Rimino</td>
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<td>10</td>
<td>In Parma</td>
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<td>In Brussels</td>
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<td>10</td>
<td>In Placentia</td>
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<tr>
<td>10</td>
<td>In Faventia</td>
</tr>
<tr>
<td>10</td>
<td>In Rimino</td>
</tr>
</tbody>
</table>

(a) Fuller's Worthies, p. 140.
(b) Phil. Trans. abridged by Lowthorp, Vol. VIII. p. 30, 6.
(c) Derham's Physico-Theology, p. 173.
(d) Annual Register.
(e) Daily Advertiser, Nov. 18, 1777.
(f) Warwickshire.
(g) Daily Advertiser, March 1774.
(h) Morning Post, Feb. 29, 1776.
(i) Daily Advertiser, June 24, 1776.
(j) Daily Advertiser, Aug. 22, 1776.
(k) See Inscription in the portico of All-Saints church.
(m) London Chronicle, Oct. 5, 1780.
(o) Well known to persons of credit of Northamton.
(p) Gen. Evening Post, March 24, 1781.
Longevity. Mr Carew, in his survey of Cornwall, affirms us, that it is not unusual, with the inhabitants of that county to reach 90 years of age and upwards, and even to retain their strength of body and perfect use of their senses. Besides Brown, the Cornish beggar, who lived to 120, and one Polezow to 130 years of age, he remembered the decease of persons living to even that it is still comparatively convenient. He took a journey to Versailles, to be hold and return thanks to the National of the Prince de Beaufremont. His memory continued good to the end of his life. He was made for a chair, and his body was taken in the middle of the dog-days, although longevity evident.

<table>
<thead>
<tr>
<th>Names of the Persons</th>
<th>Places of Abode</th>
<th>Where recorded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hilpocrates, Physician</td>
<td>Island of Cos</td>
<td>Lynco in Health, chap. 3.</td>
</tr>
<tr>
<td>Democritus, Philosopher</td>
<td>Abdera</td>
<td>Bacon’s History, 1095.</td>
</tr>
<tr>
<td>Galen, Physician</td>
<td>Pergamus</td>
<td>Voil. Inl. or lib. 3.</td>
</tr>
<tr>
<td>Albana, Marc</td>
<td>Ethiopia</td>
<td>Hakewill’s Ap. lib. 1.</td>
</tr>
<tr>
<td>Titus Fulloius</td>
<td>Bononia</td>
<td>Gazetteer, April 18th.</td>
</tr>
<tr>
<td>Abraham Paiba</td>
<td>Charlestown, South-Ca.</td>
<td>Fulgo in, lib. 8.</td>
</tr>
<tr>
<td>L. Teraula</td>
<td>Arminium</td>
<td>General Gazetteer</td>
</tr>
<tr>
<td>Lewis Corano</td>
<td>Venice</td>
<td>Bulgo in lib. 8.</td>
</tr>
<tr>
<td>Robert Blakeney, Esq.</td>
<td>Armagh, Ireland</td>
<td>Bacon’s Hist. of Life, p. 134</td>
</tr>
<tr>
<td>Margaret Scott</td>
<td>Dalkeith, Scotland</td>
<td>General Gazetteer.</td>
</tr>
<tr>
<td>W. Guilfoke</td>
<td>Ireland</td>
<td>Inferior on hurl Tombthere.</td>
</tr>
<tr>
<td>J. Bright</td>
<td>Ludlow</td>
<td>Fuller’s Worthies.</td>
</tr>
<tr>
<td>William Poilel</td>
<td>France</td>
<td>Lynch on Health.</td>
</tr>
<tr>
<td>Jane Reeves</td>
<td>Eifex</td>
<td>Bacon’s History, p. 134.</td>
</tr>
<tr>
<td>W. Pauler, Marquis of Winchefer</td>
<td>Hampshire</td>
<td>St J. Chron. June 14, 1781.</td>
</tr>
<tr>
<td>M. Laurence</td>
<td>Orkades</td>
<td>Plymouth, Fundamed, 4. c. 8.</td>
</tr>
<tr>
<td>Evan Williams</td>
<td>Caermarchen work-house, still alive</td>
<td>Buchanan’s Hist. of Scot.</td>
</tr>
<tr>
<td>Matthew Tait (s)</td>
<td>Auchinleck, Airshire.</td>
<td>1782.</td>
</tr>
<tr>
<td>Donald Macleod (r)</td>
<td>Isle of Sky. Alive Jan. 1792</td>
<td>All the public prints, Jan. 1790.</td>
</tr>
</tbody>
</table>

(a) This man, in 1780, at the age of 120, quitted his native hills, and from the summit of Mount Jura undertook a journey to Versailles, to be hold and return thanks to the National Assembly for the vote which had freed him and his poor countrymen from the feudal yoke. In the early part of his life, he was a servant in the family of the Prince de Beaufract. His memory continued good to the last day of his life; and the principal inconveniences which he felt from his great age were, that his sight was weakened, and the natural heat of his body was so diminished, that he shivered with cold in the middle of the dog-days if he was not sitting by a good fire. This old man was received in the body of the house by the National Assembly, indulged with the public prints, Jan. 1790, with great funeral pomp, in the parish-church of St Eulalie at Paris.

(b) He served as a private at the taking of Gibraltar in 1704. (r) Memoirs of the Life and gallant Exploits of the Old Highlander Sergeant Donald Macleod, &c. published Jan. 1791, in the 102d year of his age.–This old gentleman, for it appears that he really is a gentleman both by birth and by behaviour, was born in the year of the Revolution, in the parish of Bracadill, in the isle of Sky and county of Inverness, North Britain. He is a cadet of the family of Ulinithe in Sky; and descended, through his mother, from Macdonald of Slate, the ancestor of the present Lord Macdonald. The earlier part of his life coincided with the family of seven years in Scotland; which was so great as to suggest, even to the patriotic Mr Fletcher, the idea of the people telling themselves as slaves for immediate subsistence. He was bred in the midst of want and hardships, cold, hunger, and for the years of his apprenticeship with a mason and stonemason in Inverness, in incessant fatigue. He enlisted, when a boy, in the Scottish service, in the town of Perth, in the last part of the reign of King William. The regiment into which he enlisted was
Longevity.

The Antrimians are purposely omitted, as bearing too little reference to the present race of mortals, to afford any satisfactory conclusions; and as they have been already taken notice of in a separate article; (see Antrimians). As the improbable stories of some persons who have almost rivalled them in modern times, border too much upon the marvellous to find a place in these tables, the present examples are abundantly sufficient to prove, that longevity does not depend, to much, as has been supposed, on any particular climate, situation, or occupation in life: for we see, that it often prevails in places where all these are extremely dissimilar; and it would, moreover, be very difficult, in the histories of the several persons abovementioned, to find any circumstance common to them all, except, perhaps, that of being born of healthy parents, and of being inured to daily labour, temperance, and simplicity of diet. Among the inferior ranks of mankind, therefore, rather than among the sons of ease and luxury, shall we find the most numerous instances of longevity; even frequently, when other external circumstances seem extremely unfavorable—as in the case of the poor sexton at Peterborough, who, notwithstanding his unprospering occupation, among dead bodies, lived long enough to bury two crowned heads, and to survive his complete generations. The livelihood of Henry Jenkins and old Parke, is said to have consisted chiefly of the coarsest fare, as they depended on plentiful alms. To which may be added the remarkable instance of Agnes Melbourne, who, after bringing forth a numerous offspring, and being obliged, through extreme in ligence, to pass the latter part of her life in St Luke's workhouse, yet reached her 108th year in that forlorn and unfriendly situation. The plain diet and invigorating employments of country life are acknowledged on all hands to be highly conducive to health and longevity, while the luxury and refinements of large cities are allowed to be equally destructive to the human species; and this consideration alone, perhaps, more than counterbalances all the boasted privileges of superior longevity, elegance and civilization resulting from a city life.

From country villages, and not from crowded cities, have the preceding instances of longevity been chiefly supplied. Accordingly it appears, from the London bills of mortality, during a period of 30 years, viz. from the year 1728 to 1758, the sum of the deaths amounted to 750,322, and that, in all this prodigious number, only 242 persons survived the 100th year of their age! This overgrown metropolis is computed by Dr Price to contain a ninth part of the inhabitants of England, and to consume annually 7000 persons, who remove into it from the country every year, without increasing it. He moreover observes, that the number of inhabitants in England and Wales has diminished about one fourth part since the Revolution; and so rapidly of late, that in 11 years, near 200,000 of the common people have been lost. If the calculation be just, however alarming it may appear in a national view, there is this consolation, when considered in a philosophical light, that without partial evil, there can be no general good; and that what a nation loses in the state, or occupation in life: for policy is computed sufficient to bury two thus probably, the average number of inhabitants on the surface of the globe continues at all times nearly the same. By this medium, the world is neither overstocked with inhabitants nor kept too thin, but life and death keep a tolerably equal pace. The inhabitants of Britain comparatively speaking, are but as the dust of the balance; yet instead of being diminished, we are assured by other writers, that within these 30 years they are greatly increased.

The desire of self-preservation, and of protracting the short span of life, is so intimately interwoven with our constitution, that it is justly esteemed one of the first principles of our nature, and, in spite even of pain and misery, seldom quits us to the last moments of our existence. It seems, therefore, to be no less our duty than our interest, to examine minutely into the various

was the Scots Royals, commanded by the earl of Orkney. That old military corps, at that time, used bows and arrows as well as swords, and wore full caps. He served in Germany and Flanders under the duke of Marlborough, under the duke of Argyll in the rebellion 1715, in the Highland Watch, or companies raised for enforcing the laws in the Highlands; in the same companies when, under the name of the 42d regiment, they were sent abroad to Flanders, to join the army under the duke of Cumberland; in the same regiment in Ireland, and on the breaking out of the French war, 1757, in America. From the 42d he was draughted to act as a drill sergeant in the 78th regiment, in which he served at the reduction of Louisburg and Quebec: After this he became an out-pensioner of Chelsea Hospital. But such was the spirit of this brave and hardy veteran, that he served in 1761 as a volunteer in Germany under the marquis of Granby; and offered his services in the American war to Sir Henry Clinton; who, though he declined to employ the old man in the fatigues and dangers of war, treated him with great kindness, allowed him a liberal weekly pension out of his own pocket, and sent him home in a ship charged with dispatches to government.—The sergeant, as his memory, according to the observation of his biographer, is impaired, does not pretend to make an exact enumeration of all his offspring: but he knows of 16 sons now living, 14 of whom are in the army and navy, besides daughters: the eldest of whom by his present wife is a mantuemaker in Newcastle. His eldest son is now 83 years old, and the youngest only nine. Nor, in all probability, would this lad clothe the rear of his immediate progeny, if his present wife, the boy's mother, had not attained to the 40th year of her age. In his prime, he did not exceed five feet and seven inches. He is now inclined through age to five feet five inches. He has an interesting phlogiston expressive of sincerity, sensibility, and manly courage. His biographer very properly submits is to the consideration of the Polygraphical Society, whether they might not do a thing worthy of themselves and their ingenious art, if they should multiply likenesses of this living antiquity, and circulate them at an easy rate throughout Britain and Europe. They would thus gratify a very general curiosity; a curiosity not confined to the present age.
Longevity. Various means that have been considered as conducive to health and long life; and, if possible to distinguish such circumstances as are essential to that great end from those which are merely accidental. But here it is much to be regretted, that an accurate history of the lives of all the remarkable personages in the above table, so far as relates to the diet, regimen, and the use of the non-naturals, has not been faithfully handed down to us; without which it is impossible to draw the necessary inferences. Is it not then matter of astonishment, that historians and philosophers have hitherto paid so little attention to longevity? If the present imperfect list should excite others of more leisure and better abilities, to undertake a full investigation of fo interesting a subject, the inquiry might prove not only curious but highly useful to mankind. In order to furnish materials for a future history of longevity, the bills of mortality throughout the British dominions and foreign parts have already given a specimen highly worthy of imitation. The plan, however, might be further improved with very little trouble, by adding a particular account of the diet and regimen of every nation, who dies at 80 years of age or upwards; and mentioning whether his parents were healthy, long-lived people, &c. An accurate register, thus established throughout the British dominions would be productive of many important advantages to society, not only in a medical and philosophical, but also in a political and moral view.

All the circumstances that are most essentially necessary to life, may be comprised under the six following heads: 1. Air and climate; 2. Meat and drink; 3. Motion and rest; 4. The secretions and excretions; 5. Sleep and watching; 6. Affections of the mind.

These, though all perfectly natural to the constitution, have by writers been stigmatized the non-naturals, by a strange perversion of language; and have been all copiously handled under that improper term. However, it may not be amiss to offer a few short observations on each, as they are so immediately connected with the present subject.

1. Air, &c. It has long been known that fresh air is more immediately necessary to life than food for a man may live two or three days without the latter, but not many minutes without the former. The vivifying principle contained in the atmosphere, so essential to the support of flame, as well as animal life, concerning which authors have proposed so many conjectures, appears now to be nothing else but that pure dephlogisticated fluid lately discovered by that ingenious philosopher Dr Priestley. The common atmosphere may well be appoised to be more or less healthy in proportion as it abounds with this animating principle. As this exhales in copious streams from the green leaves of all kinds of vegetables, even from those of the most poisonous kind, may we not, in some measure, account why instances of longevity are so much more frequent in the country than in large cities where the air, instead of partaking to a large extent of this salutary impregnation, is daily contaminated with noxious animal effluvia, and phlogiston?

With respect to climate, various observations, confpire to prove, those regions which lie within the temperate zones are best calculated to promote long life. Hence, perhaps, may be explained, why Italy has produced so many long lives; and why islands in general are more salutary than continents; of which Bermudas and some others afford examples. And it is a pleasing circumstance for Great Britain that the appearing from the above table (notwithstanding the fudden vicissitudes to which it is liable) to contain far more instances of longevity than could well be imagined. The ingenious Mr Whitehurst affures us from certain facts, that Englishmen are in general longer lived than North Americans; and that a British constitution will last longer, even in that climate, than a native one. But it must be allowed in general, that the human constitution is adapted to the peculiar state and temperature of each respective climate, so that no part of the habitable globe can be pronounced too hot or too cold for its inhabitants. Yet in order to promote a friendly intercourse between the most remote regions, the Author of nature has wisely enabled the inhabitants to endure great and surprising changes of temperature with impunity.

2. Food and drink. Though foods and drink of the most simple kind are allowed to be the best calculated for supporting the body in health, yet it can hardly be doubted but variety may be safely indulged occasionally, provided men would restrain their appetites within the bounds of temperance; for bountiful Nature cannot be supposed to have poured forth such a rich profusion of provisions, merely to tantalize the human species, without attributing to her the part of a cruel step-dame, instead of that of the kind and indulgent parent. Besides, we find that by the wonderful powers of the digestive organs, a variety of animal and vegetable substances, of very discordant principles, are happily assimilated into one bland homogenous chyle; therefore it seems natural to distrust those cynical writers, who would rigidly confine mankind to one simple dish, and their drink to the mere water of the brook. Nature, it is true, has pointed out that mild insipid fluid as the universal diluent, and therefore most admirably adapted for our daily beverage. But experience has equally proved, that vinous and spirituous liquors, on certain occasions, are no less salutary and beneficial, whether it be to support strength against sickness or bodily fatigue, or to exhilarate the mind under the preliure of heavy misfortunes. But, alas! what Nature meant for innocent and useful cordials, to be used only occasionally, and according to the direction of reason, custom and caprice have, by degrees, rendered habitual to the human frame, and liable to the most enormous and destructive abuses. Hence it may be justly doubted, whether gluttony and intemperance have not depopulated the world more than even the sword, pestilence and famine. True, therefore, is the old maxim, "Ab nos utendi ex veneno facit medicamentum, ex medicamento venenum.

3. and 4. Motion and rest; sleep and watching. It is allowed at all hands, that alternate motion and rest, and sleep and watching, are necessary conditions to health and longevity; and that they ought to be adapted to age, temperament, constitution, temperature of the climate, &c. but the errors which mankind daily commit in these respects become a fruitful source of diseases. While some are bloated and relaxed in cafe
Longevity, cafe and indulgence, others are engrafted, and become rigid through hard labour, watching and fatigue.

5. Secretions and Excretions. Where the animal functions are duly performed, the secretions go on regularly; and the different evacuations so exactly correspond to the quantity of aliment taken in, in a given time, that the body is found to return daily to nearly the same weight. If any particular evacuation happen to be preternaturally diminished, some other evacuation is proportionally augmented, and the equilibrium is commonly preferred: but continued irregularities, in these important functions, cannot but terminate in disease.

6. Affections of the mind. The due regulation of the passions, perhaps, contributes more to health and longevity than that of any other of the non-naturals. The animating passions, such as joy, hope, love, &c. when kept within proper bounds, gently excite the nervous influence, promote an equable circulation, and are highly conducive to health: while the depressing affections, such as fear, grief, and despair, produce the contrary effect, and lay the foundation of most formidable diseases.

From the light which history affords us, as well as from some instances in the above table, there is great reason to believe, that longevity is in a great measure hereditary; and that healthy long-lived parents would commonly transmit the fame to their children, were it not for the frequent errors in the non-naturals, which so evidently tend to the abbreviation of human life.

Whereas it, but from these causes, and the unnatural modes of living, that of all the children which are born in the capital cities of Europe, nearly one half die in early infancy! To what else can we attribute this extraordinary mortality! Such an amazing proportion of premature deaths is a circumstance unheard of among savage nations, or among the young of other animals! In the earliest ages, we are informed, that human life was protracted to a very extraordinary length; yet how few persons, in these later times, arrive at that period which nature seems to have designed! Man is by nature a field animal, and feeoms destined to rise with the sun, and to spend a large portion of his time in the open air, to inure his body to robust exercises and the inclemency of the seasons, and to make a plain honestly repast only when hunger dictates. But art has Fludently defeated the kind intentions of nature; and by endowing him to all the blemishments of life, has left him, alas! an easy victim to folly and caprice. To enumerate the various abuses which take place from the earliest infancy, and which are continued through the succeeding stages of modifh life, would carry us far beyond our present intention. Suffice it to observe, that they prevail more particularly among people who are the most highly polished and refined. To compare their artificial mode of life with that of nature, or even with the long-livers in the wilds, would probably afford a very striking contrast; and at the same time supply an additional reason why, in the very large cities, instances of longevity are so very rare.

LONGFORD, a county of Ireland, in the province of Leinster, bounded by the county of Leitrim on the north, Meath on the east and south, and Roscommon on the west. It contains 134,700 Irish plantation acres, 24 parishes, 6 baronies, and 4 boroughs; and returns 10 members to parliament. It is small and much encumbered with bog, intermixed with a tolerable good soil; and is about 25 miles long and 15 broad.

LONGFORD, a town of Ireland, situated on the river Cromlin, in the county of Longford and province of Leinster, 64 miles from Dublin; which river falls a few miles below this place into the Shannon. It is a borough, port, market, and fair town; and returns two members to parliament; patron Long Fingal. It gave title of earl to the family of Anngier; of esq., to the family of Meelehwaite; and now gives that of baron to the family of Packenham. Within a mile and a half of the town is a charter-school for above 40 children. This place has a barracks for a troop of horse. It is large and well built; and in a very early age an abbey was founded here, of which St Idus, one of St Patrick's disciples, was abbot. In the year 1400, a fine monastery was founded to the honour of the Virgin Mary, for Dominican friars, by O'Ferral prince of Acailly. This monastery being destroyed by fire, Pope Martin V. by a bull in the year 1429, granted an indulgence to all who should contribute to the rebuilding of it. In 1433, Pope Eugene IV. granted a bull to the same purpose; and in 1438 he granted another to the like effect. The church of this friary, now the parish-church, is in the diocese of Ardagh. The fairs are four in the year.

LONG ISLAND, is an island of North America belonging to the state of New-York, which is separated from the continent by a narrow channel. It extends from the city of New-York 140 miles, terminating with Montauk point; and is not more than 10 miles in breadth on a medium. It is divided into three counties, King's, Queen's, and Suffolk. The north side of the island is flat land, of a light sandy soil, bordered on the sea-coast with large tracts of fall-meadow, extending from the west point of the island to Southampton. This soil, however, is well calculated for raising grain, especially Indian corn. The north side of the island is hilly, and of a strong soil, adapted to the culture of grain, hay and fruit. A ridge of hills extends from Jamaica to Southold. Large herds of cattle feed upon Hampton plain and on the salt marshes upon the south side of the island. Hampton plain in Queen's county is a curiosity. It is 16 miles in length, east and west, and 7 or 8 miles wide. The soil is black, and to appearance rich, and yet it was never known to have any natural growth, but a kind of wild grass and a few shrubs. It is frequented by vast numbers of plovers. Rye grows tolerably well on some parts of the plain. The most of it lies common for cattle, horses and sheep. As there is nothing to impede the prospect in the whole length of this plain, it has a curious but tiresome effect upon the eye, not unlike that of the ocean. The island contains 30,863 inhabitants.

LON GIMETRY, the art of measuring lengths, both accessible and inaccessible. See GEOMETRY and TRIGONOMETRY.

LONGING, is a preternatural appetite in pregnant women; and in some fickle persons when about to recover. It is called pica, from the bird of that name, which is said to be subject to the same disorder. The disorder con-
LON[279]LONGITUDES.

Longinus contends both of a desire of unusual things to eat and drink, and in being soon tired of one another. It is called malacis, from ma-gas, "weakness." In pregnant women it is somewhat relieved by bleeding, and in about the fourth month of their pregnancy it leaves them. Choleric girls, and men who labour under suppurated haemorrhoids, are very subject to this complaint, and are relieved by promoting the rectification of evacuations. In general, whether this disorder is observed in pregnant women, in persons recovering from an acute fever, or in those who labour under obstructions of the natural evacuations, this craving of the appetite should be indulged.

LONGINUS, a town of Turkey in Europe, in the Morea, anciently called Olympia, famous for being the place where the Olympic games were celebrated, and for the temple of Jupiter Olympus, about a mile distant. It is now but a small place, situated on the river Aphaeus, 10 miles from its mouth, and 50 south of Lepanto, E. Long. 29° 20'. N. Lat. 37° 30'.

LONGINUS (Dioctylus), a celebrated Greek critic of the third century, was probably an Athenian. His father's name is unknown, but by his mother he was allied to the celebrated Plutarch. His youth was spent in travelling with his parents, which gave him an opportunity to increase his knowledge, and improve his mind. After his travels, he fixed his residence at Athens, and with the greatest assiduity applied to study. Here he published his "Treatise on the Sublime," which raised his reputation to such a height, and gave the Athenians such an opinion of his judgment and taste, that they made him sovereign judge of all authors, and every thing was received and rejected by the public according to his decisions. He seems to have died at Athens a long time; here he taught the academic philosophy, and among others had the famous Porphyry for his pupil. But it was at length his fortune to be drawn from Athens, and to mix in more active scenes; to train up young princes to virtue and glory; to guide the bashful lions of the great to noble objects; to struggle, and at last die, in the cause of liberty. Zenobia, queen of the East, prevailed on him to undertake the education of her sons; and he soon gained an uncommon share in her confidence: he spent the vacant hours of his life in his conversation, and modelled her sentiments and conduct by his instructions. That prince was at war with Aurelian; and being defeated by him near Antioch, was compelled to hurl herself up in Palmyra, her capital city. The emperor wrote her a letter, in which he ordered her to surrender; to which she returned an answer, drawn up by Longinus, which filled him with resentment. The emperor laid siege to the city; and the Palmyrians were at length obliged to open their gates and receive the conqueror. The Queen and Longinus endeavoured to fly into Persia; but were unhappily overtaken and made prisoners when they were on the point of crossing the Euphrates. The Queen, intimidated, weakly laid the blame of vindicating the liberty of her country on its true author; and the brave Longinus, to the disgrace of the conqueror, was carried away to immediate execution. The writings of Longinus were numerous, some on philosophical, but the greater part on critical subjects. Dr. Pearce has collected the titles of 25 treatises, none of which, excepting that on the Sublime, have escaped the depredations of time and barbarians. On this imperfect piece the great fame of Longinus is raised, who, as Pope expresses it, "is himself the great sublime he draws." The best edition of his works is that of Tullius, printed at Utrecht in 1694, "cum suis variis." It has been translated into English by Mr. Smith.

LONGISSIMUS DORSI. See Anatomy, Table of the Muscles.

LONITUDE, in geography and navigation, is the distance of any place from another eastward or westward, counted in degrees, upon the equator; but when the distance is reckoned by leagues or miles and not in degrees, or in degrees on the meridian, and not of the parallel of latitude, in which case it includes both latitude and longitude, it is called departure.

To find the longitude at sea, is a problem to which the attention of navigators and mathematicians has been drawn ever since navigation began to be improved. The importance of this problem soon became so well known, that, in 1598, Philip III. of Spain offered a reward of 1000 crowns for the solution; and his example was soon followed by the States General, who offered 10,000 florins. In 1714 an act was passed in the British parliament, empowering certain commissioners to make out a bill for a sum not exceeding 2000l. for defraying the necessary expenses of experiments for ascertaining this point; and likewise granting a reward to the person who made any progress in the solution, proportionable to the degree of accuracy with which the solution was performed: 10,000l. was granted if the longitude should be determined to one degree of a great circle, or 60 geographical miles; 15,000 if two thirds of that distance; and 20,000l. to the half the distance.

In consequence of these offered rewards, innumerable attempts were made to discover this important secret. The first was that of John Morin professor of mathematics at Paris, who proposed it to Cardinal Richelieu; and though it was judged insufficient on account of the imperfection of the lunar tables, a subscription of 2000 livres per annum was procured for him in 1645 by Cardinal Mazarine. Gemma Frisius had, indeed, in 1530, projected a method of finding the longitude by means of watches, which at that time were newly invented; but the structure of these machines was then by far too imperfect to admit of any attempt; nor even in 1631, when Metius made an attempt to this purpose, were they advanced in any considerable degree. About the year 1664, Dr. Hooke and Mr. Huygens made a very great improvement in watchmaking, by the application of the pendulum spring. Dr. Hooke having quarrelled with the ministry, no experiment was made with any of his machines; but many were made with those of Mr. Huygens. One experiment, particularly, made by Major Holmes, in a voyage from the coast of Guinea in 1665, answered so well, that Mr. Huygens was encouraged to improve the structure of his watches; but it was found that the variations of heat and cold produced such alterations in the rate of going of the watch, that unless this could be remedied, the watches could be of little use in determining the longitude.

In 1714 Henry Sully, an Englishman, printed a small tract at Vienna upon the subject of watchmaking.
Longitude-making. Having afterwards removed to Paris, he applied himself to the improvement of time-keepers for the discovery of the longitude. He taught the famous Julian de Roy; and this gentleman, with his son, and M. Berthoud, are the only persons who, since the days of Sully, have turned their thoughts this way. But though experiments have been made at two with some of their watches, it does not appear that they have been able to accomplish anything of importance with regard to the main point. The first who succeeded in any considerable degree was Mr. John Harrison; who, in 1726, produced a watch which went so exactly, that for ten years together it did not err above one second in a month. In 1736 it was tried in a voyage to Lisbon and back again, on board a ship of his Britannic Majesty; during which it corrected an error of a degree and a half in the computation of the ship’s reckoning. In consequence of this he received public encouragement to go on; and by the year 1761 had finished three time-keepers, each of them more accurate than the former. The last turned out so much to his satisfaction, that he now applied to the commissioners for leave to make an experiment with his watch in a voyage to the West-Indies. Permission being granted, his son Mr. William Harrison set out in a British ship the Deptford for Jamaica in the month of November 1761. This trial was attended with all imaginable success. The longitude of the island, as determined by the time-keeper, differed from that found by astronomical observations only one minute and a quarter of the equator; the longitude of places seen by the way being also determined with great exactness. On the ship’s return to England, it was found to have erred no more during the whole voyage than 1° 54½', in time, which is little more than 28 miles in distance; which being within the limits preferred by the British act, the inventor claimed the whole L.20,000 offered by government. Objections to this, however, were soon started. Doubts were pretended about the real longitude of Jamaica, as well as the manner in which the time had been found both there and at Portsmouth. It was alleged also, that though the time-keeper happened to be right at Jamaica, and after its return to England, this was by no means a proof that it had always been so in the intermediate times; in consequence of which allegations, another trial was appointed in a voyage to Barbadoes. Observations were now taken to obviate as many of these objections as possible. The commissioners felt out proper persons to make astronomical observations at that island; which, when compared with others in England, would afford more than a doubt its true situation. In 1764 then, Mr. Harrison junior set sail for Barbadoes; and the result of the experiment was, that the difference of longitude betwixt Portsmouth and Barbadoes was shown by the time-keeper to be 3½ 55½'; and by astronomical observations to be 3½ 54° 20'; the error being now only 43½' of time, or 10½' of longitude. In consequence of this and the former trials, Mr. Harrison received one half of the reward promised, upon making a discovery of the principles upon which his timekeepers were constructed. He was likewise promised the other half of the reward as soon as time-keepers should be constructed by other artists which should answer the purpose as well as those of Mr. Harrison himself. Longitude. At this time he delivered up all his time-keepers, the last of which was sent to Greenwich to be tried by Mr. Nevil Maskelyne the astronomer-royal. On trial, however, it was found to go with much less regularity than had been expected; but Mr. Harrison attributed this to his having made some experiments with it which he had not time to finish when he was ordered to deliver up the watch. Soon after this, an agreement was made by the commissioners with Mr. Kendall to construct a watch upon Mr. Harrison’s principles; and this upon trial was found to answer the purpose even better than any that Harrison himself had constructed. This watch was sent out with Captain Cook in 1773; and during all the time of his voyage round the world in 1772, 1773, 1774, and 1775, never erred quite 1½ seconds per day: in consequence of which, the house of commons, in 1774, ordered the other L.10,000 to be paid to Mr. Harrison. Still greater accuracy, however, has been attained. A watch was lately constructed by Mr. Arnold, which, during a trial of 13 months, from February 1779 to February 1780, varied not more than 6½' during any single day, and the greatest difference between its rates of going on any day and the next to it was 4½'. The greatest error it would have committed therefore in the longitude during any single day would have been very little more than one minute of longitude; and thus the longitude be determined with as great exactness as the latitude generally can. This watch, however, has not yet been tried at sea.

Thus the method of constructing time-keepers for discovering the longitude seems to be brought to as great a degree of perfection as can well be expected. Still, however, as these watches are subject to accidents, and may thus alter the rate of their going with out any possibility of a discovery, it is necessary that some other method should be fallen upon, in order to correct from time to time these errors which may arise either from the natural going of the watch, or from any accident which may happen to it. Methods of this kind are all founded upon celestial observations of some kind or other; and for these methods, or even for an improvement in time-keepers, rewards are still held out by Great Britain. After the discoveries made by Mr. Harrison, the act concerning the longitude was repealed, excepting so much of it as related to the constructing, printing, publishing, &c. of nautical almanacks and other useful tables. It was enacted also that any person who shall discover a method for finding the longitude by means of a time-keeper, the principles of which have not hitherto been made public, shall be intitled to a reward of L.5000, if, after certain trials made by the commissioners, the said method shall enable a ship to keep her longitude during a voyage of six months within 60 geographical miles or a degree of a great circle. If the ship keeps longitude within 40 geographical miles for that time the inventor is intitled to a reward of L.7500, and to L10,000 if the longitude is kept within half a degree. If the method is by improved astronomical observations, the author is intitled to L5000 when they show the distance of the moon from the sun and tides, within 15 seconds of a degree, answering to about 7 minutes of longitude, after allowing half a degree for cites.
longitude.

Errors of observation, and under certain restrictions, and after comparison with astronomical observations for a period of 18 years, during which the lunar irregularities are supposed to be completed. The same rewards are offered to the person who shall with the like accuracy discover any other method of finding the longitude.

These methods require celestial observations; and any of the phenomena, such as the different apparent places of stars with regard to the moon, the beginning and ending of eclipses, &c. will answer the purpose: only it is absolutely necessary that some variation should be perceptible in the phenomenon in the space of two minutes; for even this short space of time will produce an error of 30 miles in longitude. The most proper phenomena therefore for determining the longitude in this manner are the eclipses of Jupiter's satellites. Tables of their motions have been constructed, and carefully corrected from time to time, as the mutual attractions of these bodies are found greatly to disturb the regularity of their motions. The difficulty here, however, is to observe these eclipses at sea; and this difficulty has been found so great, that no person seems able to accomplish it. The difficulty arises from the violent agitation of a ship in the ocean, for which no adequate remedy has ever yet been found, nor probably will ever be found. Mr. Christopher Irwin indeed invented a machine which he called a marine chair, with a view to prevent the effects of this agitation; but on trying it in a voyage to Barbadoes, it was found to be totally useless.

A whimsical method of finding the longitude was proposed by Melliss Whilton and Ditton from the report and flash of great guns. The motion of sound is known to be nearly equal, from whatever body it proceeds or whatever be the medium. Supposing therefore a mortar to be fired at any place the longitude of which is known, the difference between the moment that the flash is seen and the report heard will give the distance between the two places; whence, if we know the latitudes of these places, their longitudes must also be known. If the exact time of the explosion be known at the place where it happens, the difference of time at the place where it is heard will likewise give the difference of longitude. Let us next suppose the mortar to be loaded with an iron shell filled with combustible matter, and fired perpendicularly upwards into the air, the shell will be carried to the height of a mile, and will be seen at the distance of nearly 100; whence, supposing neither the flash of the mortar should be seen nor the report heard, still the longitude might be determined by the altitude of the shell above the horizon.

According to this plan, mortars were to be fired at certain times and at proper stations along all frequented coasts for the direction of mariners. This indeed might be of use, and in stormy weather might be a kind of improvement in light-houses, or a proper addition to them; but with regard to the determination of longitude, is evidently ridiculous.

We shall now proceed to give some practical directions for finding the longitude at sea by proper celestial observations; exclusive of those from Jupiter's Satellites, which, for reasons just mentioned, cannot be practised at sea. In the first place, however, it will be

necessary to point out some of those difficulties which stand in the way, and which render even this method of finding the longitude precarious and uncertain. These lie principally in the reduction of the observations of the heavenly bodies made on the surface of the earth to similar observations supposed to be made at the centre; which is the only place where the celestial bodies appear in their proper situation. It is also very difficult to make proper allowances for the refraction of the atmosphere, by which all objects appear higher than they really are; and another difficulty arises from their parallaxes, which makes them, particularly the moon, appear lower than they would otherwise do, excepting when they are in the very zenith. It is also well known, that the nearer the horizon any celestial body is, the greater its parallax will be; and as the parallax and refraction act in opposite ways to one another, the former depressing and the latter raising the object, it is plain, that great difficulties must arise from this circumstance. The sun, for instance, whose parallax is less than the refraction, must always appear higher than he really is; but the moon, whose parallax is greater than her refraction, must always appear lower.

To render observations of the celestial bodies more easy, the inconsiderable parallaxes have caused an Ephemeris or Nautical Almanack to be published annually, containing every requisite for solving this important problem which can be put into the form of tables. But whatever may be done in this way, it will be necessary to make the necessary preparation concerning the dip of the horizon, the refraction, sidereal distances, &c. in order to reduce the apparent to the true altitudes and distances; for which we shall here subjoin two general rules.

The principal observation for finding the longitude at sea is that of the moon from the sun, or from some remarkable star near the zodiac. To do this, the operator must be furnished with a watch which can be depended upon for keeping time within a minute for six hours; and with a good Hadley's quadrant, or, which is preferable, a sextant; and this last instrument will still be more fit for the purpose if it be furnished with a screw for moving the index gradually, likewise an additional dark glass, but not so dark as the common kind, for taking off the glare of the moon's light in observing her distance from a star. A small telescope, which may magnify three or four times, is also necessary to render the contact of a star with the moon's limb more discernible. A magnifying glass of 1; or 2 inches focus will likewise assist the operator in reading of his observations with the greater facility.

1. To make the observation. Having examined and adjusted his instrument as well as possible, the observer is next to proceed in the following manner: If the distance of the moon from the sun is to be observed, turn down one of the screens; look at the moon directly through the transparent part the horizon-glass; and keeping her in view, gently move the index till the sun's image be brought into the filtered part of that glass. Bring the nearest limbs of both objects into contact, and let the quadrant limb lie on the lunar ray; by which means the sun will appear to rise and fall by the side of the moon; in which motion the nearest limbs must be made to touch one another exactly by

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longitude.

Longitude.
Longitude moving the index. The observation is then made; and the division coinciding with that on the Vernier scale, will show the distance of the nearest limbs of the object.

When the distance of the moon from a star is to be observed when the moon is very bright, turn down the lighted screen, or use a dark glass lighter than the screen, and designed for this particular purpose; look at the star directly through the transparent part of the horizon-glass; and keeping it there, move the index till the moon’s image is brought into the silvered part of the same glass. Make the quadrant librate gently on the star’s ray, and the moon will appear to rise and fall by the star; move the index between the librations, until the moon’s enlightened limb is exactly touched by the star, and then the observation is made. In these operations, the places of the quadrant must always pass through the two objects, the distance of which is to be observed; and for this purpose it must be placed in various positions according to the situation of the objects, which will soon be rendered easy by practice.

The observation being made, somebody at the very instant that the operator calls must observe by the watch the exact hour, minute, and quarter minute, if there be no second hand, in order to find the apparent time; and at the same instant, or as quick as possible, two assistants must take the altitudes of those objects the distance of which is observed; after which, the observations necessary for finding the longitude are completed.

The ephemeris shows the moon’s distance from the sun, and likewise from proper stars, to every three hours of apparent time for the meridian of Greenwich; and that the greater number of opportunities of observing this luminary may be given, her distance is generally set down from at least one object on each side of her. Her distance from the sun is set down while it is between 40 and 120 degrees, so that, by means of a sextant, it may be observed for two or three days after her first and before her last quarter. When the moon is between 40 and 90 degrees from the sun, her distance is set down both from the sun and from a star on the contrary side; and, lastly, when the distance is above 120 degrees, the distance is set down from two stars, one on each side of her. The distance of the moon from objects on the east side of her is found in the ephemeris in the 8th and 9th pages of the month; and her distance from objects on the west is found in the 10th and 11th pages of the month.

When the ephemeris is used, the distance of the moon must only be observed from those stars the distance of which is set down there; and these afford a ready means of knowing the star from which her distance ought to be observed. The observer has then nothing more to do than to set his index to the distance roughly computed at the apparent time, estimated nearly for the meridian at Greenwich; after which he is to look to the east or west of the moon, according as the distance of the star is found in the 8th or 9th, or in the 10th or 11th, pages of the month; and having found the moon upon the horizon-glass, the star will easily be found by sweeping with the quadrant to the right or left, provided the air be clear, and the star be in the line of the moon’s shortest axis produced. The time at Greenwich is estimated by turning into time the supposed longitude from that place, and adding it to the apparent time at Longitude, the ship, or subtracting it from it as occasion requires.

The distance of the moon from the sun, or a star, is roughly found at this time, by saying, as 180 minutes (the number contained in three hours) is to the difference in minutes between this nearly estimated time and the next preceding time set down in the ephemeris; so is the difference in minutes between the distances in the ephemeris for the next preceding and next following times, to a number of minutes; which being added to the next preceding distance, or subtracted from it, according as it is increasing or decreasing, will give the distance nearly at the time the observation is to be made, and to which the index must be set.

An easier method of finding the angular distance is by bringing the objects nearly into contact in the common way, and then fixing the index tight to a certain degree and minute; waiting until the objects are nearly in contact, giving notice to the assistants to get ready with the altitudes, and when the objects are exactly in contact to call for the altitudes and the exact time by the watch. The observer may then prepare for taking another distance, by setting his index three or four minutes backwards or forwards, as the objects happen to be receding from or approaching to each other; thus proceeding to take the distance, altitudes, and time by the watch, as before. Thus the observer may take as many distances as he thinks proper; but four at the distance of three minutes, or three at the distance of four minutes, will at all times be sufficient. Thus not only the eye of the observer will be less fatigued, but he will likewise be enabled to manage his instrument with much greater facility in every direction, a vertical one only excepted. If in taking the distances the middle one can be taken at any even division on the arch, such as a degree, or a degree and 20 or 40 minutes, that distance will be independent of the Nomius division, and consequently free of those errors which frequently arise from the inequality of that division in several parts of the graduated arch. The observation ought always to be made about two hours before or after noon; and the true time may be found by the altitude of the sun taken at the precise time of the distance. If three distances are taken, then find the time by the altitude corresponding with the middle distance; and thus the observation will be free from any error arising from the irregularity of the going of the watch. As the time, however, found by the altitude of a star cannot be depended upon, because of the uncertainty of the horizon in the night, the best way of determining the time for a night observation will be by two altitudes of the sun; one taken on the preceding afternoon, before he is within six degrees of the horizon; and the other on the next morning, when he is more than six degrees high. It must be observed, however, that in order to follow these directions, it is necessary that the atmosphere should be pretty free from clouds; otherwise the observer must take the observation at such times as he can best obtain them.

2. To reduce the observed Distance of the Sun or a Star from the moon to the true Distance. 1. Turn the longitude into time, add it to the time at the ship if the longitude be east, or subtract it if it be west, which
Longitude, which will give the supposed time at Greenwich; and this we may call reduced time. 2. Find the nearest noon or midnight both before and after the reduced time in the seventh page of the month in the ephemeris. 3. Take out the moon's semidiameter and horizontal parallaxes corresponding to these noons and midnights, and find their differences. Then say, As 12 hours is to the moon's semidiameter in 12 hours, so is the reduced time to a number of seconds; which, either added to or subtracted from the moon's semidiameter at the noon or midnight just mentioned, according as it is increasing or decreasing, will give her apparent semidiameter; to which add the correction from Table VIII. of the ephemeris, and the sum will be her true semidiameter at the reduced time. And as 12 hours is to the difference of the moon's horizontal parallax in 12 hours, so is the reduced time to a fourth number; which, being added to or subtracted from the moon's horizontal parallax at the noon or midnight before the reduced time, according as it is increasing or decreasing, the sum or difference will be the moon's horizontal parallax at the reduced time. 4. If the reduced time be nearly any even part of 12 hours, viz. 17th, 14th, &c. these parts of the difference may be taken, and either added or subtracted according to the directions already given, without being at the trouble of working by the rule of proportion. 5. To the observed altitude of the sun's lower limb add the difference between his semidiameter and dip; and that sum will be his apparent altitude. 6. From the sun's refraction take his parallax in altitude, and the remainder will be the correction of the sun's altitude. 7. From the star's observed altitude take the dip of the horizon, and the remainder will be the apparent altitude. 8. The refraction of a star will be the correction of its altitude. 9. Take the difference between the moon's semidiameter and dip, and add it to the observed altitude if her lower limb was taken, or subtract it if her upper limb was taken; and the sum or difference will be the apparent altitude of her centre. 10. From the proportional logarithm of the moon's horizontal parallax, taken out of the nautical almanac (increasing its index by 10), take the logarithmic cosine of the moon's apparent altitude, the remainder will be the proportional logarithm of her parallax in altitude; from which take her refraction, and the remainder will be the correction of the moon's altitude. 11. To the observed distance of the moon from a star add her semidiameter if the nearest limb be taken, but subtract it if the farthest limb was taken, and the sum or difference will be the apparent distance. 12. To the observed distance of the sun and moon add both their semidiameters, and the sum will be the apparent distance of their centres.

3. To find the true Distance of the Objects, having their apparent Altitudes and Distances. 1. To the proportional logarithm of the correction of the sun or star's altitude, add the logarithmic cosine of the sun or star's apparent altitude; the logarithmic sine of the apparent distance of the moon from the sun or star; and the logarithmic co-tangent of the moon's apparent altitude. The sum of these, rejecting 20 in the index, will be the proportional logarithm of the first angle. 2. To the proportional logarithm of the correction of the sun or star's altitude, add the logarithmic co-tangent of the sun or star's apparent altitude, and the logarithmic tangent of the apparent distance of the moon from the sun or star. The sum of these, rejecting 30 in the index, will be the proportional logarithm of the second angle. 3. Take the differences between the first and second angles, adding it to the apparent distance if it be less than 90, and the first angle be greater than the second; but subtracting it if the second be greater than the first. If the distance be greater than 90, the sum of the angles must be added to the apparent distance, which will give the distance corrected for the refraction of the sun or star. 4. To the proportional logarithm of the correction of the moon's altitude add the logarithmic cosine of her apparent altitude; the logarithmic sine of the distance corrected for the sun or star's refraction, and the logarithmic co-tangent of the sun or star's apparent altitude. The sum, rejecting 30 in the index, will be the proportional logarithm of the third angle. 5. To the proportional logarithm of the correction of the moon's apparent altitude, add the logarithmic co-tangent of her apparent altitude, and the tangent of the distance corrected for the sun or star's refraction; their sum, rejecting 30 in the index, will be the proportional logarithm of the fourth angle. 6. Take the difference between the third and fourth angles, and subtract it from the distance corrected for the sun or star's refraction if less than 90, and the third angle be greater than the fourth; or add it to the distance if the fourth angle be greater than the third: but if the distance be more than 90, the sum of the angles must be subtracted from it, to give the distance corrected for the sun or star's refraction, and the principal effects of the moon's parallax. 7. In Table XX. of the ephemeris, look for the distance corrected for the sun and star's refraction, and the moon's parallax in the top column, and the correction of her altitude in the left-hand side column; take out the number of seconds that stand under the former, and opposite to the latter. Look again in the same table for the corrected distance in the top column, and the correction of the moon's altitude in the left-hand side column; take out the number of seconds that stand under the former, and opposite to the latter. Look again in the same table for the corrected distance in the top column, and the correction of the moon's altitude in the the left-hand side column; take out the number of seconds that stand under the former, and opposite to the latter. Look again in the same table for the corrected distance in the top column, and the principal effects of the moon's parallax in the left-hand side column, and take out the number of seconds. The difference between these two numbers must be added to the corrected distance if less than 90, but subtracted from it if greater; and the sum or difference will be the true distance.
Longitude, the computed distance; then take the proportional logarithms of the first and second differences, and the difference between these two logarithms will be the proportional logarithm of a number of hours, minutes, and seconds; which being added to the time standing over the first distance, will give the true time at Greenwich. Or it may be found by saying, As the first difference is to three hours, so is the second difference to a proportional part of time; which being added as above directed, will give the time at Greenwich. The difference between Greenwich time and that at the ship, turned into longitude, will be that at the time the observations were made; and will eke if the time at the ship is greatest, but would if it is least.

Having given these general directions, we shall next proceed to show some particular examples of finding the longitude at sea by all the different methods in which it is usually tried.

1. To find the Longitude by Computation from the Ship’s Course.—Were it possible to keep an accurate account of the distance the ship has run, and to measure it exactly by the log or any other means, then both latitude and longitude would easily be found by settling the ship’s account to that time. For the course and distance being known, the difference of latitude and departure is readily found by the Traversee Table; and the difference of longitude being known, the true latitude and longitude will also be known. A variety of causes, however, concur to render this computation inaccurate; particularly the ship’s continual deflection from the course set by her playing to the right and left round her centre of gravity; the unequal care of those at the helm, and the distance supposed to be sailed being erroneous, on account of stormy seas, unsteady winds, currents, &c. for which it seems impossible to make any allowance. The place of the ship, however, is judged of by finding the latitude every day, if possible, by observation; and if the latitude found by observation agrees with that by the reckoning, it is presumed that the ship’s place is properly determined; but if they disagree, it is concluded that the account of the longitude stands in need of correction, as the latitude by observation is always to be depended upon.

Currents very often occasion errors in the computation of a ship’s place. The cause of these in the great depths of the ocean are not well known, though many of the motions near the shore can be accounted for. It is supposed that some of these in the great oceans are owing to the tide following the moon, and a certain libration of the waters arising from thence; likewise that the unsettled nature of these currents may be owing to the changes in the moon’s declination. In the torrid zone, however, a considerable current is occasioned by the trade-winds, the motion being constantly to the west, at the rate of eight or ten miles per day. At the extremities of the trade winds or near the 20th degree of north or south latitude, the currents are probably compound of this motion to the westward, and of one towards the equator; whence all ships falling within these limits ought to allow a course each day for the current.

When the error is supposed to have been occasioned by a current, it ought if possible to be tried whether the case is to or not; or we must make a reasonable estimate of its drift and course. Then with the setting and drift, as a course and distance, find the difference of latitude and departure; with which the dead reckoning is to be increased or diminished: and if the latitude thus corrected agrees with that by observation, the departure thus corrected may be safely taken as true, and thus the ship’s place with regard to the longitude determined.

Example. Suppose a ship in 24 hours finds, by her dead reckoning, that she has made 96 miles of difference of latitude north and 38 miles of departure west; but by observation finds her difference of latitude 112, and on trial that there is a current which in 24 hours makes a difference of 16 miles latitude north and 10 miles of departure east: Require the ship’s departure.

<table>
<thead>
<tr>
<th>Diff. lat. by account 96 N</th>
<th>Departure by miles,</th>
<th>Diff. lat. by current 16 N</th>
<th>Departure by current</th>
</tr>
</thead>
<tbody>
<tr>
<td>True diff. lat. 112</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here the dead reckoning corrected by the current gives the difference of latitude 112 miles, which is the same as that found by observations; whence the departure 28 is taken as the true one.

When the error is supposed to arise from the courses and distances, we must observe, that if the difference of latitude is much more than the departure, or the direct course has been within three points of the meridian, the error is most probably in the distance. But if the departure be much greater than the difference of latitude, or the direct course be within three points of the parallel, or more than five points from the meridian, the error is probably to be ascribed to the course. But if the courses in general are near the middle of the quadrant, the error may be either in the course, or in the distance, or both. This method admits of three cases.

1. When, by the dead reckoning, the difference of latitude is more than once and a half the departure; or when the course is less than three points: Find the course to the difference of latitude and departure. With this course and the meridional difference of latitude by observation, find the difference of longitude.

2. When the dead reckoning is more than once and an half the difference of latitude; or when the course is more than five points: Find the course and distance with the difference of latitude by observation, and departure by account; then with the course middle of latitude by observation, and departure by account, find the difference of longitude.

3. When the difference of latitude and departure by account is nearly equal, or the direct course is between three and five points of the meridian: Find the course with the difference of latitude and departure by account since the last observation. With this course and the difference of latitude by observation find another departure. Take half the sum of these departures for the true one. With the true departure and difference of latitude by observation find the true course; then with the true course and meridional difference of latitude find the difference of longitude.

2. To find the Longitude at Sea by a Variation-chart.
Dr. Halley having collected a great number of observations on the variations of the needle in many parts of the world, by that means enabled to draw certain lines on Mercator's chart, showing the variation in all the places over which they fell in the year 1700, at which time he first published the chart; whence the longitude of those places might be found by the chart provided its latitude and variation was given. The rule is, Draw a parallel of latitude on the chart through the latitude found by observation; and the point where it cuts the curved line marked with the variation that was observed will be the ship's place.

Exam. A ship finds by observation the latitude to be 18° 20' north; and the variation of the compass to be 48° west. Required the ship's place. — Lay a ruler over 18° 20' north parallel to the equator; and the point where its edge cuts the curve of 48° west variation gives the ship's place, which will be found in about 27° 10' west from London.

This method of finding the longitude, however, is attended with two inconveniences. 1. That when the variation lines run east or west, or nearly so, it cannot be applied; though as this happens only in certain parts of the world, a variation chart may be of great use for the rest. Even in those places indeed where the variation curves do run east or west, they may be of considerable use in correcting the latitude when meridian observations cannot be had; which frequently happens on the northern coasts of America, the Western Ocean, and about Newfound land; for if the variation can be found exactly, the east and west curve answering to it will show the latitude. But, 2. The variation itself is subject to continual change; whence a chart, though ever so perfect at first, must in time become totally useless; and hence the charts constructed by Dr. Halley, though of great utility at their first publication, became at length almost entirely useless. A new one was published in 1746 by Meffrs. Moutaine and Dollon, which so well received, that in 1756 they again drew variation lines for that year, and published a third chart the year following. They also presented to the Royal Society a curious paper concerning the variation of the magnetic needle, with a set of tables annexed, containing the result of more than 50,000 observations in six periodical reviews from the year 1700 to 1756 inclusive, adapted to every five degrees of latitude and longitude in the more frequented oceans; all of which were published in the Philosophical Transactions for 1757.

3. To Find the Longitude by the Sun's Declination. —Having made such observations on the sun as may enable us to find his declination at the place, take the difference between this computed declination and that shown at London by the ephemeris; from which take also the daily difference of declination at that time; then say, as the daily difference of declination is to the longitude of London, so is 360 degrees to the difference of longitude. In this method, however, a small error in the declination will make a great one in longitude.

4. To Find the Longitude by the Moon's culminating. —Seek in the ephemeris for the time of her coming to the meridian on the given day and on the day following, and take their difference; also take the difference between the times of culminating on the same day as found in the ephemeris, and as observed; then

5. By Eclipses of the Moon. —This is done much in the same manner as by the eclipses of Jupiter's satellites: For if, in two or more distant places where an eclipse of the moon is visible, we carefully observe the times of beginning and ending, the number of digits eclipsed, or the time when the shadow touches some remarkable spot, or when it leaves any particular spot on the moon, the difference of the times when the observations were made will give the difference of longitude. Phenomena of this kind, however, occur too seldom to be of much use.

In 1783, Mr. Pigot informs us, that he thought of finding the difference of meridians by observing the meridian right ascensions of the moon's limbs. This he thought had been quite original: but he found it afterwards in the Nautical Almanack for 1769, and in 1784 read a pamphlet on the subject by the Abbé Delafield; but still found that the great exactness of this method was not suspected; though he is convinced that it must soon be universally adopted in preference to that from the first satellite of Jupiter.

After giving a number of observations on the satellites of Jupiter, he concludes, that the exactness expected from observations, even on the first satellite, is much over-rated. "Among the various objections (says he), there is one I have often experienced, and which proceeds solely from the disposition of the eye, that of seeing more distinctly at one time than another. It may not be improper also to mention, that the observation I should have relied on as the best, that of Aug. 30. 1783, marked excellent, is one of those most different from the truth."
Proceeds from the observation of the moon's limb, which may be considerably increased, if certain little round spots near each limb were also observed in settled observatories; in which case the libration of the moon will perhaps be a consideration. 7. When the difference of meridians, or of the latitudes of places, is very considerable, the change of the moon's diameter becomes an equation.

"Though such are the requisites to use this method with advantage, only one or two of them have been employed in the observations that I have reduced. Two-thirds of these observations had not even the same stars observed at Greenwich and York; and yet none of the results, except a doubtful one, differed 15" from the mean; therefore I think we may expect a still greater exactness, perhaps within 10" if the above particulars be attended to.

"When the same stars are not observed, it is necessary for the observers at both places to compute their right ascension from tables; in order to get the apparent right ascension of the moon's limb. Though this is not so satisfactory as by actual observation, still the difference will be trifling, provided the star's right ascensions are accurately settled. I am also of opinion, that the same method can be put in practice by travellers with little trouble, and a transit instrument, constructed as to fix up with facility in any place.

It is not necessary, perhaps, that the instrument should be perfectly in the meridian for a few seconds of time, provided stars, nearly in the same parallel of declination with the moon, are observed; may, I am inclined to think, that if the instrument deviates even a quarter or half a degree, or more, sufficient exactness can be attained; as a table might be computed, showing the moon's parallax and motion for such deviation; which last may easily be found by the well known method of observing stars whose difference of declination is considerable.

"As travellers very seldom meet with situations to observe stars near the pole, or find a proper object for determining the error of the line of collimation, I shall recommend the following method as original—

Having computed the apparent right ascension of four, six, or more stars, which have nearly the same parallel of declination, observe half of them with the instrument inverted, and the other half when in its right position. If the difference of right ascensions between each set by observation agrees with the computation, there is no error; but if they disagree, half that disagreement is the error of the line of collimation.

The same observations may also serve to determine, whether the distance of the corresponding wires are equal. In case of necessity, each limb of the sun might be observed in the same manner, though probably with less precision. By a single trial I made above two years ago, the result was much more exact than I expected. Mayor's catalogue of stars will prove of great use to those that adopt the above method.—I am rather surprised that the impenetrable thicknesses of known stars of the sixth and seventh magnitudes, behind the dark limb of the moon, are not constantly observed in fixed observatories, as they would frequently be of great use."
Longitude. The annexed rule for finding the ship's place, with the miscellaneous observations on different methods, we have been favoured with Mr. John M'Lean of the Observatory, Edinburgh. The rule was examined and approved of by Sir Joseph Banks president of the Royal Society.

1. With regard to determining the ship's place by the help of the course and distance sailed, the following rule may be applied. It will be found as expeditious as any of the common methods by the middle latitude or meridian parts, and is in some respects preferable, as the common tables of lines and tangents only are requisite in applying it. Let $a$ and $b$ be the distances of two places from the same pole in degrees, or their complete latitudes; $C$ the angle which a meridian makes with the rhumb line passing through the places; and $L$ the angle formed by their meridians, or the difference of longitude in minutes; then $A$ and $B$ being the logarithmic tangents of $a$ and $b$, $S$ the sine of $C$, and the sine of $(C + L')$, we shall have the following equation:

$$S = S - S$$

The property of the rhumb line, we have the following equation:

$$S + E = R + D$$

where $S$ is the logarithmic cofine of $C$, $E$ the logarithm of the length of the rhumb line, or distance, $D$ the logarithm of the minute's difference of latitude, and $R$ the logarithm of the radius.

By the help of these two equations, we shall have an easy solution of the several cases to which the middle latitude, or meridianal parts, are commonly applied.

Example. A ship from a port, in latitude 56° N., sails SW. by W. till she arrives at the latitude of 40° N.: Required the difference of longitude.

Here $a = 34°$, $b = 50°$, $C = 6° 15'$, $A = 9.493544$, $B = 9.569707$, $S' = 9.0192308$, $S = 9.0198464$; therefore, $L = A - B = 973200 = 897$ the minutes difference of longitude. Also, $S = 9.74474$, $D = 2.98227$; therefore $E = R + D = 3.23752$, to which the natural number is 1738, the miles in the rhumb line sailed over.

2. The common method of finding the difference of longitude made good upon several courses and distances, by means of the difference of latitude and departure made good upon the several courses, is not accurately true.

For example: If a ship should sail due south 600 miles, from a port in 60° north latitude, and then due west 600 miles, the difference of longitude found by the common method of solution would be 1053; whereas the true difference of longitude is only 933, less than the former by 120 miles, which is more than 1/4 of the whole. Indeed every considerable alteration in the course will produce a very liable error in the difference of longitude. Though, when the several rhumb lines sailed over are nearly in the same direction, the error in longitude will be but small.

Therefore of this will easily appear from the annexed figure, in which the ship is supposed to sail from $Z$ to $A$, along the rhumb lines $ZB$, $BA$; for if the meridians $PZ$, $P_{10}eBL$ be drawn, and very near the latter other two meridians $PhD$, $Pmn$; and likewise the parallels of latitude $Bn$, $De$, $mo$, $hk$; then it is plain that $De$ is greater than $hk$ (for $De$ is to $hk$ as the line of DP to the sine of $hP$): and since this is the case every where, the departure corresponding to the distance $BZ$ and course $BZC$, will be greater than the departure to the distance $oz$ and course $ozC$. And in the same manner, we prove that $hB$ is greater than $mo$; and consequently, the departure corresponding to the distance $AB$, and course $ABL$, is greater than the departure to the distance $Ao$, and course $AoL$: Wherefore, the sum of the two departures corresponding to the courses $ABL$ and $BZC$, and to the distances $AB$ and $BZ$, is greater than the departure corresponding to the distance $AZ$ and course $AZC$; therefore the course answering to this sum as a departure, and $CZ$ as a difference of latitude, (AD being the parallel of latitudes passing through $A$), will be greater than the true course $AZC$ made good upon the whole. And hence the difference of longitude found by the common rule will be greater than the true difference of longitudes; and the error will be greater or less according as $BA$ deviates more or less from the direction of $BZ$.

2. Of determining the ship's longitude by lunar observations.

Several rules for this purpose have been lately published, the principal object of which seems to have been to abbreviate the computations requisite for determining the true distance of the sun or a star from the moon's centre. This, however, should have certainly been attended to than the investigation of a solution, in which considerable errors in the data may produce a small error in the required distance. When either of the luminaries has a small elevation, its altitude will be affected by the variables of the atmosphere; likewise the altitude, as given by the quadrant, will be affected by the inaccuracy of the instrument, and the uncertainty necessarily attending all observations made.

(1) $A \omega B$ signifies the difference between $A$ and $B$. 
Long. [283] Lon.

Longitude. made at sea. The sum of these errors, when they all tend the same way, may be supposed to amount to at least one minute in altitude; which, in many cases, according to the common rules for computing the true distance, will produce an error of about 30 minutes in the longitude. Thus, in the example given by Mont. Callet, in the Tables Rectoriana, if we suppose an error of one minute in the sun's altitude, or call it 6° 26' 24", instead of 6° 27' 34"; we shall find the alteration in distance according to his rule to be 54", producing an error of about 27 minutes in the longitude.

Perhaps the only method of determining the distance, so as not to be affected by the errors of altitude, is that by first finding the angles at the sun and moon, and by the help of them the corrections of distance for parallax and refraction. The rule is as follows:

Add together the complement of the sun's apparent altitude, the complement of the sun's apparent altitude, and the apparent distance of centres; from half the sum of these subtract the complement of the sun's altitude, and add together the logarithmic cofecant of the complement of the sun's altitude, the logarithmic co-secant of the apparent distances of centres, the logarithmic cofine of the sun's altitude, and the logarithmic co-secant of the remainder; and half the sum of these four logarithms, after rejecting 20 from the index, is the logarithmic cofine of half the angle at the moon.

As radius is to the cofine of the angle at the moon, so is the difference between the moon's parallax and refraction in altitude to a correction of distance; which is to be added to the apparent distance of centres Longitude, when the angle at the moon is obtuse; but to be subtracted when that angle be acute, in order to have the distance once corrected.

In the above formula, if the word sun be changed for moon, and vice versa, wherever these terms occur, we shall find a second correction of distance to be applied to the distance, once corrected by subtraction when the angle at the sun be obtuse, but by addition when that angle is acute, and the remainder or sum is the true distance nearly.

In applying this rule, it will be sufficient to use the complement, altitudes, and apparent distances of centres, true to the nearest minute only, as a smaller error in the angles at the sun and moon will very little affect the corrections of distances.

If D be the computed distance in seconds, d the difference between the moon's parallax and refraction in altitude, S the sine of the angle at the moon, and R the radius; then \(d S\) will be a third correction of Distance, to be added to the distance twice corrected: But it is plain, from the nature of this correction, that it may be always rejected, except when the difference D is very small, and the angle at the moon nearly equal to 90°.

This solution is likewise of use in finding the true distance of a star from the moon, by changing the word sun into star, and using the refraction of the star, instead of the difference between the refraction and parallax in altitude of the sun, in finding the second correction of distance.

Ex. Given the observed distance of a star from the centre of the moon, 50° 8' 41'": the moon's altitude, 55° 58' 5": the star's altitude, 192° 18' 5": and the moon's horizontal parallax, 1° 0' 5": Required the true distance.

Here the first correction of distance is additive, since the angle at the moon is obtuse; and the second correction is also additive, since the angle at the stars is acute: therefore the sum 923°+418°=1361°=:17° 41', being added to 50° 8' 41', the apparent distance of the star from the moon's centre, gives 50° 25' 21" for the true distance of centres nearly; and 2xL (445)—L (2 L R+L 2+L D) =L 8", which, being added to the distance twice corrected, gives 50° 26' 29", for the true distance. By comparing
LONGITUDINAL, in general, denotes something placed lengthwise; thus some of the fibres in the vessels of the human body are placed longitudinally, others transversely or across.

LONGOBARDI. See Langobardi.

LONGOMONTANUS (Christian), a learned astronomer, born in a village of Denmark in 1562. He was the son of a ploughman; and was obliged to suffer during his studies all the hardships to which he could be exposed, dividing his time, like the philosopher Cle- anthes, between the cultivation of the earth and the lessons he received from the minister of the place. At last, when he was 15, he stole away from his family, and went to Wiburg, where there was a college, in which he spent 11 years: and though he was obliged to earn a livelihood, he applied himself to study with such ardour, that among other sciences he learned the mathematics in great perfection. He afterwards went to Copenhagen; where the professors of that university in a short time conceived to high an opinion of him, that they recommended him to the celebrated Tycho Brahe. Longomontanus lived eight years with that famous astronomer, and was of great service to him in red

LONGOMONTANUS, in the month of July.

LONGWY, a town of France, on the frontiers of the duchy of Luxembourg, with a castle, divided into the old and new towns. This last was built and fortified by Louis XIV. It is feated on an eminence, E. Lon. 51. N. Lat. 40. 32.

LONGUS, a Greek sophist, author of a book intitled 

Avranches, speaks very advantageously of this works but he extolles the oblicen touches with which it is

LONGUS. [ 289 ]

LONICERA, honeysuckle, in botany: A genus of the monogynia order, belonging to the pentandra class of plants. The corolla is monopetalous and irregular; the berry polysepmorous, bilocular, and inferior.

Species. 1. The alpigena, or upright red-berried honeysuckle, rises with a thorny, short, thick upright stem branching long and erectly four or five feet high; large, heart-shaped leaves, in pairs opposite; and from the sides of the branches many red-flowers two's on long four-flacks, each succeeded by two red berries joined together at their base; it flowers in August, and the berries ripen in autumn. 2. The carées, or blue-berried upright honeysuckle, rises with a thorny upright stem, branching moderately three or four feet high, with many white flowers proceeding from the sides of the branches; appearing in May, and succeeded by blue berries joined together at their base.

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L O N [ 290. ] L O P

LOOM, at sea. If a ship appears big, when at a distance, they say the looms, or appears a great sail; the term is also used to denote the indistinct appearance of any other distant objects.

LOOM-sail, at sea, a gentle easy gale of wind, in which a ship can carry her top-sails a-trip.

LOOP, in the iron works, is a part of a few or block of cast iron broken or melted off from the rest, and prepared for the forge or hammer. The usual method is, to break off the loop of about three quarters of a hundred weight. This loop they take up with their flinging-tongs; and beat it with iron pledges upon an iron plate near the fire, that so it may not fall to pieces, but be in a condition to be carried under the hammer. It is then placed under the hammer, and a little water being drawn to make the hammer move but softly, it is beat very gently, and by this means the drofs and foulness are forced off, and after this they draw more and more water by degrees, and beat it more and more till they bring it to a four square mafs, of about two feet long, which they call a bloom.

LOOPING, in metallurgy, a word used by the miners of some counties of England, to express the running together of the matter of an ore into a mafs, in the roasting or first burning, intended only to calcine it to be used as powdering. This accident, which gives the miners some trouble, is generally owing to the continuing the fire too long in this process.

LOOSE-stripe. See LYSIMACHIA.

LOOSA, in botany: a genus of the monogynia order, belonging to the polyandria class of plants. The calyx is pentaphyllous, superior; there are five ovate, cucullated, and large petals; the nectarium consists of five leaves, gathered into a conical figure, each terminated by two filaments; the capsule is turbinate, unilocular, and trivalved at top; the seeds are very numerous; and there are three linear and longitudinal hairs.

LOPE, or INDIAN, Root, in the materia medica. The plant to which this article belongs is unknown. Neither the woody nor cortical part of the root has any remarkable sensible quality. A slight bitterness is perceptible; and it is recommended, like samaruba, in diarrhoeas even of the colliquative kind, in half-dram doses four times a day. Little of this root has been brought to Europe: but some of those who have had an opportunity of employing it, speak in very high terms of the effects obtained from it.

LOPHIUS, FISHING-Frog, Tead-fish or Sea-devil; a genus of the branchiostegous order of fishes, whose head is equal in size to all the rest of the body. There are three species; the most remarkable of which is the picaforius or common fishing-frog, an inhabitant of the British seas. This singular fish was known to the ancients by the name of Barus, and rand; and to us by that of the fishing-frog, for it is of a figure resembling that animal in a tadpole state. Pliny takes notice of the artifice used by it to take its prey: Eminencia fab occultis cornulis tauto lino extenuatae, affilatina, pliosus attrahens, donum tam prope ascendit, ut affila.

It puts forth the hinder horns it has beneath its eyes, enticing by that means the little fish to play round, till they come within reach, when it springs on...
LOR [ 291 ]

Loplium Lorii.

II

ments, and on the back three others, these are what out for that end.

circumference, and teeth: in these are two large orifices that serve

body are a multitude of spermous. There are two large orifices that serve

spermous. There are two large orifices that serve

colour of the upper part of this

11aves who disobeyed their

bers oHmall fcarlet-coloured flowers, succeeded by oval

os; as, on the other hand, the lords spiritual are in the eye of the law a

pation for the practice which was first given. See LADY.

house of Lords, one of the three estates of the parliament of Britain, and composed of the Lords Spiritual and Temporal.

1. The Spiritual Lords consist of 2 archbishops and 24 bishops; and, at the dissolution of monasteries by Henry VIII., consisted likewise of 26 mitred abbots and two priors; a very considerable body, and in those times equal in number to the temporal nobility. All these hold, or are supposed to hold, certain ancient baronies under the king: for William the Conqueror thought proper to change the spiritual tenure of frank-

the feudal or Norman tenure by barony; which subjected their estates to all civil charges and afligments, from which they were before exempt, and in right of succession to those baronies, which were unalienable from their respective dignities, the bishops and abbots were allowed their seats in the house of lords. But though these lords spiritual are in the eye of the law a distinct estate from the lords temporal, and are so distinguished in most of the acts of the British parliament; yet in practice they are usually blended together under the name of the lords; they intermix in their votes, and the majority of such intermixture joins both estates. And from this want of a separate assembly, and separate negative of the prelates, some writers have argued very cogently, that the lords spiritual and temporal are now in reality only one estate; which is unquestionably true in every effectual sense, though the ancient distinction between them still nominally continues. For if a bill should pass their house, there is no doubt of its validity, though every lord spiritual should vote against it; of which Selden and Sir Edward Coke give many instances: as, on the other hand, doubts it would be equally good, if the lords temporal present were inferior to the bishops in number, and every one of those temporal lords gave his vote to reject the bill; though this Sir Edward Coke seems to doubt of.

2. The Temporal Lords consist of all the peers of the realm, (the bishops not being in their places held to be such, but merely lords of parliament,) by whatever title of nobility distinguished; dukes, marquises, earls, viscounts, or barons.

Some of these sit by descent; they as do all ancient peers; some by creation, as do all new-made ones; others, since the union with Scotland, by election, which is the case of the 16 peers, who represent the body of the Scots nobility. Their number is indefinite, and may be increased at will by the power of the crown; and once, in the reign of Queen Anne, there was an instance of creating no less than 12 together; in contemplation of which, in the reign of King George I., a bill passed the house of lords, and...
was countenanced by the then ministry, for limiting the number of the peerage. This was thought by forebears to promise a great acquisition to the crown, by retaining the prerogative from gaining the ascendancy in that august assembly, by pouring in at pleasure an unlimited number of new-created lords. But the bill was ill relished, and misconstrued in the house of commons, whose leading members were then defirous to keep the avenues to the other house as open and easy as possible.

"The distinction of ranks and honours is necessary in every well-governed state: in order to reward such as are eminent for their services to the public, in a manner the most desirable to individuals, and yet without burthen to the community; exciting thereby an ambitious yet laudable ardour and generous emulation in others. And emulation, or virtuous ambition, is a spring of action which, however dangerous or invidious in a mere republic or under a despotic sway, will certainly be attended with good effects under a free monarchy; where, without destroying its existence, its excesses may be continually restrained by that superior power from which all honour is derived. Such a spirit, when nationally diffused, gives life and vigour to the community; it sets all the wheels of government in motion, which, under a wise regulator, may be directed to any beneficial purpose; and thereby every individual may be made fulfilling to the public good, while he principally seeks to promote his own particular views. A body of nobility is also more particularly necessary in a mixed and compounded constitution, in order to support the rights of both the crown and the people, by forming a barrier to withstand the encroachments of both. It creates and preserves that gradual scale of dignity which proceeds from the peafant to the prince; rising like a pyramid from a broad foundation, and diminishing to a point as it rises. It is this ascending and contracting proportion that adds stability to any government; for when the departure is sudden from one extreme to another, we may pronounce that state to be precarious. The nobility therefore are the pillars, which are reared from among the people, more immediately to support the throne; and, if that fails, they must also be buried under its ruins. Accordingly, when in the last century the commons had determined to extirpate monarchy, they also voted the house of lords to be useless and dangerous. And since titles of nobility are thus expedient in the state, it is also expedient that their owners should form an independent and separate branch of the legislature. If they were confounded with the mass of the people, and like them had only a vote in electing representatives, their privileges would soon be borne down and overwhelmed by the popular torrent, which would effectually level all distinctions. It is therefore highly necessary that the body of nobles should have a distinct assembly, distinct deliberations, and distinct powers from the commons." See also King, Nobility, Parliament, Commons, and Commonalty.

As to the peculiar laws and customs relating to the house of lords: One very ancient privilege is that declared by the charter of the forest, confirmed in parliament 9 Hen. III.: viz. that every lord spiritual or temporal summoned to parliament, and pulling through the king's forests, may, both in going and returning, kill one or two of the king's deer without warrant; in view of the forest if he be present, or on blowing a horn if he be absent; that he may not seem to take the king's venison by stealth.

In the next place, they have a right to be attended, and constantly are, by the judges of the court of king's-bench and common-pleas, and such of the barons of the exchequer as are of the degree of the cot, or have been made serjeants at law; as likewise by the king's learned counsel, being serjeants, and by the masters of the court of chancery; for their advice in point of law, and for the greater dignity of their proceedings. The secretaries of state, with the attorney and solicitor general, were also used to attend the house of peers, and have to this day (together with the judges, &c.) their regular writs of summons intituled at the beginning of every parliament, ad tradandum et consiliium impendendum, though not ad confertendum: but, whenever of late years they have been members of the house of commons, their attendance here hath fallen into disuse.

Another privilege is, that every peer, by licence obtained from the king, may make another lord of parliament his proxy, to vote for him in his absence: A privilege, which a member of the other house can by no means have, as he himself but a proxy for a multitude of other people.

Each peer has also a right, by leave of the house, when a vote paves contrary to his sentiments, to enter his dissent on the journals of the house, with the reasons for such dissent; which is usually styled his protest.

All bills likewise, that may in their consequences any way affect the rights of the peerage, are by the custom of parliament, to have their first rise and beginnings in the house of peers and to suffer no changes or amendments in the house of commons.

There is also one statute peculiarly relative to the house of lords, 6 Ann. c. 23. which regulates the election of the 16 representatives peers of North Britain, in consequence of the 22d and 23d articles of the union; and for that purpose prescribes the oaths, &c. to be taken by the electors; directs the mode of balloting; prohibits the peers electing from being attended in an usual manner; and expressly provides that no other matter shall be treated of in that assembly save only the election, on pain of incurring a prænunia. See also the Articles Nobility and Peers.

LORDOSIS, (of ἄμφος, bent inward), in the medical writings, a name given to a diseased state of the spine, in which it is bent inward, or towards the anterior parts. It is used in opposition to gibbus or hump-backed. See Surgery.

LORETTO, a town of Italy, in the Marche or Marche of Ancona, with a bishop's see. It is small, but fortified; and contains the famous festa santo, or holy chapel, so much visited by pilgrims. This chapel, according to the legend, was originally a small house in Nazareth, inhabited by the virgin Mary, in which she was saluted by the angel, and where she bore our Saviour. After their deaths, it was held in great veneration by all believers in Jesus, and at length consecrated into a chapel, and dedicated to the virgin; upon which occasion St Luke made that identical image
The sacred chapel stands due east and west, at the farther end of a large church of the most durable stone of Iferia, which has been built around it. This may be considered as the external covering or as a kind of great cost to the casa santa, which has a smaller coat of more precious materials and workmanship nearer its body. This internal covering or casa is of the choicest marble, after a plan of San Savino’s, and ornamented with baso relieves, the workmanship of the best sculptors which Italy could furnish in the reign of Leo X. The subject of these baso relieves are, the history of the blest virgin, and other parts of the Bible. The whole casa is about 50 feet long, 30 in breadth, and the main in height; but the real house itself is no more than 32 feet in length, 14 in breadth, and at the sides about 18 feet in height; the centre of the roof is four or five feet higher. The walls of this little holy chapel are composed of pieces of a reddish substance, of an oblong square shape, laid one upon another, in the manner of brick. At first sight, on a superficial view, these red-coloured oblong substances appear to be nothing else than common Italian bricks; and which is still more extraordinary, on the second and third view, with all possible attention, they still have the same appearance. Travellers, however, are assured, with great earnestness, that there is not a single particle of brick in their whole composition, being entirely of a stone, which, though it cannot now be found in Palestine, was formerly very common, particularly in the neighbourhood of Nazareth.

The holy house is divided within into two unequal portions, by a kind of grate-work of silver. The division towards the well is about three-fourths of the whole; that to the east is called the Sacrauriy. In the larger division, which may be considered as the main body of the house, the walls are left bare, to show the true original fabric of Nazareth stone; for they must not be supposed to be bricks. At the lower or western wall there is a window, the frame through which the angel Gabriel entered at the Annunciation. The architraves of this window are covered with silver. There are a great number of golden and silver lamps in this chapel; one of the former, a present from the republic of Venice, is said to weigh 37 pounds, and some of the silver lamps weigh from 120 to 130 pounds. At the upper end of the largest room is an altar, but so low, that from it you may see the famous image which stands over the chimney in the small room or sanctuary. Golden and silver angels, of considerable size, kneel around her, borne in shining hearts of gold, enriched with diamonds, and one an infant of pure gold. The wall of the sanctuary is plated with silver; and adorned with crucifixes, precious stones, and votive gifts of various kinds. The figure of the Virgin herself by no means corresponds with the fine furniture of her house: She is a little woman, about four feet in height, with the features and complexion of a negro. Of all the sculptors that ever existed, assuredly St Luke, by whom this figure is said to have been made, is the least of a flatterer; and nothing can be a stronger proof of the blest Virgin’s contempt for external beauty, than her being satisfied with her reprentation of herself. The figure of the infant Jesus, by St Luke, is of a piece with that of the Virgin: he holds a large golden globe in one hand, and the other is extended in the act of blessing. Both figures have crowns on their heads, enriched with diamonds: these were presents from Ann of Austria queen of France. Both arms of the Virgin are incorporeal with her robes. and no part but her face is to be seen; her dress is so magnificent, but in a wretched ruff; this is not surprising, for the two female attendants. She has particular cloaks for the different feasts held in honour of her, and, which is not quite so decent, is always dressed and undressed by the priests belonging to the chapel: her robes are ornamented with all kinds of precious stones down to the hem of her garment.

There is a small place behind the sanctuary, in which are shown the chimney, and some other furniture which they pretend belonged to the Virgin when she lived at Nazareth; particularly a little earthen potter’s wheel, out of which the infant used to eat. The pilgrims bring rotaries, little crucifixes, and Agnus Dei’s, which the obliging priest makes for half a minute in this dish; after which it is believed they acquire the virtue of curing various diseases, and prove an excellent preventative of all temptations of Satan. The gown which the image had on when the chapel arrived from Nazareth is of red camble, and carefully kept in a glass shrine.

Above 100 masas are daily paid in this chapel, and in the church in which it stands. The jewels and riches

Loretto
Loretto; riches to be seen at any one time in the holy chapel are in small value in comparison of those of the treasury, which is a large room adjoining to the vestibule of the great church. In the predator of this room are kept those presents which royal, noble, and rich bishops of all ranks, have, by oppressing them subjects and injuring their families, sent to this place. To enumerate every particular would fill volumes. They consist of various utensils and other things in silver and gold; as lamps, candlesticks, goblets, crowns, and crucifixes; lambs, eagles, fames, apostles, angels, virgins, and infants: then there are cameos, pearls, gems, and precious stones, of all kinds and in great numbers. What is valued above all the other jewels is, the miraculous pearl wherein they assert that Nature has given a faithful delineation of the virgin sitting on a cloud with the infant Jesus in her arms.

There was not room in the predator of the treasury to hold all the silver pieces which have been presented to the Virgin. Several other predicators in the vestry are completely full. It is said that those pieces are occasionally melted down by his holiness for the use of the state, and also that the most precious of the jewels are picked out and sold for the same purpose, false stones being substituted in their room.

Pilgrimages to Loretto are not so frequent with foreigners, or with Italians of fortune and distiction, as formerly; nineteen out of twenty of those who make this journey now are poor people, who depend for their maintenance on the charity they receive on the road. To those who are of such a rank in life as make this journey by themselves or on mules; others of considerable merit which ornament the altars are apt to make on any occasion, and fathers and husbands, in moderate or confined circumstances, are frequently brought to disagreeable dilemmas, by the ruinous of going to Loretto, which their wives or daughters are apt to make on any supposed deliverance from danger. To refuse, is considered by the whole neighbourhood as cruel, and even impious; and to grant, is often highly disquieting, particularly to such husbands as from affection or any other motive, do not choose that their wives should be long out of their sight. But the poor, who are maintained during their whole journey, and have nothing more than a bare maintenance to expect from their labour at home, to them a journey to Loretto is a party of pleasure as well as devotion, and by much the most agreeable road they can take to heaven. The greatest concourse of pilgrims is at the feasons of Easter and Whitintide. Thither travel in their carriages; a greater number come on horseback or on mules; or, what is still more common, on asses. Great numbers of females come in this manner, with a male friend walking by them as their guide and protector; but the greatest number of both sexes are on foot. The pilgrims on foot, as soon as they enter the suburbs, begin a hymn in honour of the Virgin which they continue till they reach the church. The poorer sort are received into an hospital, where they have bed and board for three days.

The only trade of Loretto consists of rosaries, crucifixes, images, Agnus Dei's, and medals, which are manufactured here, and sold by the pilgrims. There are great numbers of shops full of these commodities, some of them of a high price; but infinitely the greater part are adapted to the purities of the buyers, and sold for a mere trifle. The evident poverty of those manufacturers and traders, and of the inhabitants of this town in general, is a sufficient proof that the reputation of our Lady of Loretto is greatly on the decline.

In the great church which contains the holy chapel are confessionals, where the penitents from every country of Europe may be confided in their own language, priests being always in waiting for that purpose: each of them has a long white rod in his hand, with which he touches the heads of those to whom he thinks it proper to give absolution. They place themselves on their knees in groups around the confessional chair; and when the holy father has touched their heads with the expiatory rod, they retire, freed from the burden of their sins, and with renewed courage to begin a fresh account.

In the spacious area before this church there is an elegant marble fountain, supplied with water from an adjoining hill by an aqueduct. Few even of the most inconsiderable towns of Italy are without the useful ornament of a public fountain. The embellishments of sculpture and architecture are employed with great propriety on such works, which are continually in the people's view; the air is refreshed and the eye delighted by the streams of water they pour forth; a sight peculiarly agreeable in a warm climate. In this area there is also a statue of Sextus V. in bronze. Over the portal of the church itself is a statue of the Virgin; and above the middle gate is a Latin inscription, importing, that within is the house of the mother of God, in which the Word was made flesh. The gates of the church are likewise of bronze, embellished with bas-reliefs of admirable workmanship; the subjects taken partly from the Old and partly from the New Testament, and divided into different compartments. As the gates of this church are shut at noon, the pilgrims who arrive after that time can get no nearer the Santa Casa than these gates, which are by this means sometimes exposed to the first violence of that holy ardour which was designed for the chapel itself. All the sculpture upon the gates which is within reach of the mouths of those zealots, is in some degree effaced by their kisses.

There are also several paintings to be seen here, some of which are highly esteemed, particularly two in the treasury. The subject of one of these is the Virgin's Nativity, by Annibal Carracci; and of the other, a Holy Family, by Raphael. There are some others of considerable merit which ornament the altars of the great church. These altars, or little chapels, of which this fabric contains a great number, are lined with marble and embellished by sculpture; but nothing within this church interests a traveller of sensibility so much as the iron grates before those chapels which were made of the fetters and chains of the Christian slaves, who were freed from bondage by the glorious victory of Lepanto.

The place where the governor resides stands near the church, and the ecclesiastics who were employed in it lodge in the same palace, where they receive the pilgrims of high distinction. The environs of this town are very agreeable, and in fine weather the high mountains
LORICA, was a cuirass, brigantine, or coat of mail, in use among the Roman soldiers. It was generally made of leather, and is supposed to be derived from *lorum*—The loricae were fet with plates of metal in various forms; sometimes in hooks or rings like a chain, sometimes like feathers, and sometimes like the scales of serpents or fishes, to which plates of gold were often added. There were other lighter cuirasses consisting only of many folds of linen cloth; or of flax made strong enough to withstand weapons. Such soldiers as were rated under 1000 drachms, instead of the lorica now described, wore a *pelio* (lorica).—The Roman lorica was made like a shirt, and defended the wearer both before and behind, but was so contrived that the back part could be occasionally separated from the front. Some of the loricae were made of cords of hemp or flax, close fet together; whence they are called *tortices*, *billices*, *trilices*, &c. from the number of the cords fixed one upon another; but these were used rather in hunting than in the field of battle.

LORICATION, in chemistry, is the covering a glass or earthen vessel with a coat or crust of a matter able to withstand the fire, to prevent its breaking in the performing an operation that requires great violence of fire. See CHEMISTRY.

LORIS, in zoology. See LEMUR.

LORIMERS, one of the companies of London, that make bits for bridles, spurs, and such like small iron ware. They are mentioned in statute 1 Rich. II. c. 12.—The word is derived from the Latin word *lorum*, a thong.

LORNE, a division of Argyllshire in Scotland, which gives the title of marquis to the duke of Argyll. It extends above 30 miles in length from north to south, and about nine at its utmost breadth; bounded on the east by Bracklauch; on the west, by the islands; on the north, by Lochaber; and is divided from Knapdale on the south by Loch Etive, on the banks of which stands the castle of Bergomarn, wherein the courts of justice were anciently held. This district, abounding with lakes, is the most pleasant and fertile part of Argyllshire, producing plenty of oats and barley. It once belonged to the ancient family of Macdougal, till residing on the spot; but devolved to the lords of Argyll in consequence of a marriage with the heiresses, at that time a branch of the Stuart family. The chief place of note in this district is the castle of Dunstaffnage, a seat of the Scottish kings previous to the conquest of the Picts in 843 by Kenneth II. In this place was long preferred the famous *fion*, the palladium of North Britain; brought, says legend, out of Spain, where it was first used as a seat of justice by Cathlucus, coeval with Moses. It continued here as the coronation-chair till the reign of Kenneth II, who removed it to Scone, in order to secure his reign; for, according to the inscription,

\[ \text{Ni fallat fatum. Scoti quosque locatum} \\
\text{Inuentum tepident, regnare tibi intus idheem.} \]

Some of the ancient regalia were preserved till the present century, when the keeper's servants, during his infirm years, embezzled them for the silver ornaments; and left only a battle-axe, nine feet long, of beautiful workmanship, and ornamented with silver.

The castle is square; the inside only 87 feet; partly ruinous, partly habitable. At three of the corners are round towers; one of them projects very little. The entrance is towards the sea at present by a stair-case, in old times probably by a draw-bridge, which fell from a little gate-way. The masonry appears very ancient; the tops battlemented. This pile is seated on a rock near the mouth of Loch Ewe, whose waters expand within to a beautiful bay, where ships may safely ride in all weather. Of this building, the founder of which is unknown, nothing remains except the outer walls, which, though roofless, are still in good order; and within which some buildings have been erected, which serve as the residence of the laird. The duke of Argyll is hereditary keeper under the Crown.—At a small distance from the castle is a ruined chapel, once an elegant building; and at one end an inclosure, a family-cemetery. Opposite to these is a high precipice, ending abrupt and turning suddenly towards the south-east. A person concealed in the recess of the rock, a little beyond the angle, surprizes friends stationed at some distance beneath the precipice with a very remarkable echo of any word, or even a sentence, he pronounces; which reaches the last distinct and unbroken. The repetition is single, but remarkably clear.

In 1307, this castle was possessed by Alexander Macdougal lord of Argyll, a friend to the English; but was that year reduced by Robert Bruce, when Macdougal sued for peace with that prince, and was received into favour.

We find, about the year 1455, this to have been a residence of the lords of the illes; for here James I of Douglas, after his defeat in Annandale, fled to Donald, the regent of the time, and prevailed on him to take arms and carry on a plundering war against his monarch James II.

The situation of this regal seat was calculated for pleasure as well as strength. The views of mountains, valleys, waters, and islands, are delightful. On the north side of Loch Etive flows the town of Beregromaticum, supposed to have been the capital of the West Highlands. It forms, from certain mounds, excavations, and other appearances, to be a strong fortres, to prevent invasion, or to secure a retreat, as occasions might require. On the bank of the same loch is the site of Ardochattan, a priory, or monks of Valliaecum in Burgundy, founded in 1320 by Donald MacCool, ancestor of the Macdougals of Lorn. Here Robert Bruce, who remained master of this country before he got entire possession of Scotland, held a parliament or council.—The country abounds in Druidical, Danilith, and other monuments.

LORRAINE, a foreign state of Europe, bounded on the north by Luxemburg and the archbishopric of Troyes, on the east by Allace and the duchy of Deux Ponts,
PONTS, on the south by Franche comté, and on the west by Champagne and the duchy of Bar. It is about 100 miles in length, and 75 in breadth; and abounds in all sorts of corn, wine, hemp, flax, rape-seed, game, and fish, with which it carries on trade, and in general all the necessaries of life. There are fine meadows and large forests, with mines of iron, flint, and copper, as also salt-pits. There are a great number of rivers; of which the principal are the Meuse or Meuto, the Moselle, the Seille, the Meure, and the Sarre. It is divided into three parts; the duchy of Lorraine, properly so called, which was herefore a sovereign state; the duchy of Barr, which formerly belonged to the dukes of Lorraine, but afterwards came under the government of France; and the third comprehends the three bishoprics of Metz, Toul, and Verdun, which have belonged to France ever since the year 1355. In 1733, the emperor of Germany being at war with France, this last got possession of the duchy of Lorraine; and when there was a peace made in 1735, it was agreed, that Stanislaus king of Poland, father-in-law to the king of France, should possess these dominions, and that after his death they should be united for ever to the crown of France. It was also then agreed, that Francis Stephen, duke of Lorraine, and the emperor's son-in-law, should have the grand duchy of Tuscany an equivalent for Lorraine. After the death of the great duke of Tuscany, in 1737, King Stanislaus and the duke of Lorraine took possession of their respective dominions, and the cession was confirmed and guaranteed by a treaty in 1738. The inhabitants are laborious and valiant, and their religion is the Roman Catholic. They have but little trade with strangers, because they have no navigable rivers, and because they have all necessaries within themselves; but little trade they have consist of corn and linen cloth. Nancy is the capital town.

LORRAIN (Robert), an eminent sculptor, born at Paris in 1666. From his infancy, he made so rapid a progress in the art of designing, that at the age of 18 the celebrated Girardon intrusted him with the care of teaching his children and correcting his disciples. He committed to him also, in composition, the tomb of Noullemon, the execution of the famous tomb of Cardinal Richelieu in the Sorbonne, and his own tomb at St. Landres in Paris. On his return from Rome, he finished several pieces at Marcielles, which had been left imperfect by the death of Mr. Puget. He was received into the academy of Sculpture in 1701. His chief d'œuvre is Galatea, a work universally admired. Lorrain afterwards made a Bacchus for the gardens at Versailles, a Faun for those of Marly; and several bronzes, among which is an Andromeda; all in an excellent taste. This artist succeeded chiefly in heads; and more particularly in that of young girls, which he performed with incomparable delicacy and truth.

LOTHIAN (Robert), See Claude.

LOTEN (John), a good landscape painter of the English school; though a native of Switzerland. His taste led him to solemn and dreary scenes, as landscapes accompanied with flowers of rain, &c. and he seldom omitted to introduce oak-trees in his prospects: his landscapes are generally large; and he painted with nature, truth, and force. But the effect of his composition had been much greater if he had been less cold in his colouring: for the judicious eye is not pleased with the darkish tint that predominates in it. He died in London about 1681.

LOT, a name given to three counties of Scotland, viz. Haddington-shire, Edinburgh-shire, and Linlithgow-shire; otherwise called East, Mid, and West Lothians.

1. East Lothian, or Haddington-shire, is bounded on the north-west by the Frith of Forth; and on the east by the German Sea; on the south-east by Berwickshire; and on the west by the county of Edinburgh. It extends about 25 miles from east to west, and where broadest, nearly 15 from north to south. The coast, advancing northward into the Frith, forms an irregular curve.—This is one of the most fruitful counties in Scotland, producing great quantities, of wheat and all sorts of grain, well-watered, and plentifully supplied with fish, fuel, and all the necessaries of life. It abounds with towns, villages, and farms, intersected with a great number of agreeable houses belonging to persons of rank and fortune. For cultivation, populousness, and fertility, this shire may vie with any tract of land in the island of Great Britain. Over and above the farming, which turns out to great account, the people towards the sea-coast employ themselves in the filhery, salt-making, and in foreign trade; and some of the more inland inhabitants engage in the linen and woollen manufactures. Lime-fl ())1 and coal are found in most parts of the country, and great numbers of sheep are fed on the hills of Lammermuir.

2. Edinburgh-shire, or Mid-Lothian, is about 35 miles long, but varies in its breadth in different places from five to 16 miles. It is bounded on the east by Haddington-shire; on the west by the shire of Linlithgow; on the south, by Tweeddale or Peebles-shire; and on the north, by part of West-Lothian and the Frith of Forth. The aspect of the county is in general level andpleasant, intersected with a few hills, that help to exhibit agreeable prospects. It is well watered with rivers, and laden with woods. It produces plenty of coal, lime-stone, a soft black marble, and some copper-ore. The soil, of itself fertile, is finely cultivated, and yields as plentiful harvests of excellent wheat as are found in any part of Great Britain. The whole shire is intersected with noble houses and plantations, belonging to noblemen and gentlemen of fortune. The farmers are masters of the sciences of agriculture; and wealthy in consequence of their skill, some of them paying 500 l. of yearly rent. The country is well inhabited, and prefers us with a good number of towns and populous villages. Along the sea-coast the common people subsist by fishing, and traffic in coals and salt, and some few carry on a smuggling commerce. Those in the inland are employed in farming, and some branches of the weaving manufacture. The fertility of this shire is in the gift of the crown; and Edinburgh is a county in itself.

3. The shire of Linlithgow, or West Lothian, is bounded on the north by the Frith of Forth. The small river Almond divides it from Edinburghshire on the east. On the south-west it joins the county of Lanark; and on the west it is parted from Stirlingshire by Avon, a small river. Its form, though irregular,
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L O T

regular, approaches to a parallelogram. It measures from north-east to south-west, nearly 20 miles. Its breadth, except on the shore of the Frith, does not exceed 12. — The country is pleasant and fertile, abounding with corn and pasturage. Here is found plenty of coal, limestone and lead ore; nay, in the reign of James VI. it produced a rich mine of silver.

LOTION, is, strictly speaking, such washing as concerns beautifying the skin, by cleansing it of those deformities which a disfigured blood throws upon it. Medicines of this kind, however, are for the most part insigificant, and sometimes very dangerous; the only proper method of treating these disorders is, by administering such medicines as tend to correct the morbid state of the constitution from whence they arise.

Lotion, in pharmacy, denotes a preparation of medicines, by washing them in some liquid, either made very light, so as to take away only the dregs; or harsh, so as to penetrate them, in order to clear them of some fat, or corrotive spirit as is done to antimony, precipitates, magisterics, &c. or intended to take away some foulness or ill quality, or to communicate some good one.

LOTAPHAGI (anc. geog.), a people of the Regio Syrica (loc'd from their living on the lotus); inhabiting between the two Syretes, from the Cinnyphus to Triton. The lotus was said to be a food gain'd by the prince of Trinacria, and a dish served by* Antoninus. 

LOTTERY, a kind of public game at hazard, frequent in Britain, France, and Holland, in order to raise money for the service of the state; being appointed in Britain by the authority of parliament, and managed by commissioners appointed by the lords of the treasury for that purpose. It consists of several numbers of blanks and prizes, which are drawn out of wheels, one of which contains the numbers, and the other the corresponding blanks or prizes.

The Romans invented lotteries to enrich their Saturnalia. This festival began by the distribution of tickets which gained some prize. Augustus made lotteries which consisted of things of little value; but Nero established some for the people, in which 1000 tickets were distributed daily, and several of those who were favoured by Fortune got rich by them. Heliodorus invented some very singular: the prizes were either of great value or of none at all; one gained a prize of six flaves, and another of six flies; some got valuable vases, and others vases of common earth. A lottery of this kind exhibited an excellent picture of the inequality with which Fortune distributes her favours.

The first English lottery we find mentioned in history was drawn A. D. 1569. It consisted of 40,000 lots, at 10s. each lot: the prizes were plate; and the profits were to go towards repairing the havens of the kingdom. It was drawn at the west door of St Paul's cathedral. The drawing began on the 11th of January 1562, and continued incessantly drawing, day and night, till the 6th of May following; as Maitland from Stowe, informs us in his History, Vol. I. p. 237. There were then only three lottery-offices in London. The proposals for this lottery were published in the years 1567 and 1568. It was at first intended to have been drawn at the house of Mr Derick, her majesty's servant (i.e. her jeweler), but was afterwards drawn as abovementioned.

Dr Rawlinson showed the Antiquary Society, 1748, "A Proposal for a very rich lottery, general without any blanks, containing a great number of good prizes as well as of redy money as of plate and certain forts of merchandizes, having been valued and priced by the commandment of the queen's most excellent majesties order, to the extent that such commodities as may chance to arise thereof after the charges borne may be converted towards the reparations of the havens and the strength of the realme, and towards such other public good works. The number of lots shall be four hundred thousand, and no more; and every lot shall be the sum of tenne shillings sterling, and no more. To be filled by the feast of St Bartholomew. The four of prizes are to be seen in Cheapside at the sign of the Queen's Armes, the house of Mr Derick, goldsmith, servant to the queen. Some other orders about it in 1567-8. Printed by Hen. Byromsman." In the year 1612, king James, in special favour for the present plantation of English colonies in Virginia, granted a lottery, to be held at the west end of St Paul's; whereof one Thomas Sharpless, a taylor of London, had the chief prize, which was 4000 crowns in fair place." Baker's Chronicle.

In the reign of queen Anne, it was thought necessary to suppress lotteries, as nuisances to the public. Since that time, however, they have been licenced by an act of parliament, under various regulations. The act passed in 1776 restrains any person from keeping an office for the sale of tickets, shares, or chances, or for buying, selling, infuring, or registering, without a licence; for which licence each office-keeper must pay 51. to continue in force for one year, and the produce to be applied towards defraying the expenses of the lottery. And no person is allowed to sell any share or chance less than a sixteenth, on the penalty of 51. All tickets divided into shares or chances are to be deposited in an office, to be established in London by the commissioners of the treasury, who are to appoint a person to conduct the business thereof; and all shares are to be stamped with the name of the office, who is to give a receipt for every ticket deposited with him. The number of all tickets so deposited are to be entered in a book, with the names of the owners, and the number of shares into which they are divided; and two pence for each share is to be paid to the officer on depositing such tickets, who is therewith to pay all expences incident to the office. All tickets deposited in the office are to remain there three days after the drawing. And any person keeping an office, or selling shares, or who shall publish any scheme for receiving monies in consideration of any interest, to be granted in any ticket in the said lottery, &c., without being in possessi on of such ticket, shall forfeit 500l. and suffer three months imprisonment. And no business is to be transacted at any of the offices after eight in the evening, except on the evening of the Saturday preceding the drawing. No person is to keep any office for the sale of tickets, &c. in Oxford or Cambridge, on penalty of 20l. Before this regulating statute took place, there were upwards of 400 lottery offices in and about London only; but the whole number afterwards, for all Britain, as appeared by the list published by authority, amounted to no more than 51.
LOTUS, or bird's-foot trefoil, in botany: A

lotus

LOTUS, or bird's-foot trefoil, in botany: A
genus of the decandria order, belonging to the diadel-
phia class of plants; and in the natural method rank-
ing under the 32d order, Papilionaceae. The legumen
is cylindrical, and very erect; the ale closing upwards
longitudinally; the calyx is tubulated. There are
many species, but only five or six are usually cul-
tivated in our gardens. 1. The trigonolobus, or wing-
ed pea, hath trailing, slender, branchy stalks, about
a foot long, garnished with trifoliate oval leaves; and,
from the axils of the branches, large, papilionaceous
red flowers, one on each footstalk; succeeded by tri-
gonous solitary pods, having a membranous wing or
lobe, running longitudinally at each corner. It flowers
in June and July, and the seeds ripen in autumn.

2. The cretica, or Creten silvery lotus, hath a flender
under shrubby stalk, rising by support three or four
feet high, ornamented with trifoliate bright, silvery
leaves; and branches terminated by several yellow
flowers succeeded by subternate pods. 3. The Jaco-
baeus, or lotus of St James's island, hath upright her-
bacous stalks branching two or three feet high, and,
from the upper part of the branches, long slender
footstalks, terminated each by three to five yellowish
purple flowers, appearing most part of the summer and
autumn, and succeeded by subternate pods filled with
plenty of seeds. 4. The hirsutus, or hairy Italian lo-
tus, hath upright hairy stalks branching a yard high;
and terminated by heads of whitish hoary-cupped flowers
appearing in June, which are succeeded by oval pods
full of seed, which ripen in autumn. 5. The dory-
cnium, white Austrian lotus, or shrub-trefoil of Mont-
pelier, has under shrubby smooth stalks, branching three
or four feet high, and the branches terminated by
aphylous heads of small white flowers appearing in
June, succeeded by short pods. 6. The edulis, sends
forth several trailing stalks about a foot long, furnished
at their joints with trifoliate, roundish, smooth leaves,
having oval stipules. The flowers come singly from
the sides of the stalks, on long peduncles, with three
oval floral leaves, the length of the flower: the latter
is small, yellow; and is succeeded by a thick arched
pod, having a deep furrow on its outside.

Culture, &c. The first species is a hardy annual,
and is easily raised from seed joiny any time from the
mouth of February to May; the plants requiring no
other culture than to be kept free from weeds. It was
formerly cultivated as an excellent: for its young green
seed-pods may be dried and eat like peas, or in the
manner of kidney-beans. The other species may be
propagated either by seeds or cuttings, but require to
be kept in pots in the green-house during the winter-
seas. — The sixth species is an annual, and a native
of several parts of Italy, where the inhabitants eat the
young pods as we do kidney beans. The green pods of
the first species were formerly gathered in Scotland
and dried in the manner of kidney beans, and are used
so still in some of the northern counties of England;
but they are coarse, and not very agreeable to such as
have been accustomed to feed upon better fare.

LOTUS of Homer. See Diospyros.

Egyptian Lotus. See Nymphaea.

Libyan Lotus. See Rhamnus.

LOVAGE, in botany. See Ligusticum.

LOVE, in a large sense of the word denotes all
those affections of the pleasing kind which objects and
incidents raise in us; thus we are said to love not on-
ly intelligent agents of morally good dispositions, but
also sensual pleasures, riches, and honours.

Love, in its usual and more appropriate signification,
may be defined, "that affection which, being com-
ounded of animal desire, esteem, and benevolence,
becomes the bond of attachment and union between in-
dividuals of the different sexes; and makes them feel
in the society of each other a species of happiness
which they experience no where else." We call it an af-
fession rather than a passion, because it involves a desire
of the happiness of object: And that its constituent
parts are these which have been just enumerated, we
shall first endeavour to prove, and then proceed to
trace its rise and progress from a selfish appetite to a
generous sentiment.

Animal desire is the actual energy of the sensual
appetite: and that it is an essential part of the complex
affection, which is properly called love, is apparent
from this consideration, that though a man may have
sentiments of esteem and benevolence towards women
who are both old and ugly, he never supposes himself
to be in love of any woman, to whom he feels not the
sensual appetite to have a stronger tendency than to
other individuals of her sex. On the other hand,
that animal desire alone cannot be called the affection of
love is evident; because he who gratifies such a desire
without esteeming its object, and wishing to communi-
cate at the same time that he receives enjoyment, loves not
the woman, but himself. Mere animal desire has nothing
in view but the species and the sex of its object; and
before it make a feclusion, it must be combined with
sentiments very different from itself. The first sen-
timent with which it is combined, and by which a man
is induced to prefer one woman to another, seems to
be that by which we are delighted with graces, such as
person, regularity of features, and beauty of comple-
xion. It is not indeed to be denied that there is
something irresistible in female beauty. The most fe-
vere will not pretend, that they do not feel an im-
mediate prepossession, in favour of a handsome woman;
but this prepossession even when combined with an-
imal desire, does not constitute the whole of that af-
fection which is called love. Savages feel the influ-
ence of the sensual appetite, and it is extremely prob-
able that they have some ideas of beauty; but among
savages the affection of love is seldom felt. Even among
the lower orders in civil society it seems to be a very
great passion, and to have in it more of the selfishness of
appetite than of the generosity of esteem. To these ob-
servations many exceptions will no doubt be found (A);
but we speak of savages in general, and of the great
body of the labouring poor, who in the choice of their
mates do not study—who indeed are incapable of stu-
(1) Such as the negroes whose story is so pathetically told by Addison in No. 215 of the Spectator; the
two lovers who were killed by lightning at Stanton Harcourt, August 9th, 1718, (see Pope's Letters); and
many others which will occur to every reader.
Love

Love is the sentiment without which neither man nor woman can live. In the savage state, and even in the first stages of refinement, the bond of union between the sexes seems to consist of nothing more than mere animal desire and instinctive tenderness for their infant progeny. The former impels them to unite for the propagation of the species; and the latter preserves the union till the children, who are the fruit of it, be able to provide for their own subsistence. That in such unions, whether casual or permanent, there is no mutual esteem and benevolence, is apparent from the state of subjection in which women are held in rude and uncultivated nations, as well as from the manner in which marriages are in such nations contracted.

Sweetness of temper, a capital article in the female character, displays itself externally in mild looks and gentle manners, and is the first and perhaps the most powerful inducement to love in a cultivated mind. "But such graces (says an ingenious writer*) are scarce discernible in a female savage; and even in the most polished woman would not be perceived by a male savage. Among savages, strength and boldness are the only valuable qualities. In these, females are miserably deficient; for which reason they are contemned by the males as beings of an inferior order. Memoirs threatened to rob him of his favourite female in the marriage, which prevailed universally among nations emerging from the savage state, or in the rudest stage of society: and wherever it prevailed, men could not possibly have for the fair sex any of that tender regard and esteem which constitute so essential a part of the complex affection of love.

Accordingly we find the magnanimous Achilles an absolute stranger to that generous affection, though his heart was susceptible of the warmest and purest friendship. His attachment to Patroclus was so heroically disinterested, that he willingly sacrificed his own life to revenge the death of his friend; but when Agamemnon threatened to rob him of his favourite female captive, though he felt the insult offered to his pride, he never spoke of the woman as a woman, but as a slave whom he was coerced to prefer to in point of honour, and as a testimony of his glory. Hence it is that we never hear him mention her but as his spoil, the reward of war, or the gift which the Grecians gave him.

"And dar'st thou threaten to snatch my prize away,
Due to the deeds of many a dreadful day?
A prize as small, O tyrant! match'd with thine,
As thy own actions if compar'd with mine.
Thine in each conquest is the wealthy prey,
Thee mine the sweat and danger of the day.
Some trivial present to my lips I bear,
Or barren praises pay the wounds of war."

And again, after upbraiding the general with his tyranny and want of regard for merit, he adds, with the greatest indifference to the charms of the woman,

"Seize on Briseis, whom the Grecians deem'd
My prize of war, yet tamely see retain'd.
And seize secure; no more Achilles draws
His conquering sword in any woman's cause,
The gods command me to forgive thepast;
But let this first insult be the last.
For know, thy blood, when now dar'st invite,
Shall stream in vengeance on my reeking blade."

Pope made the language of this rough warrior less inflammatory and purely natural to an injured lover than it is in the original (a); but from p. 2.

(a) The original passages are:

And, Alle, de τω ξώια, τον τε φιλεῖ θάλασσαν αὐτός.

καὶ ἔδω τις γράφεις αὐτῷ συνεκεπέθησεν αὐτῷ,

τινί ἐπείδ' ἐμερόνεσκεν, ὥσπερ ἐν τοῖς ἀρχαῖοι.

οὐ μὴ κατ' οὓς ὑπάρχει, ὡς εἴρηκα τοῖς Ἀρχαῖοι.

τῶν εὔπορων παραδίδοντος τοῦ θυγατέρου.

Ἀλλ' ἐπὶ τὸν κόσμον πολίτες τελείωσεν.

χρείας ἐκεί πέπεθεν ἀνὴρ ὅτι δὲν ἐπιρρέας ἐκείνῳ.

καί τὸ γράφειν έκτὸς μενούς, θῶς ὑπ' ὑπήρχε τὸ σόλος τι.

ἀπράξια ἡ τοις ἐκείνοις προσκεκλήθη ἁπατάτη.

It is, Lib. 1.

And, Alle de τε φιλέω, τον τε φιλεῖ θάλασσαν αὐτός.

καὶ ἔδω τις γράφεις αὐτῷ συνεκεπέθησεν αὐτῷ,

τινί ἐπείδ' ἐμερόνεσκεν, ὥσπερ ἐν τοῖς ἀρχαῖοι.

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ἀπράξια ἡ τοις ἐκείνοις προσκεκλήθη ἁπατάτη.

In this latter passage the hero says expressly, "I will not fight with you or with any other man for the sake of a girl; but you shall not rob me of any other part of my property." which it fairly the language of a man to whom heart love must have been an utter stranger.
the last quoted passage, even as translated by him, it is apparent that Achilles would have been equally hurt had Agamemnon threatened to deprive him of any other part of his plunder. Accordingly he yields up Briseis, not in grief for a mistress whom he loves, but in fulfèmets for an injury that is done him. Nor let it be imagined, that this coldness proceeded from the pride of the hero, which would not permit him to acknowledge his love of a captive. With the generous affection of love captives and princesses were equally incapable of inspiring him. He repeatedly affirmed indeed that he delighted in his fair Lyrian slave, but it was only as an instrument of sensual gratification; for as to every thing else in a woman, he was so totally indifferent, that he declared he would not, when he should be disposed to marry, give himself the trouble to make a choice, but leave the whole matter to his father.

"If heaven refuse me to my realms with life,"

"The rev'rend Pelus shall elect my wife." But this was said merely to enhance the value of the prize, which for the public good he was about to resign; for that he was dear to him only as ministering to his pleasure, is past dispute from the language which he had previously held with her father, as well as from his requiring grateful Greece to pay a just equivalent, and to repair his private loss. A man who really loved would have thought nothing an equivalent for the object of his love; much less would he have intimated to her father a possibility of his dismissing from his embrace a woman whom he esteemed, when time should have robbed her of every youthful grace.

Since, then, it is so apparent, that in the heroic age of Greece even princes and kings were strangers to the generous affection of love, it needs not occasion much surprise that the same affection has very little influence upon mankind in the lowest ranks of the most polished societies of modern Europe. That this is actually the case, that among the generality of uneducated men and women there is no other bond of attachment than the sensual appetite, every year furnishes multiplied proofs. We daily see youths, rejected by their mistresses, paying their addresses without delay to girls who, in looks, temper, and disposition, are diametrically opposite to those whom so lately they pretended to love: We daily see maidens, flighted by their lovers, receiving the addresses of men, who, in nothing but their sex, resemble those to whom a week before they wished to be married: and we believe it is not very uncommon to find a girl entertaining several lovers together, that if one or more of them should prove false, she may still have a chance not to be totally deferred. Did esteem and benevolence, placed on manners and character, constitute any part of vulgar love, these people would act very differently; for they would find it impossible to change their lovers and their mistresses with the same ease that they change their cloaths.

To this account of love, as it appears in savage nations, some one may perhaps oppose the paintings of the softer passions in the poems of Ossian. That bard describes the female character as commanding respect and esteem, and the Caledonian heroes as cherishing for their mistresses a flame so pure and elevated as never was surpassed, and has seldom been equalled, in those ages which we commonly call most enlightened. This is indeed true: and it is one of the many reasons which have induced Johnson and others to pronounce the whole a modern fiction. Into that debate we do not enter. We may admit the authenticity of the poems, without acknowledging that they furnish any exception to our general theory. They furnish indeed in the manners in which they describe a wonderful anomaly in the general history of man. All other nations of which we read were in the hunter-state savage and cruel. The Caledonians, as exhibited by Ossian, are gentle and magnanimous. The heroes of Homer fought for plunder, and felt no clemency for a vanquished foe. The heroes of Ossian fought for fame; and when their enemies were subdued, they took them to their bosoms. The first of Greeks committed a mean infult on the dead body of the first of Trojans. Among the Caledonians infults offered to the dead, as well as cruelty to the living, were condemned as infamous. The heroes of Ossian appear in no instance as savages. How they came to be polished and refined before they were acquainted with agriculture and the most useful arts of life, it is not our business to enquire; but suffice it to say, they unquestionably were so, in the treatment of the female sex, instead of oppressing, confirms our theory; for we never conceived rich cloaths, superb houses, highly-dressed food, or even the knowledge of foreign tongues, to be necessary to the acquisition of a generous sentiment. Luxury indeed appears to be as imical to love as barbarism: and we believe, that in modern nations the tender and exalted affection which devolves that name is as little known amongst the highest orders of life as among the lowest. Perhaps the Caledonian ladies of Ossian resembled in their manners the German ladies of Tactius, who accompanied their husbands to the chase, who fought by their side, who gave them all for their beauty, and partook with them of every danger. If so, they could not fail to be respected by a race of heroes among whom courage took place of all other virtues: and this single circumstance, from whatever cause it might proceed, will sufficiently account for the estima­tion of the female character among the ancient Germans and Caledonians, so different from that in which it has been held in almost every other barbarous nation.

But if among savages and the vulgar, love be unknown, it cannot possibly be an instinctive affection: and therefore it may be asked, How it gets possession of the human heart; and by what means we can judge whether in any particular instance it be real or imaginary? These questions are of importance, and deserve to be fully answered, though many circumstances conspire to render it no easy task to give to them such answers as shall be perfectly satisfactory. Love can distinguish only between individuals of the different sexes. A man can hardly love two women at the same time;
and we believe that a woman is still less capable of loving at once more than one man. Love, therefore, has a natural tendency to make men and women pair, or, in other words, it is the source of marriage: but in polished Society, where alone this affection has any place, so many things besides mutual attachment are necessary to make the married life comfortable, that we rarely see young persons uniting from the impulse of love, and have therefore but few opportunities of tracing the rise, progress, and consequences of the affection. We shall, however, throw together such reflections as have occurred to us on the subject, not without indulging a hope, that they may be useful to the younger part of our readers when forming the most important connection in life.

We have said, that the perception of beauty, combined with animal desire, is the first inducement which a man can have to prefer one woman to another. It may be added, that elegance of figure, a placid masculine countenance, with a person which indicates strength and agility are the qualities which first tend to attach any woman to a particular man. Beauty has been defined †, "That particular form, which is the most common of all particular forms to be met with in the same species of beings." Let us apply this definition to our own species, and try, by means of it, to ascertain what constitutes the beauty of the human face. It is evident, that of countenances we find a number almost infinite of different forms, of which forms one only constitutes the beauty, whilst the rest, however numerous, constitute what is not beauty, but deformity, or ugliness. To an attentive observer, however, it is evident, that of the numerous particular forms of ugliness, there is not one which includes so many faces as are formed after that particular cast which constitutes beauty. Every particular species of the animal as well as of the vegetable creation, may be said to have a fixed or determinate form, to which, as to a centre, nature is continually inclining. It may be compared to pendulums vibrating in different directions over one central point; and as they all cross the centre, though only ones pass through any other point; so it will be found that perfect beauty is oftener produced by nature than deformity; we do not mean that deformity is greater than any one kind and degree of deformity. To instance in a particular part of a human feature: the line which forms the ridge of the nose is deemed beautiful when it is straight; but this is likewise the central form, which is oftener found than any one particular degree of convex, convex, or any other irregular form that shall be proposed. As we are then more accustomed to beauty than deformity, we may conclude that to be the reason why we approve and admire it, just as we approve and admire fashions of dres of for no other reason than that we are used to them. The same thing may be said of colour as of form: it is custom alone which determines our preference of the colour of the European to that of the Ethiopian, and which makes them prefer their own colour to ours: so that though habit and custom cannot be the cause of beauty (see Beauty), they are certainly the cause of our liking it.

That we do like it cannot be denied. Every one is conscious of a pleasing emotion when contemplating beauty either in man or woman; and when that pleasure is combined with the gratification of the sensual appetite, it is obvious that the sum of enjoyment must be greatly increased. The perception of beauty, therefore, necessarily directs the energy of the sensual appetities to a particular object, but still this combination is a mere selfish feeling, which regards its object only as the best of many similar instruments of pleasure. Before it can deserve the name of love, it must be combined with esteem, which is never bestowed but upon moral character and internal worth; for let a woman be ever so beautiful, and of course ever so desirable as an instrument of sensual gratification, if she be not possessed of the virtues and dispositions which are peculiar to her sex, she will inspire no man with a generous affection. With regard to the outlines, ind ed, whether of internal disposition or of external form, men and women are the same; but nature, intending them for mates, has given them dispositions, which, though concordant, are, however, different, so as to produce together delicious harmony. "The man more robust, is fitted for severe labour, and for field exercises; the woman, more delicate, is fitted for sedentary occupations, and particularly for nursing children. The man bold and vigorous, is qualified for being a protector ‡; the woman, delicate and timid, requires protection. Hence it is, that a man never admires a woman for possessing bodily strength or personal courage; and women always despise men who are totally destitute of these qualities. The man, as protector, is directed by nature to govern; the woman, conscious of inferiority, is disposed to obey. Their intellectual powers correspond to the definition of nature: Men have penetration and solid judgment to fit them for governing; women have sufficient understanding to make a decent figure under good government: a greater proportion would excite dangerous rivalry between the sexes, which nature has avoided by giving them different talents. Women have more imagination and sensibility than men, which make all their enjoyment more exquisite; at the same time that they are better qualified to communicate enjoyment. Add another capital difference of disposition: the gentle and ingenuous manners of the female sex tend to soften the roughness of the other sex; and wherever women are indulged with any freedom, they are more gentle than men. "These are not the only particulars that differ in the sexes. With respect to the ultimate end of love, it is the privilege of the male, as superior and protector, to make a choice: the female, preferred, has no privilege but barely to content or to refuse. Whether this distinction be the immediate result of the originally different dispositions of the sexes, or only the effect of associations inevitably formed, may be questioned; but among all nations it is the practice for men to court, and for women to be courted; and were the most beautiful woman on earth to invert this practice, she would forfeit the esteem, however by her external grace she might excite the desire, of the man whom she addressed. The great moral virtues which may be comprehended under the general term integrity, are all absolutely necessary to make either men or women estimable; but to procure esteem to the female character, the modestly peculiar to their sex is a very essential circumstance. Nature hath provided them with it as a defence against the artful solicitations of the other.
A woman, therefore, whose dispositions are gentle, delicate, and rather timid than bold, who is possessed of a large share of sensibility and modesty, and whose manners are soft and inimitable, must, upon moral principles (See Moral Philosophy), command the esteem and benevolence of every individual of the other sex who is possessed of sound understanding; but if her perfections be deformed, or not such as to excite some degree of animal desire, she will attract no man's love. In like manner, a man whose moral character is good, whose understanding is acute, and whose conversation is instructive, must command the esteem of every sensible and virtuous woman; but if his figure be disagreeable, his manners unpolished, his habits slovenly, and above all, if he be deficient in personal courage, he will hardly excite desire in the female breast. It is only when the qualities which command esteem are, in the same person, united with those which excite desire, that the individual so accomplished can be an object of love to one of the other sex; but when these qualities are thus united, each of them increases the other in the imagination of the lover. The beauty of his mistress gives her, in his apprehension, a greater promise of happiness, than perhaps she really desires; whilst his perfections of her internal worth makes him, on the other hand, apprehend her beauty to be absolutely unrivalled.

To this theory an objection readily offers itself, which it is incumbent upon us to obviate. Men and women sometimes fall in love at a first sight, and very often before they have opportunities of forming a just estimate of each other's moral character: how is this circumstance to be reconciled with the progressive generation of love? We answer, By an association of ideas which is formed upon principles of physiognomy. Every passion and habitual disposition of mind gives a particular cast to the countenance, and is apt to discover itself in some feature of the face. This we learn by experience; and in time, without any effort of our own, the idea of each particular cast of countenance comes to be so closely associated in our minds with the internal disposition which it indicates, that the one can never afterwards be presented to our view without instantly suggesting the other to the imagination. (See Metaphysics and Physiognomy). Hence it is that every man, who has been accustomed to make observations, naturally forms to himself, from the features and lineaments of a stranger's face, some opinion of his character and fortune. We are no sooner presented to a person for the first time, than we are immediately impressed with the idea of a proud, a revered, an affable, or a good-natured man; and upon our going into a company of absolute strangers, our benevolence or aversion, our awe or contempt, rises instantly towards particular persons, before we have heard them speak a word, or know so much as their names or denigrations. The same thing happens when we are presented to the fair sex. If a woman, for the first time, have that particular cast of countenance, and that expression of features, to which we have associated notions gentle, modest, and other female virtues, the instantly commands our esteem; and if she have likewise to much beauty as to make her an object of particular desire, esteem and desire become suddenly combined; and that combination constitutes the affection of love. Such, too, is the nature of all mental associations, that each part of which they are composed adds strength and vividness to the other parts; so that, in the present instance, desire makes us imagine virtues in the woman which her countenance perhaps does not indicate; and the virtues which are there actually visible, make us apprehend her beauty as more perfect than it is.

The affection thus generated is more or less pure, and will be more or less permanent, according as the one or the other part of which it is compounded predominates. Where desire of possession prevails over our esteem of the person and merits of the desirable object, love loses its benevolent character: the appetite for gratification becomes ungovernable, and tends violently to its end, regardless of the misery that must follow. In that state love is no longer a sweet agreeable affection; it becomes a selfish, painful passion, which, like hunger and thirst, produces no happiness but in the instant of fruition; and when fruition is over, disgust and aversion generally succeed to desire. On the other hand, where esteem, founded on a virtuous character and gentle manners, prevails over animal desire, the lover would not for the world gratify his appetite at the expense of his mistress's honour or peace of mind. He wishes, indeed, for enjoyment; and to him enjoyment is more exquisite than to the mere sensual lover, because it unites sentiment with the gratification of sense; at the same time that, by far from being succeeded by disgust or aversion, it increases his benevolence to the woman, whose character and manners he esteems, and who has contributed so much to his pleasure. Benevolence to an individual, having a general end, admits of acts without number and is seldom fully accomplished. Hence mutual love, which is composed chiefly of esteem and benevolence, can hardly be of a shorter duration than its objects. Frequent enjoyment endears such lovers to each other, and makes constancy a pleasure; and when the days of sensual enjoyment are over, esteem and benevolence will remain in the mind, making sweet, even in the old age, the society of that pair, in whom are collected the affections of husband, wife, lover, friend, the tenderest affections of human nature.

From the whole of this investigation, we think it appears, that the affection between the sexes which deferves the name of love, is inseparably connected with virtue and delicacy; that a man of loose morals cannot be a faithful or a generous lover; that in the breast of him who has ranged from woman to woman for the mere gratification of his sensual appetite desire must have effected all esteem for the female character; and that, therefore, the maxim too generally received, "that a reformed rake makes the best husband," has very seldom a chance to be true. We think it may likewise be inferred; that thousands fancy themselves in love who know not what love is, or how their affections are generated in the human breast: and therefore we beg leave to advise such of our readers as may imagine themselves to be in that state, to examine their own minds, with a view to discover, whether, if the objects of their love were old or ugly, they would still esteem them.
them for the virtues of their character, and the propriety of their manners. This is a question which
ought to be well weighed by the young and the amorous, who, in forming the matrimonial connection are
often blind to the pleasures of gratifying that desire is gone and if not refined by esteem and benevolence, goit must
with a swift pace), that a new bond of attachment may be formed upon more dignified and more lasting prin-
ciples; but this is a dangerous experiment. Even sup-
posing good fortune, good temper, and internal worth
of every fort, yet a new attachment upon such quali-
fications is rarely formed; because it commonly, or ra-
ther always, happens, that such qualifications, the only
solid foundation of an indissoluble connection, if they
did not originally make esteem preponderate over an-
imal desire, are afterwards rendered altogether invi-
bable by fatiey of enjoyment creating disgust."

Love, in medicine. The symptoms produced by
this passion as a disease, according to medical writers,
are as follows: The eye-lids often twinkle; the eyes
are hollow, and yet appear as full with pleasure;
the pulse is not peculiar to the passion, but the same
with that which attends solicitude and care. When
the object of this affection is thought of, particularly
in the idea is sudden, the spirits are confused, the pulse
changes, and its force and time are very variable; in
some instances, the person is sad and watchful; in oth-
ers, the person, not being conscious of his state,
pines away, is loath, and regardless of food, though
the wiser, when they find themselves in love, seek
pleasent company and active entertainments. As the
force of love prevails, sighs grow deeper; a tremor af-
fects the heart and pulse; the countenance is alter-
nately pale and red; the voice is suppressed in the
fauces, the eye grow dim; cold sweats break out; deep
abductions itself, at least until the morning; the secre-
tions become disturbed; and a loss of appetite, a hec-
tic fever, melancholy, or perhaps madness, if not
dead, constitutes the fatal catalepsy. On this sub-
ject the curious may consult Egineta, lib. iii. cap. 17.
Oribat. Synop. lib. viii. cap. 9. or a treatise proficul-
ously written on love, as a diatemper, by James Fer-
rard, Oxford, printed 1640.

The manner of the Greeks and Romans were simi-
lar to each other in the affairs of love. They gen-
erally made a discovery of their passion, by writing
upon trees, walls, doors, &c. the name of their be-
loved. They usually decked the door of their dulci-
nea with flowers and garlands, made libations of wine
before their houses, sprinkling the pofts with the same
liqueur, as if the object of their affection was a real
goddes. For a man’s garland to be untied, and for a
woman to compose a garland, were held to be in-
dubitable indications of their love.

When their love was without success, they used se-
veral arts to excite affection in the object of their de-
 sire. They had recourse to enchantresses, of whom
the Thessalian were in the highest estimation. The
means made use of were most commonly philtres or
love potions, the operation of which was violent and
dangerous, and frequently deprived such as drank them
of their reason. Some of the most remarkable ingre-
dients of which they were composed were these: the
hippopomans, the jynx, insects bred from purpae-
tation, the fig remora, the lizard, brains of a calf, the
hairs on the tip of a wolf’s tail, his secret parts, the
bones of the left side of a toad eaten with ants, the blood
of doves, bones of fisakes, feathers of ferich-ows,
twisted cords of wool in which a person had hanged
himself, rags, torches, reliquies, of swallows bu-
ried and famished in the earth, bones snatched from
hungry bitches, the marrow of a boy famished in the
midst of plenty, dried human liver; to these may be
added several herbs growing out of putrid substances.
Such were the ingredients that entered into the com-
poition of that infernal draught a love potion.

But, besides the philtres, various other arts were
used to excite love, in which the application of certain
substances was to have a magical influence on the per-
son against whom they levelled their skill. A hyaena’s
uder worn under the flat arm, they fancied would
draw the affections of whatever woman they fixed
their eyes upon. That species of olives called πινυτις,
and barley-straw made up into a paste, and thrown into
the fire, they thought would excite the flame of love.
Flower was used with the same intention. Burning
laural, and melting wax, were supposed to have the
like effect. When one heart was to be hardened, and
another mollified, clay and wax, were exposed to the
same fire together. Images of wax were frequently
used, representing the persons on whom they wished
to make an impression; and whatever was done to the
substitute of wax, they imagined was felt by the per-
son represented. Enchanted medicaments were often
sprinkled on some part of the house where the per-
son resided. Love-pledges were supposed to be of singu-
lar use and efficacy; these they placed under their
threshold, to preserve the affections of the owner from
warding. Love-knots were of singular power, and the
number three was particularly observed in all they
did. But no good effect was expected, if the use of
these things was not attended with charms or magical
verses and forms of words. See Magic.

Having mentioned their arts of exciting love, it
may not be amiss to take notice, that, the ancients ima-
gined, that love excited by magic might be allayed by
more powerful spells and medicaments, or by applying
to demons more powerful than those who had been
concerned in raising that passion. But love inspired
without magic had no cure; Apollo himself could find
no remedy, but cried out

He miki quad nilis amor cf medicabilis herbis.
The antidotes against love were generally anus caflus,
which has the power of weakening the generative fa-
culty; sprinkling the dust in which a mule had rolled
himself; tying threads in the hide of a beast newly slain;
applying annules of minerals or herbs, which were sup-
ppanied of great efficacy in other cases, and invoking
the assistance of the infernal deities. Another cure
for love was bathing in the waters of the river Selem-
nus; to which we may add the lover’s leap, or jump-
down from the Lacedian promontory.

Love-Apple. See SOLANUM.

LOVENTINUM, or LuENtinum, (anc. geog.)
a town of the Demetian Britain, near the mouth of
the Tauribus or Tivis. Supposed to have been after-
wards.
wards swallowed up by an earthquake, and to have
flood where is now the lake called Lin Swatan in
Brecknockshire.

LOUGHBOROUGH, a town of Leicestershire in
England, 110 miles from London. It is the sec-
tend town in the county, and was in the Saxons time
a royal village. Its market is on Thursday; and its
fairs are on April 25th, May 28th, August 1st, and
November 2d. It has a large church, and a free
school; besides a charity school for 80 boys and
another for 20 girls. It has been very much reduced
by fires; but is still a very agreeable town, with rich mea-
dow-ground, on the Fosse, which runs here almost
parallel with the river Soar. The New canal has made
the coal-trade here very extensive.

LOUGHBOROUGH, a fair and post town of
Ireland, situated in the county of Down, and province
of Ulster, 58 miles from Dublin. The name signi-
fies the lake of the speckled trouts; and it was so called
from a lake near it, which abounds with these fish. It
consists of one broad street, at the end of which is the
parish-church, said to have been built by Dr Taylor
when bishop of Dromore, soon after the Resur-
lation. The linen manufacture is carried on here very
extensively; and the town is a great thoroughfare,
the turnpike road from Dublin to Belfast passing
through a red bog near it. The fairs are five in the
year.

LOCH-DERGH, anciently Derg-abhan, i.e., "the
rivulet of the woody moras," from a river which issues
out of this lake. This loch is situated in the county
of Donegal and province of Ulster in Ireland, and is
famous for having in it the island that contains St
Patrick's purgatory, which is a narrow little cell,
hewn out of the solid rock, in which a man could
fearce stand upright.—There is also a lake of this
name situated between the counties of Galway and
Tipperary.

LOUCH-NEACH, a loch or lake of Ireland, sit-
tuated in the counties of Armagh, Down, Derry;
and Antrim, and province of Ulster. It is the largest
in Europe, the size of Ladoga and Onega in Russia, and
that of Geneva in Switzerland, excepted; being 20
miles long and 15 broad. The area of this lake is
computed to be 100,000 acres. It is remarkable
for a healing virtue; and likewise for petrifying wood,
which is not only found in the water, but in the ad-
Jacent soil at a considerable depth. On its shore
several beautiful gems have been discovered. Its
ancient name was Loch-sucha or Loch-Neach from loch,
"a lake," and Neach, "wonderful, divine, or emi-
inent." Its petrifying powers are not insconstant
as several of the ancients have supposed, but require a
long series of ages to bring them to perfection, and
appear to be occasioned by a fine mud or sand, which
infuscates itself into the pores of the wood, and which
in process of time becomes hard like bone. On the
borders of this lake is Slane's castle, the elegant seat
of the right honourable John O'Neil. Dr Smyth
seems to doubt whether the healing quality in this
lake is not to be confined to one side of it, called the
fishing bank; and he informs us, that this virtue was
discovered in the reign of Charles II, in the instance
of the son of one Mr Cunningham, who had an evil
which ran on him in eight or ten places; and notwith-
standing all applications seemed incurable, at length
he was perfectly healed, after bathing in this lough
about eight days. Hence that writer gives us another
imputation of the name Loch-Neach, which seems to hint at the quality Neagh or Near, in Irish,
signifying a fore or ulcer," which might not impro-
bly be corrupted into Neagh. Hence he apprehends
this lake was remarked at a much earlier period for
its healing property. As to its petrifying power, it
is mentioned by Nenius, a writer at the ninth century,
who says, "Eli clad flagnum quod facit ligna du-
resce in lapides. Homines autem findunt Iyria, et
post quam formaverunt, projequant in flagnum, et ma-
orient in eo uque ad caput anni, et in capite anni lapis
inventurus, et vocatur flagnum Loch-Euch." Lough-
Neach gives title of baron to the family of Struf-
ton.

LOUGH-STRANGFORD, a lake of Ireland,
situated in the county of Down and province of
Ulster. It takes its present name from a small port-
town called Strangford, seated on the west side of
the narrow entrance into the sea. It was formerly
known by the name Lough-Cone or Lough-Coyne. It is a
deep bay or inlet of the sea, about 17 miles long and
four or five broad; it goes as far as Downpatrick,
and north as far as Comber and Newtown, and by
computation covers 25,775 acres, Irish plantation
measure. It abounds with excellent fish, particularly
finches; and off the bar there is a peopled hering
fishery in or about August. The bar or entrance
into this lough is about three miles below Stra-
ngford. There is a long rock at the entrance in the
middle of the passage, dangerous to strangers on ac-
count of the current; yet there is a broad passage
on either side, and deep water. The current here is
very strong and rapid, running at the rate of six or seven
miles an hour. There are but few vessels that go
higher up than Strangford. A good many vessels
bound up the channel put in here, if the wind is un-
 favourable to their passage. The islands of this lake
are numerous; Doctor Boat enumerates them at 250.
But from an actual survey, made at the time Dr Smith
wrote his history of that country, it appears, there
are 54 islands small and large, known by different
names, and many others nameless; the contents of
these 54 islands added together amount to 954 acres
and an half. The great and profitable manufacture
carried on in these islands, and the flat sandy coasts
surrounding the lake, is the burning of sea-weed into
kelp, which employs a number of hands, and has been
computed to produce to the several proprietors a net
profit of 1000l. per annum and upwards. Four of
the islands here are called Swan Islands, from the num-
ber of swans that frequent them.

LOUIS, or Knights of St Louis, the name of a
military order in France, instituted by Louis XIV. in
1693. Their colors are of flame colour, and pales
from left to right: the king is their grand master.
There are in it eight great crosses, and 24 com-
manders; the number of knights is not limited. At
the time of their institution, the king charged his revenue
with a fund of 300,000 livres for the pensions of the
commanders and knights.

LOUIS, Lewis, Louis d'or, or Lewidore, a French
coin, first struck in 1640, under the reign of Louis
XIII. and which has now a considerable currency.
See Money-Table.

LOUISIANA,
LOUISIANA, a country in North-America, bounded on the south by the gulf of Mexico, on the east by the river Mississippi, on the west by New Mexico, and on the north by an unknown country. It extends from the 29th to the 40th degree of north latitude, and from about the 80th to the 96th or 97th degree west longitude from London. The climate of Louisiana varies according to the latitudes. The southern parts are not so hot as those parts of Africa which lie under the same parallel, and the northern parts are colder than the countries of Europe at the same distance from the pole; the causses of which are supposed to be the thick forests which over-run the country, and the great number of rivers; the former preventing the sun from heating the earth, and the latter supplying it with moist vapours: besides the cold winds which come from the north over vast tracks of land. They have bad weather but it never lasts long, for the rain generally falls in storms and sudden showers; the air is wholesome, the inhabitants healthy, and they who are temperate live to a great old age. The country is extremely well watered; and almost all the rivers that run through it fall into the Mississippi, which discharges itself into the Gulf of Florida.

LOUSE, in zoology. See Pediculus and Lice. LOUSY DISEASE. See Medicine-Index.

LOUTH, a town of Lincolnshire in England, 156 miles from London. It is a town corporate; and one of the handsomest and gayest in the county, there being in it not only frequent assemblies, concerts, &c. but even masquerades. Here are several handsome houses. From hence there is a canal to the sea at Tilney, about eight miles. Besides a charity school for 40 children, it has a free school founded by Edward VI. with a large church, and a fine steeple, which some think is as high as Grantham spire which is 288 feet high. Its markets are on Wednesday and Saturday, and its fairs on May 24th, and August 16th.

LOUTH, a county in the eastern part of Ireland, which extends in the form of a bow or half-moon, on the side of the ocean, being much longer than it is broad; it is bounded on the south and west by the county of East-Meath, on the north-west by Monaghan, on the north by Armagh, and on the north-east by the bay of Carlingford, which parts it from the county of Down; it is washed by several small rivers which fall into the sea; and its four frontiers are watered by the river Boyne. Its chief towns are Dundalk and Carlingford; unless we include Drogheda, a part whereof is in this county. It is the smallest county in the kingdom but very fertile and pleasant and abounding with many remains of antiquities, of which Mr Wright, in his Louthian, has given a very ample description. It contains 111,180 Irish plantation acres, 50 parishes, 5 baronies, and 5 boroughs, and returns to members to parliament; it is about 22 miles long and 14 broad.

LOUTH, a town in the above county, having a yearly fair.

LOUVAIN, a city in the Austrian Netherlands, in the province of Brabant, pleasantly seated on the river Dyle, in a plentiful and agreeable country. The walls are about eight or nine miles in circumference; but they include several fields and vineyards. The castle stands on a high hill, surrounded with fine gardens, and has a charming prospect all over the country. This town contains nine market places, 14 water-mills, 126 streets, 16 stone bridges, and several handsome palaces. The town-house is a venerable old building, adorned with statues on the outside; and the churches are very handsome, particularly the collegiate church of St Peter, but the principal ornament is the university, founded only in 1426 by John IV. duke of Brabant, with the concurrence of Pope Martin V. It contains about 40 colleges, four of which are called Pedegren. There is in the number also an English college of friars, preachers, which owes its establishment to the liberality of Cardinal Philip Howard, brother to the duke of Norfolk, who, before he was raised to the purple, had been private chaplain to Queen Catherine, con­ fort to Charles II. The Irish have likewise a seminary, erected in part under the care of Engenius Mathes, titular archbishop of Dublin, anno 1622, which receives its appointments from the propaganda at Rome. Besides the above, there are two colleges for the Irish, one of Recollects and the other of Dominicans, where divinity and the Mathesia are taught. In the last century the number of scholars exceeded 3000, but in the year 1743 the inhabitants amounted to 12,000, including 2000 students only. At the beginning of the 14th century, under John III, it flourished considerably in the manufacture of woollen cloth: 400 houses were then occupied by substantial clothiers, who gave employment to an incredible number of weavers, but great loss is said, that it was ruinous by the injuries which the children in the streets might receive from the crowd and hurry of their returning from work. In 1382, these weavers, however, took up arms, and rebelled against their sovereign Prince Wenceslaus, throwing from the windows of the Town-hall of the aldermen and councillors; and afterwards proceeded to lay waste great part of Brabant: but being besieged and reduced to great extremities, they submissively implored his clemency; which was granted after the execution of some of the principal ringleaders. The weavers, the chief instigators to this revolt, were banished, the greater part of whom took refuge in England; where they first introduced, or at least augmented very much, the woollen manufacture. The town, by this circumstance, being almost depopulated, the university was established to supply in some measure the loss of the rebellious clothiers. Since that time the manufacture gradually declined, no cloth of any account being made there at present. This impolitic step of the Duke Wenceslaus sent treasures to England, through the hands of those exiled people; an impolitic step to governors, that they should deal with great precaution respecting such useful members of the community. Upon the ruin of those looms was formed the cloth manufacture of Limbourg, which is carried on with good advantage to this day. There is yet flourishing at Louvain part of the old drapers-hall, now converted into four public schools, where lectures in divinity, philosophy, law, and physic, are given and the public acts are made. Adjoining to the schools is the university library, which altogether compose a large pile of buildings. Over the door of the chief entrance we read these words, Sapientia edificans ibi domum. The principal church is collegiate, dedicated to St
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LOW, or Louis (John), an engraver of considerable eminence, who flourished about the middle of the 17th century. According to Bannet, he was a native of Flanders. He learned the art of engraving from Peter Soumman, at the time that Eyderheof died under the fame master; and his usual style of engraving bears some resemblance to that of his master's. One of his best prayers is, Diana, with her nymphs, reposing after the chase; a muddling-sized plate, lengthwise from Rubens.

LOW-BELL, in birding, a name given to a bell, by means of which they take birds in the night, in open plains, and among rough, in October. The method is to go out about nine o'clock at night in a still evening, when the air is mild and the wind does not blow. The low-bell should be of a deep, hollow sound, and of such a size that a man may conveniently carry it in one hand. The person who carries it is to make it toll all the way he goes, as nearly as may be, in such manner in which the bell on the neck of a sheep tows as it goes on and feeds. There must also be a box made like a large lantern, about a foot square, and lined with tin, but with one side open. Two or three great lights are to be set in this; and the box is to be fixed on the person's breast, with the open side forwards, so that the light may be cast forward to a great distance. It will spread as it goes out of the box, and will naturally close on the person who carries the bell, no matter where it is. The birds are to be then caught in the slip or poach, and whichever bird any bird is seen at, to be taken, the person who is nearest is to lay his net over it, and take it with as little noise as possible. When the net is over the bird, the person who laid it is not to be in a hurry to take the bird, but must stay till he who carries the light is got beyond it, that the motions may not be discovered. The blaze of the light and the noise of the bell terrify and amaze the birds in such a manner that they remain still to be taken; but the people who are about the work must keep the greatest quiet and stillness that may be.

Some people are fond of going on this scheme alone. The person then fixes the light box to his breast and carries the bell in one hand and the net in the other; the net in this case may be somewhat smaller, and the handle shorter. When more than one are out at a time, it is always proper to carry a gun; as it is no uncommon thing to flay a hare when on this expedition.

LOW (East), a town of Cornwall in England, 231 miles from London, in the post-road from Plymouth. It is an ancient borough by prescription, made a corporation by charter of queen Elizabeth, consisting of nine burgesses (one of whom is yearly chosen the mayor), a recorder, aldermen, &c.; and the mayor, magistrates, and freemen, who are about 68, choose the members of parliament. This being a manor of the duchy of Cornwall, was settled by king William on lord Somers, and is now held by the corporation at the free-rent of 20s. a-year. It is feated pretty commodiously on a creek of the sea, over which there is a large stone bridge, supported by 15 arches, which leads to Well Low, standing between two hills. The chief benefit which the inhabitants have is in their fishery. Here is a battery of four guns, and a small chapel. Its market is on Saturday, and has two fairs in the year.

Low (Well), called also Port-Pigham, a town of Cornwall, divided from East Low by a stone bridge of 15 arches over the river Low, from whence both towns receive their name, as the river does from the lowness of its current between its high banks. The corporation, by charter of queen Elizabeth, consists of 12 burgesses, one of whom is annually chosen mayor, and, with the other burgesses, has power to choose a steward. Its members, whom it has sent to parliament ever since the 6th of Edward VI. are elected by the corporation and freemen, who are about 60. There was a chapel of ease here in the reign of Henry VIII. which was afterwards converted into a town-hall; and the town lying in the parish of Tolland, the people go thither to church. The market is on Saturday, and fair on April 25. There is a pretty little harbour here; near the mouth of which is a small island called St George's, which abounds with fish and pies. The river here is navigable for vessels of 1000 tons.

LOWELL Richard), an eminent English physician in the 17th century, was born in Cornwall, and educated at Westminster-School and Oxford. He entered on the physic line; and practiced under Dr Thomas Willis, whom he instructed in some parts of anatomy, especially when the latter was writing his Cerebri anatome. He, with Dr Willis, in 1674, discovered the medicinal waters at Athopin Northamptonshire, which, upon their recommendations, became very much frequented. In 1666 he followed Dr Willis to London; practiced physic under him; and became fellow of the royal society, and of the college of physicians. In 1609 he published his Tractatus de verde; and, after the death of Dr Willis in 1675, he was esteemed the most eminent physician in London. Upon the breaking out of the Popish plot in 1678, says Mr. Wood in his Athenae Oxonienses, he closed with the Whigs, supposing that party would carry all before them; but, being mistaken, he lost his credit and practice. He died in 1691.
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LOWTH (William), D.D. a learned divine, born at London in 1661, was the son of an apothecary, and took his degrees at Oxford. His eminent worth and learning recommended him to Dr Mew bishop of the diocese of Durham, while he was in his chaplain, gave him two livings in his own province, and conferred on him a prebend in the cathedral of Winchester. He acquired an unusual share of critical learning. Thus situated in life, the labours of Mr Lowth appear to have been strictly confined within the limits of his own province, and applied solely to the peculiar duties of his own function: yet, in order that he might acquit himself the better in theology, he had purified his studies with a more general and extensive view. Few were more deeply verfied in critical learning; there being fearcely any ancient author, Greek or Latin, profane or ecclesiastical, especially the latter, but what he had read with accuracy, confantly accompanied his reading with critical and philological remarks. Of his collections in this way he was upon all occasions very communicative. Hence his notes on Clemens Alexandrinus, which are to be met with in Potter's edition of that author. Hence his remarks on Josephus, communicated to HUDSON for his edition, and acknowledged in the preface; as also those larger and more numerous annotations on the Ecclesiastical Historians, inserted in Reading's edition of them at Cambridge. The author of Bibliotheca Biblica was indebted to him for the same kind of assistance. Chandler, late bishop of Durham, while engaged in his 'Defence of Christianity, from the Prophecies of the Old Testament,' against the Difficulties of the Grounds and Reasons of the Christian religion,' and in his 'Vindication of the Defence, in answer to the Scheme of Literal Prophecy considered,' held a constant correspondence with him, and confulted him upon many difficulties that occurred in the course of that work. The most valuable part of his character was that which least appeared in the eyes of the world, the private and retired part, that of the good Christian and the useful parish-priest. His piety, his diligence, his hospitality and beneficence, rendered his life highly exemplary, and greatly enforced his public exhortations.

He married Margaret, daughter of Robert Pitt, Esq., of Blandford, by whom he had two sons and three daughters. (See the next article.) He died in 1732, and was buried by his own orders in the churchyard at Birtton. He published, 1. A vindication of the divine authority and inspiration of the Old and New Testaments; 2. Directions for the profitable reading of the Holy Scripture; 3. Commentaries on the prophets and other works.

LOWTH (Robert), D.D. second son of the preceding Dr William Lowth, and bishop successively of St. David's, Oxford, and London was born on the 29th of November 1710, probably at Burton in the county of Hants. He received the rudiments of his education in Winchester college, where his school exercises were distinguished by uncommon elegance; and having resided the requisite number of years in that seminary, in 1730 he succeeded on the foundation at New College, Oxford. He took the degree of M. A. June 8, 1737. Though his abilities must have been known to those with whom he was connected, he was not forward to appear before the world as a writer. At Oxford he continued many years improving his talents, with little notice from the great, and with preferment so small as to have at present escaped the distinct recollection of some of his contemporaries.

He was not, however, suffered to languish for ever in obscurity. His genius and his learning forced themselves upon the notice of the illustrious society of which he was a member; and he was placed in a station where he was eminently qualified to shine. In 1741 he was elected by the university to the professorship of poetry, re-elected in 1743, and whilst he held that office he read his admirable lectures De faera post Hebraorum. In 1744 Bishop Hoadley collated him to the rectory of Ovington in the county of Hants; added to it, nine years afterwards, the rectory of East Wealdhay in the same county; and in the interim raised him to the dignity of archdeacon of Winchester. These repeated favours he some years afterwards acknowledged in the following manly and respectful terms of gratitude: "This address, My Lord, is not more necessary on account of the subject, than it is in respect of the author. Your Lordship unfomented and unasked, called him from one of those colleges to a station of the first dignity in your diocese, and took the earliest opportunity of accumulating your favour upon him, and adding to that dignity a suitable support. These obligations he is now the more ready thus publicly to acknowledge, as he is removed out of the reach of further favours of the like kind. And though he hath relinquished the advantages so generously conferred on him, yet he shall always esteem himself highly honoured in having once enjoyed the patronage of the great advocate of civil and religious liberty.""}

On the 8th of July 1754 the university of Oxford conferred upon him the degree of D. D. by diploma; an honour which, as it is never granted but to distinguished merit, was probably conferred on Mr Lowth in consequence of his prelections on the Hebrew poetry, which had then been lately published. Having in 1749 travelled with Lord George and Lord Frederick Cavendish, he had a claim upon the patronage of the
Devonshire family; and in 1755, the late Duke being then Lord Lieutenant of Ireland, Dr Lowth went to that kingdom as his grace's first chaplain. Soon after this appointment he was offered the Bishopric of Limerick; but preferring a less dignified station in his own country, he exchanged it with Dr Leslie, prebendary of Durham and rector of Segedfield, for these preferments. In November 1765 he was chosen F.R.S. In June 1766 he was, on the death of Dr Squire, preferred to the bishopric of St David's; which, in the October following, he resigned for that of Oxford, vacant by the translation of Bishop Hume to Salisbury. In April 1777, he was translated to the see of London, vacant by the death of Bishop Terrick; and in 1783 he declined the offer of the primacy of all England.

Having been long afflicted with the stone, and having long borne the severest sufferings of pain and sickness with the most exemplary fortitude and resignation, this great and good man died at Fulham Nov. 3, 1787; and on the 12th his remains were privately interred in a vault at Fulham church, near those of his predecessor. He had married in 1752, Mary, the daughter of Laurence Jackon of Christchurch, Hants, Esq; by whom he had two sons and five daughters. His lady and two children only survived him.

His literary character may be estimated from the value and the importance of his works, in the account of which we may begin with his Prelections on the Hebrew Poetry. The choice of so interesting a subject naturally attracted general attention, and the work has been read with equal applause abroad and at home. In these prelections the author has acquitted himself in the most masterly manner, as a poet, a critic, and a divine; and such is the classic purity of his Latin style, that though we have read the work with the closest attention, and with no other view than to discover, if possible, an Anglicism in the composition, we never found a single phrase to which, we believe, a critic of the Augustan age could possibly have objected. This is an excellence to which neither Milton nor Johnson has attained; to which indeed no other English writer of Latin with whom we are acquainted has attained, unless perhaps Atterbury must be excepted. To the prelections was subjoined a short compendium of bishop Hare's system of Hebrew metre: which occasioned a Latin letter from Dr Edwards of Clare-hall, Cambridge, to Dr Lowth, in vindication of the Harian metre. To this the author of the prelections replied in a larger compendium, in which bishop Hare's system is completely overthrown, and the fallacy upon which it was built accurately investigated. After much attentive consideration, bishop Lowth has pronounced the metre of the Hebrew to be perfectly irrecoverable.

In 1758 he published The Life of William of Wykeham, Bishop of Winchester, with a dedication to Bishop Hoadley, which involved him in a dispute concerning a decision which that bishop had lately made respecting the wardship of Winchester-college. This controversy was on both sides carried on with such abilities, that, though relating to a private concern, it was yet to be read, if not with pleasure at least with improvement. The life of Wykeham is drawn from the most authentic sources; and affords much information concerning the manners, and some of the public transactions of the period in which Wykeham lived, whilst it displays some private intelligence respecting the two literary societies of which he was the founder. In these two societies Dr Lowth was educated, and he gratefully expresses his obligations to them.

In 1762 was first published his Short Introduction to English Grammar, which has since gone through many editions. It was originally designed only for private and domestic use, but its judicious remarks being too valuable to be confined to a few, the book was given to the world; and the excellence of its method, which teaches what is right by showing what is wrong, has inferred public approbation and very general use. In 1765 Dr Lowth was engaged with bishop Warburton in a controversy, which made much noise at the time, which attracted the notice even of royalty, and of which the memory is still recent. If we do not wish to dwell on the particulars of this controversy, it is because violent literary contention is an evil, which though like other war it may sometimes be unavoidable, is yet always to be regretted; and because the characters of learned, ingenious, and amiable men, never appear to lefs advantage than under the form in which that state of hostility obliges them to assume. The two combattants indeed engaged with such unius- and ingenuity such as is seldom brought into conflict; but it appears that, in the opinion of Dr Johnfon, Warburton had the most scholastic learning, and that Lowth was the most correct scholar: that, in their contest with each other, neither of them had much argument, and that both were extremely abusive. We have heard, and we hope it is true, that they were afterwards reconciled, and expressed mutual regret for the violence of their past conduct.

In 1778 Bishop Lowth published his last great work, A Translation of Isaiah. To his literary and theological abilities, the translator joined the most critical knowledge of the character and spirit of the eastern poetry; and, accordingly, the prophecies of Isaiah (which, though almost always sublime or elegant, are yet sometimes obscure) were translated in a manner adequate to the highest expectations of the public. Several occasional discourses, which the Bishop, by his station, was at different times called upon to deliver, were of course published, and are all worthy of their excellent author; but there is one on the kingdom of God, on the exaltation and progressive improvement of Christ's religion and on the means of promoting these by the advancement of religious knowledge, by freedom of inquiry, by toleration, and mutual charity, which may be distinguished above the rest, as exhibiting a most comprehensive view of the successive states of the Christian church, and containing the truer principles of Christianity.

Of the Bishop's poetical pieces, none display greater merit than Verses on the Genealogy of Christ, and the Choice of Hercules, both written very early in his life. He wrote a spirited imitation of an ode of Horace, applied to the alarming situation of this country in 1745; and likewise some verses on the death of Frederick prince of Wales, with a few smaller poems. The following inscription on the tomb of his daughter, beautifully displays his paternal affection and classical taste. As it is short, and, in our opinion, has all the merit
Learning and taste, however, did not constitute Bishop Lowth's highest excellence. Eulogium itself can scarcely afford to extravagant when speaking of him either as a private man or as a pastor of the church of Christ. His amiable manners rendered him an ornament to his high station, whilst they endeared him to all with whom he conversed; and his zeal for the interests of true religion made him eager to promote to places of truth and dignity such clergymen as he knew were best qualified to fill them. Of his modesty, gentleness, and pleasing conversation, we have the testimony of one whose decision will hardly be disputed.—"It would answer no end (says Bishop Warburton) to tell you what I thought of the author of Hebrew poetry, before I saw him. But this I may say, I was never more surprized, when I did fee him, than to find him of such amiable and gentle manners, so modest, temperate, and disengaged a deportment." He united, indeed, in an eminent degree, the qualities of the gentleman with those of the scholar: he conversed with elegance, as he wrote with accuracy. As a husband, a father, or the master of a family, he was as nearly faultles as the imperfections of humanity will easily permit. His temper, when roused by what he thought improper conduct, was indeed susceptible of considerable warmth; but if he could be highly offended, upon a light conceit he could likewise forgive. His heart was tender and sympathetic. He polished a mind which felt its own strength, and decided on whatever came before it with promptitude and firmness. In those trials where affection was to be suffered or subdued, he behaved as a man and a Christian. His piety had no tincture of moroseness; his charity no leaven of affectation. To his whole diocese he was endeared by his laudable discretion and his useful zeal. To the world he was a benefit by his exemplary life and his splendid abilities. And whilst virtue and learning are revered among men, the memory of Lowth will be respected and admired.

Loxia, in zoology, the name of a genus of birds of the order of passerines, the distinguishing characters of which are these: The bill is strong convex above and below, and very thick at the base: the nostrils are small and round: the tongue is as if cut off at the end: the toes are four, placed three before and one behind, excepting in one species, which has only two toes before and one behind.

The curvirostra, or common crow-bill, which is about the size of a lark, is known by the irregularity of its bill, both mandibles of which curve opposite ways and crofs each other: The general colour of the plumage in the male is of a red-lead inclining to rose-colour, and more or less mixed with brown: the wings and tail are brown; the legs black. The female is of a green colour; more or less mixed with brown in these parts where the male is red. This species is a constant inhabitant of Sweden, Germany, Poland, Switzerland, Russia, and Siberia, where it breeds; but migrates sometimes in vast flocks into other countries, as is now and then the case in respect to England; for though in some years it is met with, yet in others it has been known to visit there by thousands, fixing on such spots as are planted with pines, for the sake of the seeds, which are its natural food: it is observed to hold the cone in one claw like the parrot, and to have all the actions of that bird when kept in a cage. It is also found in North America and Greenland; and is said to make the nest in the highest parts of the fir-trees, fastening it to the branch with the resinsious matter which exudes from the trees.

2. The coccothraustes, or hawk-thrush, is in length seven inches; breadth, 13: the bill is funnel-shaped, strong, thick, and of a dull pale pink colour; the breast and whole under side are of a dirty flesh colour; and neck ash coloured; the back and coverts of the wings of a deep brown, those of the tail of a yellowish bay: the greater quill-feathers are black, marked with white on their inner webs; the tail is short, spotted with white on the inner sides; and the legs are of a flesh-colour. This species is ranked among the British birds; but only visits these kingdoms occasionally, and for the most part in winter, and never known to breed there. It is more plentiful in France, coming into Burgundy in small flocks, about the beginning of April; and soon after making the nest, which is placed between the bifurcation of the branches of trees, about twelve feet from the ground; it is composed of small dry fibres, intermixed with liverwort, and lined with finer materials. The eggs are of a roundish shape, of a bluish green, spotted with olive brown, with a few irregular black markings interposed. It is also common in Italy, Germany, Sweden, and the west and southern parts of Russia, where the wild fruits grow. It feeds on berries, kernels, &c., and from the great strength of the bill, it cracks the bones of the fruit of the haws, cherries, &c., with the greatest ease.

3. The emeulet, or pine-grosbeak, is nine inches in length, and weighs two ounces. The bill is strong, dusky, and forked at the end; the head, back, neck, and breast are of a rich crimson; the bottoms of the feathers ash-colour: the quill-feathers and tail dusky, their exterior edges of a dirty white: the legs are black. This species frequents the most northern parts of England, being only met with in Scotland, and especially the Highlands, where it breeds, and inhabits the pine-forests, feeding on the seeds, like the croft-bill. It is also found in all the pine forests of Siberia, Lapland, and the northern parts of Russia; it is common about St Peterburgh in autumn, and is caught in great plenty at that time for the use of the table; returning north in spring. They are likewise common to the northern parts of America; appearing at Hudson's Bay in May, to which place they are said to come from the south, and are observed to feed on the buds of willow. The southern settlements are inhabited by them throughout the year, but the northern only in the summer season. Our last voyagers met with this bird in Norton Sound; it was also found at Aoonalafkia.

4. The pyrrhula, or bullfinch, is so generally known, as,
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as almost to superfede description: The head, wings, and tail, are black; the breast and belly red; the upper tail coverts and vent white; and the breast ash-colour. The female differs in having the under parts of a reddish brown. This species is common in most parts of the continent of Europe, and throughout Russia and Siberia, at which latitudes it is caught for the table. It is pretty common in England; and builds in the bushes, five or six feet from the ground. The nest is composed chiefly of moss; and the eggs, which are five or six in number, are dirty bluish white, marked at the large end with dark spots. The time of breeding is about the end of May or beginning of June. In the summer it mostly frequents woods and the more retired places. In winter it approaches gardens and orchards, and has been generallyigmatized for making havoc among the buds of trees. From some late observations, however, it would appear, that the object of these birds is not the bud, but the worm in the bud; and that this species, in conjunction with various other species of small birds, are the frequent means of defending the embryo-fruits, and hence promoting their growth to maturity: for the warmth that swells the buds, not only hatches nidos (eggs) of unnumbered tribes of insects, whose parent flies, by an unerring instinct, laid them there,—but brings forward a numerous race already in a caterpillar state, that now issue from their concealments, and make their excursion along the budding branches, and would probably destroy every hope of fruitage, but for these useful instruments for its preservation. Those young are principally fed by eating caterpillars.——The bullfinch, in its wild state, has only a plain note; but when tamed it becomes remarkably docile and may be taught any tune after a pipe, or to whistle any notes in the jutest manner: it seldom forgets what it has learned; and will become so tame as to come at call, perch on its master's shoulders, and (at command) go through a difficult musical lesson. They may be also taught to speak, and some thus instructed are annually brought to London from Germany.

5. The coccineus, or blue grosbeak, is the size of the bullfinch: The bill is stout, brown, and the base of it surrounded with black feathers which reach on each side as far as the eye; the whole plumage besides is of a deep blue, except the quills and tail, which are brown, with a mixture of green, and across the wing coverts a band of red: the legs are dusky. It is an inhabitant of South America; but is sometimes found in Carolina, where it is a very solitary bird, and seen only in pairs, but disappears in winter. It has only a single note.

6. The violaceus, or purple grosbeak, is about the size of a sparrow: The bill is black: the plumage, violet black; except the irises, a streak over the eye, the chin, and the vent, which are red: the legs are dusky grey. This species inhabits the Bahama Islands, Jamaica, and the warmer parts of America.

7. The cardinalis, or cardinal grosbeak, is near eight inches in length. The bill is stout, and of a pale red colour: the irises are hazel: the head is greatly crested, the feathers rising up to a point when erect: round the bill, and on the throat, the colour is black; the rest of the bird of a fine red; the quills and tail duller than the rest, and brownish within: the legs are the colour of the bill. The female differs from the male, being mostly of a reddish brown. This species is met with in several parts of North America; and has attained the name of nightingale from the fineness of its song, the note of which resembles that of the nightingale. In spring, and most part of the summer, it sits on the tops of the highest trees, singing early in the morning, and piercing the ear with its loud pipe. These birds are frequently kept in cages, in which they sing throughout the year, with only short intervals of muteness. They are fond of maize and buckwheat; and will get together great hoards of these, often as much as a bushel, which they artfully cover with leaves and small twigs, leaving only a small hole for entrance into the magazine. They are also fond of bees. They come the beginning of April into New York and the Jerseys, and frequent the Magnolia swamps during the summer: in autumn they depart towards Carolina. They are very tame, frequently hopping along the road before the traveller, but are not gregarious, scarce ever more than three or four being met with together. From their being familiar birds, attempts have been made to breed them in cages, but without success.

8. The orix, or grenadier grosbeak, is about the size of a house-sparrow. The forehead, sides of the head, and chin, are black: the breast and belly the same: the wings are brown, with pale edges; and the rest of the body of a beautiful red colour: the legs are pale. These birds are inhabitants of Saint Helena; they are also in plenty at the Cape of Good Hope, where they frequent watery places that abound with reeds, among which they are supposed to make their nest. If (as is supposed) this be the fame with Kolben's Finch, he says that the nest is of a peculiar contrivance, made with small twigs, interwoven very closely and tightly with cotton, and divided into two apartments with but one entrance (the upper for the male, the lower for the female), and is so tight as not to be penetrated by any weather. He adds, that the bird is scarlet only in summer, being in the winter wholly ash-coloured. These birds, seen among the green reeds, are said to have a wonderful effect; for, from the brightness of their colours, they appear like so many scarlet lilies.

9. The Philippina, or Philippine grosbeak, is about the size of a sparrow: the top of the head, the hind part of the neck and back, and the scapulars, are yellow, the middle of the feathers brown: the lower part of the back is brown, with whitish margins: the fore part of the neck and breast are yellow; and from thence to the vent yellowish white: the wing-coverts brown, edged with white: the quills are brown, with pale rufous or whitish edges: and the tail the same: the legs are yellowish. These birds inhabit the Philippine Islands; and are noted for making a most curious nest, in form of a long cylinder, swelling out into a globose form in the middle. This is composed of the fine fibres of leaves, &c. and fastened by the upper part to the extreme branch of a tree. The entrance is from beneath; and, after ascending the cylinder as far as the globular cavity, the true nest is placed on one side of it; where this little architect lays
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Lox lays her eggs and hatches her brood in perfect security.

A variety of this species, the Baglafechat (Buff. iii. 460), an inhabitant of Abyssinia, makes a very curious nest like the former, but a little different in shape; and is said to have somewhat of a spiral form, not unlike that of a nautilus. It suspends it, like the other, on the extreme twig of some tree, chiefly one that hangs over some still water; and always turns the opening towards that quarter from whence least rain may be expected.

10. The Abyssinica, or Abyssinian grosbeak, is about the size of the heathfinch: the bill is black: the irides are red: the top and sides of the head, throat, and breast are black: the upper parts of the body, belly, and thighs, pale yellow, inclining to brown where the two colours divide: the capulars are blackish: the wing-coverts brown, bordered with grey; the quills and tail brown edged with yellow: the legs are of a reddish grey. This bird is found in Abyssinia; and makes a curious nest of a pyramidal shape, which is suspended from the ends of branches like the others. The opening is on one side, facing the east: the cavity is separated in the middle by a partition; upon which the bird rides perpendicularly about half-way, when describing the nest is within the cavity on one side. By this means the brood is defended from snakes, squirrels, monkeys, and other mischievous animals, besides being secure from rain, which in that country sometimes lasts for six months together.

11. The penfils, or penistle grosbeak, (the Teddy-bird of Fryer), is about the size of the house-sparrow: the bill is black: the irides are yellow: the head, throat, and fore-part of the neck, the same: from the nostrils springs a dull green stripe, which passes through the eye and beyond it, where it is broader: the hind part of the head and neck, the back, rump, and wing-coverts are of the same colour: the quills are black, edged with green: the belly is deep grey, and the vent of a rufous red: the tail and legs are black. This species is found at Madagascar; and fabricates the nest of a curious construction, composed of straw and reeds interwoven in shape of a bag, the opening beneath. It is fastened above to a twig of some tree; mostly to those growing on the borders of streams. On one side of this, within, is the true nest. The bird does not form a new nest every year, but selects a new one to the end of the last; and often as far as five in number, one hanging from another. These build in society, like rooks; often five or six hundred being seen on one tree. They have three young at each hatch.

Kämpfer mentions a bird similar to this, if not the same, which makes the nest near Siam, on a tree with narrow leaves and spreading branches, the size of an apple-tree: the nest in the shape of a purse, with a long neck, made of dry grass and other materials, and suspended at the ends of the branches; the opening always to the north-west. He counted fifty on one tree only; and describes the bird itself as being like a Canary-bird, of a dark yellow, and chirps like a sparrow.

Fryer also talks of the ingenuity of the Teddy-bird, making a nest "like a satchel, with winding meanders," and tying it by a slender thread to the bough of a tree. Hundreds of these pendulous nests may be seen on these trees.

12. The chloris or greenfinch, is a well-known bird: the general colour is a yellowish green, palest on the rump and breast, and inclining to white on the belly; the quills are edged with yellow, and the four outer tail-feathers are yellow from the middle to the base; the bill is pale-brown, and stout; and the legs of a flesh-colour.—This species is pretty common in Britain, and flies in troops during the winter. It makes the nest in some low bush or hedge, composed of dry grass, and lined with hair, wool, &c. laying five or six greenish eggs, marked at the larger end with red brown; and the male takes his turn in sitting. This bird soon becomes tame; even old ones being familiar almost as soon as caught: it lives five or six years. Like the chiffinch, it is apt to grow blind if exposed to the sun. This species is also pretty common every where on the continent of Europe; but not very frequent in Russia; and is not at all found in Siberia, though it has been found in Kamtschatka. It is sufficiently common both in Cumberland and Scotland: yet in the first, it is scarce ever observed in the winter season; but the last week in March becomes plentiful, and breeds as in other parts of England.

13. The Bengalensis, or Bengal grosbeak, is a little bigger than a house-sparrow: the bill is of flesh-colour; the irides are whitish; the top of the head is of a golden-yellow; the upper parts of the body are brown, with paler edges; the sides of the head and under parts rufous white; across the breast is a brown band, uniting to, and of the same colour with, the upper parts of the body; the legs are of a pale yellow; the claws grey. This species (thus described by Mr Latham) seems to be the same with the Indian grosbeak described as follows in the Asiatic Researches. "This little bird, called baya in Hindi, bâr bâ in Sanscrit, bârânî in the dialect of Bengal, nilâ in Persian, and tonaw威尔 in Arabic, from his remarkably pendant nest, is rather larger than a sparrow, with yellow brown plumage, a yellowish head and feet, a light-coloured breast, and a conic beak very thick in proportion to his body. This bird is exceedingly common in Hindoostan: he is holomisingly tuneful, faithful, and docile, never voluntarily defirring the place where his young were hatched, but not averse, like most other birds, to the society of mankind, and easily taught to perch on the hand of his master. In a state of nature he generally builds his nest on the highest tree that he can find, especially on the palmyra, or on the Indian fig-tree, and prefers that which happens to overhang a wall or a rivulet: he makes it of grass, which he weaves like cloth and shapes like a large bottle, suspending it firmly on the branches, but so as to rock with the wind, and placing it with its entrance downwards to secure it from birds of prey. His nest usually consists of two or three chambers; and it is the popular belief that he fights them with fire-flies, which he catches alive at night, and confines with moist clay or with cow-dung: That such flies are often found in his nest, where pieces of cow-dung are also flung, is indubitable; but as their light could be of little use to him, it seems probable that he only feeds on them. He may be taught with ease to fetch a piece of paper, or any

*Japan, p. 35.*

*Account of India and Persia, p. 76.*
LOX

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LOX

Loxia. small thing that his master points out to him: it is an attedled [lo], that if a ring be dropped into a deep well, and a signal given to him, he will fly down with amazing celerity, catch the ring before it touches the water, and bring it up to his master with apparent exultation; and it is confidently asserted, that if a house, or any other place be thrown to him once or twice, he will carry a note thither immediately on a proper signal being made. One instance of his docility I can myself mention with confidence, having often been an eye-witness of it. The young Hindoo women at Benares, and in other places, wear very thin plates of gold, called [lores], slightly fixed by way of ornament between their eyebrows; and when they pass through the crowds, it is not uncommon for the youthful libertines, who amuse themselves with training baya's, to give them a signal, which they understand, and send them to pluck the pieces of gold from the foreheads of their mistresses, which they bring in triumph to the lovers. The baya feeds naturally on grashoppers and other insects; but will, if bribed, when tame, on puce macerated in water: his flesh is warm and drying, of easy digestion, and recommended in medical books as a solvent of stone in the bladder or kidneys; but of that virtue there is no sufficient proof. The female lays many beautiful eggs resembling large pearls; the white of them, when they are boiled, is transparent, and the flavour of them is exquisitely delicate. When many baya's are assembled on a high tree, they make a lively din; but it is rather chirping than singing: Their want of musical talents is however amply supplied by their wonderful sagacity, in which they are not excelled by any feathered inhabitant of the forest.

14. The nigra, or black grosbeak, is about the size of a Canary bird: the bill is black, stout, and deeply notched in the middle of the upper mandible; the plumage is black, except a little white on the forepart of the wing and base of the two first quills: the legs are black. It inhabits Mexico.

15. The minuta, or minute grosbeak, is about the size of a wren: the bill is stout, thick, short, and brown: the upper parts of the plumage are grey brown, the under parts and rump ferruginous cheiman; the four, fifth, and sixth quills are white at the base: the legs are brown. It inhabits Surinam and Cayenne. —It is said to keep paired to its mate the whole year; and is a lively and not very tame bird. It mostly frequents lands which have lain for some time uncultivated, and lives both on fruits and seeds. It makes a roundish nest, the hollow of which is two inches in diameter, composed of a reddish herb, and placed on the trees which it frequents. The female lays three or four eggs.

16. The focial, or focial grosbeak, is about the size of a bullfinch: the general colour of the body above is a russet brown, the under parts yellowish; the beak and eyelid are black; the legs brown; and the tail is short. It inhabits the interior country at the Cape of Good Hope; where it was discovered by Mr Carter. —These birds, according to one author, live together in large societies, and their mode of widendition is entirely uncommon. They build in a species of Mimosa, which grows to an uncommon size; and which they seem to have selected for that purpose, as well on account of its ample head, and the great strength of its branches, calculated to admit and to support the extensive buildings which they have to erect, as for the taints and smoothness of its trunk, which their great enemies, the serpent-tribe, are unable to climb. The method in which the nests themselves are fabricated, is highly curious. In the one described by Mr Parson there could be no less a number (he says) than from 300 to 1,000 residing under the same roof. He [see the Plate referred to at Mimosa.] calls it a roof, because it perfectly resembles that of a thatched house, and the ridge forms an angle so acute and so smooth, projecting over the entrance of the nest below, that it is impossible for any reptile to approach them. The industry of these birds seems almost equal (says our author) to that of the bee; throughout the day they appear to be busily employed in carrying a fine species of grasa, which is the principal material they employ for the purpose of erecting this extraordinary work, as well as for additions and repairs. Though my short stay in the country was not sufficient to satisfy me by ocular proof, that they added to their nest as they annually increased in numbers, still from the many trees which I have seen borne down with the weight, and others which I have observed with their boughs completely covered over, it would appear that this is really the case; when the tree which is the support of this aerial city is obliged to give way to the increase of weight, it is obvious that they are no longer protected, and are under the necessity of rebuilding in other trees. One of these deserted nests I had the curiosity to break down, so as to inform myself of the internal structure of it, and found it equally ingenious with that of the external. There are many entrances, each of which forms a regular door, with neatness on both sides, at about two inches distance from each other. The grasa with which they build is called the Bolsman's grasa; and I believe the feed of it to be their principal food; though, on examining their nests, I found the wings and legs of different insects. From every appearance, the nest which I dissected had been inhabited for many years; and some parts of it were much more complete than others: this therefore I conceive nearly to amount to a proof, that the animals added it at different times, as they found necessary, from the increase of the family, or rather of the nation or community.

17. The tridactyla, or three-toed grosbeak (the gfronis balio of Buffon), has only three toes, two before and one behind. The bill is toothed on the edges: the head, throat, and fore-part of the neck are of a beautiful red, which is prolonged in a narrow band quite to the vent; the upper part of the neck, back, and tail are black; the wing coverts brown; edged with white; quills brown, with greenish edges; and legs a dull red: the wings reach half way on the tail. This species inhabits Abyssinia; where it frequents woods, and is a solitary species. It feeds on kernels of seeds, which it breaks with ease with its bill. The name in its native place is gufronis bulla dimus-won ferk. Buffon's figure is from Mr Bruce's drawings. There are 78 other species of this genus; the whole number, besides varieties enumerated in the Soc. Nat. (Gmelin), and in Mr Latham's Journeys into the Country of the Hindoos, is p. 133, &c.
On Plate CCLXXIV. are given specimens of six, viz., A, the Cenolea; B, the Longicuda; C, the Sociæ; D, the Cardinalis; E, the Nigra; F, the Violacea. Loyola (Ignatius). See Ignatius.

Lozenge, in heraldry, a four-cornered figure, resembling a pane of glass in old casemates. See Heraldry, p. 455. col. 1. Though all heralds agree, that single ladies are to place their arms on lozenges, yet they differ with respect to the causes that give rise to it. Plutarch says, in the life of Thefeus, that in Megas, an ancient town of Greece, the tomb-stones, under which the bodies of the giants and rofe diamonds, in brilliants, they are set factory with ballions, moats, walls, and ramparts; in the latter, by the deleting of the facets in the horizontal ribs of the crown. See Facets.

Lozenge is also a form of medicine, made into small pieces, to be held or chewed in the mouth till they are melted there; the same with what are otherwise called trochis, troches.

Lubec, a city and port-town of Germany, in the circle of Lower Saxony and duchy of Holstein, in E. Long. 10. 35. N. Lat. 54. 20. it stands at the confluent of several rivers, the largest of which is the Trave, 12 miles from the Baltic, where it has a fine harbour, and 40 north-east of Hamburg. By the Stekenitz, another of those rivers, it has a communication with the Elbe, and consequently with the German ocean. The city lies on the side of a hill, with the Trave, increased by the Stekenitz on one side, and the Weckenitz on the other; and is strongly fortified with bastions, moats, walls, and ramparts; the hack of which are planted with trees, and form an agreeable walk. Lubec being formerly the chief of the Hanfe towns, was very powerful in consequence of the vast trade it carried on; but a great part of that trade is now transferred to Hamburg; however, it is still said to employ 500 of its own ships, and has a great share of the Baltic trade. It is about two miles in length, and more than one in breadth. The houses are all of stone, but old-fashioned. Several of the streets have on each side rows of lime-trees, with canals in the middle, like those of Holland. The public structures consist of the ancient cathedral of the bishopric of Lubec, and several other Lutheran churches; a nunnery for 22 ladies, with an abbess and prioress; a poor-house, an alms-house, and house of correction; an orphan-house; an hospital dedicated to the Holy-Ghost; a house in which poor travellers are entertained three days, and then sent forward with a pass; but such as happen to be sick, are provided with all necessaries till they recover or die; the city-armoury, a grammar-school of seven classes, the Calvinist church, and the Poppish chapel. The deputies of the Hanfe-towns used to meet here formerly in the town-house.

An alliance still subsists between Lubec, Hamburg, and Bremen; and these cities, under the name of Hanfe-townes, negotiate treaties with foreign powers. Here are divers manufactures, and the city’s territory is about 60 miles in compass. In the diet of the empire Lubec is polled of the third part of the Rhein imperial cities; and among those of the circle, has the first. In the morals, its affinities are to the Rhin, and to the chamber of Wetzlar it pays 557 rixdollars and 83 krunters. The city is a republic within itself, and both makes and executes laws in regard to civil and criminal matters, &c. A father and son or two brothers, cannot be in the regency at the same time. The famous league of the Hanfe-townes was begun here in 1164. This city had its charter of privileges from the emperor Frederic II. Formerly it carried on wars, both offensive and defensive, for several years, not only against the dukes of Mecklenburg, but against the kings of Sweden and Denmark; particularly in 1428, when it fitted out 350 ships of force against Eric X. king of Denmark. There are about 20 churches in Lubec, with lofty steeples or spires. The Trave brings ships of burden into the very heart of the city; but the largest unload at Travemunde, i.e. the mouth of the Trave, eight or ten miles distant. Formerly it is said to have employed no less than 600 ships. In the famous cellar here, it is said there is wine 200 years old. The church of St Mary’s, a noble lofty pile, is supported by tall pillars, all of one stone each, and has a high spire, covered with gilt lead. The town’s garrison consists of about 700 or 800 men. The revenue of its Lutheran bishop, though he is a prince of the empire, is said not to exceed 3000 pounds.

Lubienietski (Stanislaus), a Polish gentleman, descended from a noble family, and born at Cracow in 1623, was educated by his father with great attention. He became a celebrated Socinian minister; and took great pains to obtain a toleration from the German princes for his Socinian brethren. His labours, however, were intellectual; being himself persecuted by the Lutheran ministers, and banished from place to place; until at length he was banished out of the world, with his two daughters, by poison, his wife narrowly escaping, in 1675. We have of his writing A history of the reformation in Poland; A treatise on comets; with other works in Latin.

Lubin (Eilhard), was professor of poetry in the university of Rostock in 1595; and ten years after, was promoted to the professorship of divinity. He wrote notes on Anacreon, Juvenal, Persius, &c. and several other works; but that which made the most noise is a Treatise on the nature and origin of evil, intitled, l’homme du dieu père et nature mal, printed at Rostock in 1596; in which we have a hypothesis to account for the origin of moral evil. He supposed two co-eternal principles; not matter and ca-
LUCANUS (Marcus Annaeus), a Latin poet, born at Corduba in Spain, about A. C. 39. He was the son of Annaeus Mela, the youngest brother of Seneca; and was conveyed to Rome from the place of his nativity at the age of eight months: a circumstance, as his more indigent critics observe, which sufficiently retires the colour of those who consider his language as provincial. At Rome he was educated under the Stoic Cornutus, to warmly celebrated by his disciple Perinnus the fatirists, who was the intimate friend of our poet. In the close of his education, Lucan is said to have passed some time at Athens. On his return to Rome he rose to the office of quaestor, before he had attained the legal age. He was afterward imbibed among the anesurs; and married a lady of noble birth, and of an amiable character. Lucan had for some time been admitted to familiarity with Nero, when the emperor chose to confound for poetical honours by the public recital of a poem he had composed on Niobe; and some verses of this imperial production were supposed to be preferred in the first satire of Perfins. Lucan had the hardihood to repeat a poem on Orphus, in competition with that of Nero; and, what is more remarkable, the judges of the contest were just and bold enough to decide against the emperor. From hence Nero became the perceptor of his successful rival, and forbade him to produce any poetry in public. The well-known conspiracy of Piso against the tyrant soon followed; and Tacitus, with his usual sarcastic severity, concludes that Lucan engaged in the enterprise from the poetical injuries he had received: "a remark (says Mr. Hayley), who has endeavoured to refute the imputation) which does little credit to the character of the historian; but might have found a much nobler, and, I will add, a more probable motive for his conduct, in the generous ardor of his character, and his passionate adoration of freedom. In the sequel of his narration, Tacitus accuses a charge against our poet, which, if it were true, must lead us to detect him as the most abject of mankind. The historian affirms, that Lucan, when accused of the conspiracy, for some time denied the charge; but corrupted at last by a promise of impunity, and desirous to stone for the tarduefulness of his confession, accused his mother Atilla as his accomplice. This circumstance is so improbable in itself, and so little consonant to the general character of Lucan, that some writers have treated it with contempt, as a calumny invented by Nero, to vilify the object of his envious abhorrence. But the name of Tacitus has given such an air of authority to the story that it may seem to deserve a more serious discussion, particularly as there are two subsequent events related by the same historian, which have a tendency to invalidate the accusation fo injurious to our poet. The events I mean are, the fate of Annaeus, and the escape of Atilla, the two parents of Lucan. The former died in consequence of the accusation brought against him, after the death of his son; and his witnesses, who had complained of his innocence to Nero, were afterward executed. 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Lucan. verses of the Pharsalia which the author quoted in so memorable a manner. The two passages he is supposed to have repeated are the following; of which Lipius contends for the latter.

Sanguis erat lacryma : quaeque foramina nova
Humor, ab his largus mutat crudor; ora redundat,
Et pauper oculis: lacus ruber; omnia plevis
Membras fluent venis: totum eft pro vulnere corpus.

Lib. i. 814.

Now the warm blood at once, from every part,
Ran purple o'er all, and drain'd the fainting heart.
Blood falls for tears; and a teeming mourful face
The Hudiy drop their tainted passage trace.
Where'er the liquid juices find a way.
There streams of blood, thence crimson rivers flow.
His mouth and gulping nostrils pour a flood,
And e'en the pores issue out the trickling blood;
In the red deluge all the parts lie drowned,
And the whole body feems one bleeding wound.

Scinditur avulius; nec facta vulnere languit
Emicuit, quasi prosoftique venis,
Diffecursumque animas, diversa in membra mentis,
Interceptus aquis.

Lib. iii. v. 632.

No single wound the gaping rupture feems,
Where trickling crimson wells in f tender streams;
But, from an opening horrible and wide,
A thousand vellae pour the bursting tide:
At once the winding channel's course was broke,
Where wandering life her mazes journey took;
At once the currents all forgot their way,
And left their purple in the azure sea.

Rowe.

Such was the death of Lucan before he had completed his 27th year.—His wife, Polla Argentaria, is said to have transcribed and corrected the three Ariftotle books of the Pharsalia after his death. It is much to be regretted (Mr Hayley observes) that we have not the poem which he wrote on the merits of this amiable and accomplished woman; but her name is immortalized by two surviving poets of that age. The veneration which the public paid to the memory of her husband is recorded by Martial; and more poetically described in that pleasing and elegant little production of Statius, Genethliacum Lucani, a poem said to have been written at the request of Argentaria. The author, after invoking the poetical deities to attend the ceremony, touches with great delicacy and spirit on the compositions of Lucan's childhood, which are lost, and the Pharsalia, the production of his early youth: he then pays a short compliment to the humanity and talents of Argentaria; laments the cruel fate which deprived her of such immaturity of domestic happiness; and concludes with an address to the shade of Lucan, which, with Mr Hayley's translation, we shall join in a Note, as it seems to furnish a strong presumption of Lucan's innocence in regard to one of the accusations mentioned above (A). "Had he been really guilty of basely endangering the life of his mother (says Mr Hayley), it is not probable that his wife would have honoured his memory with such enthusiastic veneration; or that Statius, in verses designed to do him honour, would have alluded to the mother of Nero. If his character as a man has been injured by the historian (continues Mr Hayley), his poetical reputation has been treated not less injuriously by the critics. Quintilian, by a frivolous distinction, disputes his title to be classed among the poets; and Scaliger says, with a brutality of language disgraceful only to himself, that he seems rather to bark than to finge. But these insults may appear amply compensated, when we remember, that in the most polished nations of modern Europe the most elevated and poetical spirits have been his warmest admirers; that in France he was idolized by Corneille, and in England translated by Rowe.—The severest cenures on Lucan have proceeded from those who

\[ \text{(a) At te, seu rapidum polli per acem} \\
\text{Etiam curritus aribus levatus,} \\
\text{Quae fargunt ansemi potentiores,} \\
\text{Terras despiciet, et fepulcre ridet :} \\
\text{Seu pacis meritum nemus reclinuit} \\
\text{Felix zephyri tenes in oris,} \\
\text{Quo Pharsalia turba congregateur,} \\
\text{Et te nobile carmen infonant,} \\
\text{Pompeii comitantur et Catones :} \\
\text{Tu magna facer et superbus umbra} \\
\text{Nefis Tartaron, et procul nocente} \\
\text{Ad victores, pallidumque vivit} \\
\text{Matris lampade refpicis Neronem,} \\
\text{Adis lucidus; et vocante Polla} \\
\text{Unam, quarto, diem deos silen tum} \\
\text{Exores; folet hoc patere limen} \\
\text{Ad nuptas redemptus maritus,} \\
\text{Hac te non thias procos dolois} \\
\text{Fali numinis induit figuras} \\
\text{Ipsum fed celet, et frequentat ipsum} \\
\text{Inim acius infrim medullis} \\
\text{Ac folatia vax subhumanis.} \\
\text{Vultus, qui finiili notatus auro} \\
\text{Stratia praxinet, excubatique fomno} \\
\text{Secures, Procui hinc abite mortes ;} \\
\text{Hac venis gentiles ex origo ;} \\
\text{Cedat lucus atrox, genitque manent} \\
\text{Jarn dulces lacrymas, dolore teceftus} \\
\text{Quicquid different siue nunc adoter.} \\
\text{But you, O! whether to the skies} \\
\text{On Fame's triumphant ear you rife,} \\
\text{Where mightier souls new life affume;}
\]

And mock the confines of the tomb;
Or whether in Elysium blest
You grace the groves of facred cell,
Where the Pharsalian heroes dwell;
And, as you strike your epic shell,
The Pompeys and the Catos throng
To catch the animating song;
Of Tartarus the dread contoul
Links not your high and hallow'd foul;
Diftant you hear that wailing cease,And flee the guilty Nero's ghoul
Grow pale with anguish and affright.
His mother flanching on his light.
Be present to your Polla's vows,
While to your honour'd name the bow's!
One day let your interest gain
From those who rule the shadowy train!
Their gates have op'd to blest a wife,
And given a husband back to life.
In you the tender fair invites
No fancied god with frantic rite:You are the object of her prayers,
You in her inmost heart the bears:
And, flant on mimic gold, your head
Adonis the faithfl mourner's bed,
And fothes her eyes before they close,
The guardian of her chaste repose.
Away with all funeral bace!
From hence his nobler life we date:
The mourners change the pang severe
To fond devotion's greatful tear;
And fateful grief, its anguish o'er,
What it lamented, now adores!
have fairly compared his language to that of Virgil: but how unjust and absurd is such a comparison! It is comparing an uneven block of prophecy, taken rough from the quarry, to the most beautiful superficies of polished marble. How differently should we think of Virgil as a poet, if we pitied only the verses which he wrote at that period of life, when Lucan composed his Pharsalia! In the disposition of his subject, in the propriety and elegance of dictation, he is undoubtedly far inferior to Virgil: but if we attend to the bold originality of his design, and to the vigour of his sentiments, if we consider the Pharsalia as the rapid and uncorrected sketch of a young poet, executed in an age when the spirit of his countrymen was broken, and their taste in literature corrupted; it may justly be esteemed as one of the noblest and most wonderful productions of the human mind."—Lucan wrote several poems; but we have none remaining beside his Pharsalia, of which an excellent English version has been given by Mr Nicholas Rowe.

LUCANUS, the Stag-bettle, in zoology; a genus of insects of the order coleoptera. The antennæ end in a club or knob, which is compressed or flattened on one side, and divided into short laminae, resembling the teeth of a comb; the jaws are produced or advanced before the head, and are dentated. There are 20 species. The largest, as well as the most singular, is the cervus; which is easily to be known by two large moveable maxillae, resembling in form the horns of a stag, which project from its head, and have in a special manner acquired it theappellation of Stag-bettle. Those maxillae, broad and flat, equal to one third of the insect's length, have in the middle, towards their inner part, a small branch, and at their extremity are forked. Besides this, they have several small teeth throughout their whole length. The head that bears these maxillae is very irregular, very broad and short. The thorax is something narrower than the head and body and margined round. The elytra are very plain, without either streaks or lines. The whole animal is of a deep brown colour. It is commonly found upon the oak, but is scarce in the neighbourhood of London, and though the largest of coleopterous insects to be met with in Europe, it is much smaller than those of the same species that are found in woody countries. This creature is strong and vigorous, and its horns, with which it pincers severely, are carefully to be avoided.—The jaws are sometimes as red as coral, which gives this insect a very beautiful appearance; the female is distinguished by the shortness of the jaws, which are not half so long as those of the male.

These insects feed on the liquor that oozes from oak, which they suck with their trunk or tongue. The females deposit their eggs in the trunks of decayed trees, such as the oak and the ash. The larvae or grubs lodge under the bark and in the hollow of old trees, which they eat into and reduce into fine powder, and there transform themselves into chrysalids. They are common in Kent and Suffex, and are sometimes met with in other parts of England. The poreded jaws are particularly useful to these animals, in stripping off the bark from trees, and affixing themselves thereto by the tree, while they suck with their trunk the juice that oozes from it.

LUCAR de Barameda (St), a handsome and considerable town of Spain, with a very good harbour, well defended, in Andalulus. It was once the greatest port in Spain, before the galleons unloaded their treasure at Cadiz. It is seated at the mouth of the river Quadsiver. W. Long. 6, 5. N. Lat. 36, 40.

LUCAR de Guadiana (St), a strong town of Spain, in Andalusia, on the confines of Algarve; seated on the river Guadiana, with a little harbour. W. Long. 5, 59. N. Lat. 57, 32.

LUCAR la maior (St), a small town of Spain, in Andalusia, with the title of a duchy. It is seated on the river Guadiana, in W. Long. 5, 32. N. Lat. 27, 21.

LUCARIA, a feast celebrated at Rome on the 18th of July, in memory of the flight of the Romans into a great wood, where they found an asylu, and saved themselves from destruction. This wood, in which they found protection, was situated between Tyber and the Pin Salaria. The enemies from whom the Romans fled were the Gauls.—On this festival, Plutarch tells us, it was customary to pay the actors, and such as contributed to the public amusement, with the money arising from the felling of wood. This money was called lucar. It is obvious, from what has been observed, that lucar and lucaria are derived from lucus, a grove.

LUCAS (Jacob), an eminent artist, more generally known by the name of Lucas van Leyden, or Huygens, was born at Leyden in 1494. He received his first instructions in the art of painting from his father Hugues Jacobs; but completed his studies in the school of Cornelius Engelbrecht. He gained much money by his profession; and being of a generous turn of mind, he spent it freely, dressed well, and lived in a superior style. It is said, that a few years before his death, he made a tour into Belgium and Brabant; and during his journey, a painter of Flanders, envious of his great abilities, gave him poison at an entertainment; which, though very slow, was too fatal in its effect, and put an end to his life, after six years languishing under its cruel influence. Others, denying the story of the poison, attribute his death to his incessant industry. The superiority of this artist's genius manifested itself in his infancy: for his works, even from the age of nine, were so excellent, as to excite the admiration of all contemporary artists; and when he was about 15, he painted a St Hubert, which gained him great applause. His taste in colouring (Mr Pilkington observes) is good, his attitudes (making a reasonable allowance for the stiff German taste) are well chosen, his figures have a considerable expression in their faces, and his pictures are very highly finished. He endeavoured to proportion the strength of his colouring to the different degrees of distance in which his objects were placed; for in that early time, the true principles of perspective were but little known, and the practice of it was much less observed. In the town-hall at Leyden, the most capital picture of Lucas, the subject of which is the Last Judgement, is preserved with great care; the magistrates have refused very large sums which have been offered for it.

This artist painted not only in oil, but also in temper and upon glass. Nor was he less eminent for his engraving than for his painting. He carried on a familiar and friendly correspondence with Albert Durer,
Luca. Durer, who was his coetemporary; and, it is said, that as regularly as Albert Durer published one print, Lucas published another, without the least jealousy on either side, or with to depreciate each other's merit. And when Albert came to Holland upon his travels, he was received by Lucas in a most cordial and affectionate manner. His style of engraving, however, according to Mr. Strutt, differed considerably from that of Albert Durer, and seems evidently to have been founded upon the works of Israel van Mecklen. His prints are very neat and clear, but without any powerful effect. The strokes are as fine and delicate upon the objects in the front, as upon those in the distances; and this want of variety, joined with the feebleness of the malleus of shadow, give his engravings with all their neatness, an unfinish'd appearance, much unlike the firm substantial effect which we find in the works of Albert Durer. He was attentive to the minute of his art. Every thing is carefully made out in his prints, and no part of them is neglected. He gave great character and expression to the heads of his figures; but, on examination of his works, we find the same heads too often repeated. The hands and feet are rather mannered than correct; and when he attempted to draw the naked figure, he succeeded but very indifferently.

He affected to make the folds of his draperies long and flowing; but his female figures are frequently excessively loaded with girdles, bandages, and other ornamental trappings, that much of the elegance of the design is lost. He engraved on wood, as well as on copper; but his works on the former are by no means numerous. They are, however, very spirited; though not equal upon the whole, to those of his friend Albert. The prints of this master are pretty numerous, but very seldom met with complete; especially fine impressions of them. For though they are, generally speaking, executed with the graver only, yet, from the delicacy of the execution, they soon suffered in the printing. Of his engravings the few following may be mentioned as among the principal. 1. Madonnat sleeping, with a priest murdered by his side, and another figure holding his sword, a middle-sized upright plate, dated 1508, said to be one of his most early productions. 2. An ece ecora, a large plate, lengthwise, dated 1510. 3. The Crucifixion on Mount Calvary, the same. 4. The Wife Mens Offering, the same, dated 1513. 5. Return of the Prodigal Son, a middle-sized upright plate, lengthwise, dated 1518. 6. A large plate breadthwise called the Dance of Magdalen, dated 1570. His own Portrait, a small upright plate, dated 1525.

8. David playing before Saul, a middle-sized upright plate, dated 1530. This is a very fine print; the expression of Saul's countenance, in particular, is admirable. 9. A print known by the name of Ulaufige, which is the scariest of all the works of this master. It is in the collection of the king of France; and said by Marolles, and other matters, to be Unique. But Bafan informs us, that M. Mariette had also an impression of this plate; and it has been since found in one or two other collections. It represents a travelling bag-piper with his family; himself playing as he goes along, and carrying two children in a basket at his back; his wife trailing by his side, supporting with one hand an infant on her shoulder, and with the other leading an ass loaded with two baskets, having two children in each; and another child going before, with a little dog, completes the singular group. This rare print is dated 1520, and is known to have been sold for 16 louis-d'ors.—It is nearly 71 inches high by 41 broad; and has been twice copied. One of the copies is the reverse way; but the other is the same way with the original, and though not well executed, might without a comparison be mistaken for it.

Lucas (Richard), D. D. a learned English divine, was born in 1649, and studied at Oxford; after which he entered into holy orders, and was for some time master of the free school at Abingdon. Being esteemed an excellent preacher, he became vicar of St Stephen's, Coleman Street, in London, and lecturer of St. Olave's in Southwark. He was doctor of divinity; and in 1696 was instituted prebendary of Westminster. His life began to fail him in his youth; and he totally loft it in his middle age. He was greatly esteemed for his piety and learning; and published several works, particularly, 1. Practical Christianity. 2. An Inquiry after happiness. 3. Several sermons. 4. A Latin translation of the whole duty of man. He died in 1715.

Lucas, a small republic of Italy on the coast of the Mediterranean, between the territory of Genoa on the west, Modena on the north, and Tuscany on the east. According to Keyler, it is only about 30 miles in circumference, but is exceeding fertile and populous. It contains, besides the city of Lucca, 500 villages. The number of inhabitants are computed at 120,000. The government is lodged in a gofoner, whose power is much the same with that of the doges of Venice and Genoa. He is assisted by nine councillors; but the power of all the ten continues only for two months; during which time they live in the state-palace, and at the public expense. They are chosen out of the great council, which consists of 240 nobles; but even this council is changed by a new election every two years. The revenues of the republic are about 400,000 fudi or crowns; out of which they maintain 300 men by way of regular force, and 70 Swifts as a guard to their acting magnates. The city of Lucca is situated in a plain, terminating in most delightful eminencies, adorned with villas, summer-houses, corn-fields, and plantations of every kind; so that nothing either for use or pleasure is here wanting. The city, which is about 3 Italian miles in circumference, has regular well-lined fortifications; and its streets, though irregular, are wide, well-paved, and full of handsome houses. The number of its inhabitants is computed to be above 40,000; and they carry on large manufactures, especially of silk-fluffs, Lucca has a bishop, who enjoys several extraordinary privileges; and its cathedral is Gothic. The city stands in E. Long. 11°. 27'. N. Lat. 43° 52'.

Lucenti, Lucentia, or Lucensum, a town of the Hither Spain, now Alcañiz, a sea-port of Valencia. W. Long. 32°, N. Lat. 38° 57'.

Luceres, in Roman antiquity, the third in order of the three tribes into which Romulus divided the people, including all foreigners; so called from the lucem or grove, where Romulus opened a asylum.

Luceria (anc. geog.), a town of Apulia in Italy; which in Strabo's time still exhibited marks of Dioscorides.
LUCERNE

Diomed's sovereignty in those parts. Ptolemy has Nuceria; whether from midlake, or the column of his time uncertain. Now Nocera de Pagani, in the kingdom of Naples. E. Long. 15. 0. N. Lat. 40. 40.

LUCERUS, in mythology, a name given to Jupiter, as Luceria was given to Juno, as the deities which gave light to the world.

LUCERNE, one of the 13 cantons of Switzerland. It holds the third place among the 13; and is the head of the Catholic cantons. Though less than Zuric, and consequently much less than Berne; it is however, far more extensive than any of the rest, being 15 or 16 leagues long, and eight broad. The population is estimated at 100,000. Even the mountains part is not barren, but abundant in wood and pasture, furnishing cattle, hides, cheese, and butter, for exportation. All the north part is fertile in grain, fruit, and hay; supplying sufficient for the consumption of the inhabitants: but as the mountainous part of the little cantons come to their market for corn, the people of Lucerne purchase this commodity from other parts of Switzerland, but especially from Alsace and Swabia. Their manufactures are very inconsiderable; confiling only in a little silk and cotton thread. — The government is oligarchical. The councils are chosen from among 500 citizens only. The great council of 64 members is the nominal sovereign; choosing the two Avoysers, or Axer; council of 36, having for their chiefs the two Avoysers. — The whole canton professes the Roman Catholic religion. The pope's nuncio, at Lucerne. — They threw off the Austrian yoke in 1532, and by entering into a perpetual alliance with the three ancient cantons, they gave such weight to the confederacy, as to enable it in 1536 to resist all the efforts of the enemy at the bloody battle of Sempach.

The town of Lucerne is situated at the extremity of a most beautiful lake of the same name, where the river Reuss issues from it. The buildings are ancient, and the streets narrow; nor is Lucerne populous in proportion to its extent, the inhabitants being only between 3 and 4000. Since this is the great passage to Italy by Mount St. Gothard, and the merchandise which passes the Alps on mules, and is to be transported by the rivers Reuss, Aar, and Rhine, is all deposited here, it might have a flourishing trade if arts and manufactures were attended to. The Reuss separates the town into two unequal parts, which are connected by three bridges; one wide for carriages; and two narrow covered ones for foot passengers: besides these, there is a fourth over an arm of the lake, to pass to the cathedral. Three of these bridges have old bad paintings of the Dance of Death, and the History of the Bible, and of Switzerland. They make a commodious dry walk for the inhabitants. — Of religious edifices, the principal are the cathedral, or collegiate church of St. Leger; the convent of Cordeliers; the college of Jesus; the convent of Conches; and the two convents of nuns. Of the secular buildings, the hotel de Ville is the principal. The arsenal is also large, and well furnished. The water tower is remarkable only for its position and antiquity: it is said to have been a pharos or lighthouse. — What greatly attracts most the notice of strangers is, a plan in relief of part of the cantons of Lucerne, Zug, and Berne, and the whole of Schweitz, Uri, and Underwald, executed by General Piiffer on a large scale. He has completed about 60 square leagues; the plan is 12 feet long, and nine and an half broad: every mountain is accurately measured; and every object distinctly placed.

The lake of Lucerne exhibits greater variety and more picturesque scenery than any other of the Swiss lakes. It is seven leagues long in a right line, and three wide about Kufinaeht; but the shape is very irregular. The whole south side is bordered by high mountains; but the north exhibits hills of no great height. The narrow gulf that extends towards the west, is bordered on the west and north-west by Mount Pilat, which is a single mountain rising boldly more than 6000 feet above the lake; and on the south by Mount Burgenberg, Stanz-Stadt, belonging to the canton of Unterwald, is on this side; and hereabouts the lake is deepest. Kufinaeht is on the point of the other gulf, which extends towards the east, and is wider than the former. All the country to the west of these gulfs, and part of it to the north of the latter, belongs to the canton of Lucerne; but that which is to the south and north-east is dependent on the canton of Zir. All the mountains on the left shore of the lake belong to the canton of Unterwald; those on the right, partly to the canton of Uri, partly to that of Schweitz, partly to the little republic of Gersau, but principally to the canton of Lucerne.

Lucerne, in botany. See Medicago.—For the culture of this plant, see Agriculture, n° 183.

LUCIA (St.), one of the Caribbee Islands in the West-Indies, about 22 miles long, and 11 broad, the middle of it lying in N. Lat. 19° 14'. W. Long. 72° 0. It was first settled by the French in 1650; but was reduced by the English in 1664; who evacuated it in 1666. The French immediately re-settled the island, but were again driven away by the Caribbes. As soon as the savages were gone, the former inhabitants returned, but only for a short time; for being afraid of falling a prey to the first privateer that should visit their coasts, they removed either to other French settlements that were stronger, or where they might expect to be better defended. There was then no regular culture or colony at St. Lucia; it was only frequented by the inhabitants of Martinico, who came thither to cut wood, and to build canoes, and who had considerable docks on the island. In 1718 it was again settled by the French; but four years after, it was given by the court of London to the duke of Montague, who was sent to take possession of it. This occasioned some disturbance between the two courts; which was settled, however, by an agreement made in 1731, that, till the respective claims should be finally adjusted, the island should be evacuated by both nations, but that both should wood and water there. This precarious agreement furnished an opportunity for private interest to exert itself. The English no longer molested the French in their habitations; but employed them as their subjects in carrying on with richer colonies a more struggle trade, which the subjects of both governments thought equally advantageous to them. This trade has been more or less considerable till the treaty of 1763, when the pro-
Lucian, a celebrated Greek author in the first century, was born at Samosata, of obscure parents, in the reign of the emperor Trajan. He studied law, and practiced some time as an advocate; but growing weary of the wrangling oratory of the bar, he commenced rhetorician. He lived to the time of Marcus Aurelius, who made him regifter of Alexander in Egypt; and, according to Suidas, he was at last worried by dogs. Lucian was one of the finest wits in all antiquity. His dialogues, and other works, are written in Greek. In these he has joined the useful to the agreeable, instruction to fatire, and erudition to elegance; and we every where meet with that fine and delicate raillery which characterizes the Attic style. Thosc who censure him as an impious scoffer at religion, have reason on their side, if religion confuted in the theology of the Pagan poets, or in the extravagant opinions of philosophers; for he perpetually throws such ridicule on the gods and philosophers, with their vices, as inspires hatred and contempt for them; but it cannot be said that he writes any where against an over-ruling providence.

Lucianists, or Lucanists, a religious sect, so called from Lucianus, or Lucanus, a heretic of the second century, being a disciple of Marcion, whose errors he followed, adding some new ones to them. Epiphanius says he abandoned Marcion, teaching that people ought not to marry, for fear of enriching the Creator; and yet other authors mention that he held this error in common with Marcion and other Gnostics. He denied the immortality of the soul: asserted it to be material.

There was another sect of Lucanists, who appeared some time after the Arians. They taught, that the Father had been a Father always, and that he had the name even before he begot the Son; so as having in him the power of the faculty of generation; and in this manner they accounted for the eternity of the Son.

Lucid Intervals, the fits of Lunatics or maniacs, wherein the phrenzy leaves them in possession of their reason.

Lucifer, according to the poets, was the son of Jupiter and Aurora: in astronomy, Lucifer is the bright planet Venus, which either goes before the sun in the morning, and is our morning star; or in the evening follows the sun, and is called Hesperus or the evening star.

Luciferia, in mythology, a surname given to Diana, under which title she was invoked by the Greeks in childhood. She was represented as covered with a large veil, interspersed with stars, bearing a crescent on her head, and holding in her hand a lighted flambeau.

Luciferians, a religious sect, who adhered to the schism of Lucifer, bishop of Cagliari, in the fourth century, who was banished by the emperor Constance for having defended the Nicene doctrine concerning the three persons in the Godhead. Didascylus seems to intimate, that they believed the soul, which they considered as of a carnal nature, to be transmitted to the children from their fathers. Theodosius says, that Lucifer was the author of a new error. The Luciferians increased mightily in Gaul, Spain, Egypt, &c. The occasion of the schism was, that Lucifer would not allow any acts he had done to be abolished. There were but two Lucerian bishops, but a great number of priests and deacons. The Luciferians bore a peculiar aversion to the Arians.

Lucilius (Caius), a Roman knight, and a Latin poet, was born at Sicilia in Italy, about 140 B. C. He served under Scipio Africanus in the war with the Numantines; and was in great favour with that celebrated general, and with Lælius. He wrote 50 books of fables, in which he lashed several persons of quality very harshly. Some learned men ascribe the invention of satire to him; but M. Dacier has maintained, with great probability, that Lucilius only gave a better turn to that kind of poetry, and wrote it with more wit and humour than his predecessors Ennius and Pausias had done. His fragments have been carefully collected.
LUCAS [320] LUCAS

Lucian collected by Francis Douce at Leyden in 1559, with notes. But they require still to be better illustrated by some learned critics.

LUCINA, a goddess among the Romans, who presided over women in labour. Some take her to be Diana, others Juno. She is called Lucina, because she brought children to the light; from the Latin word lux, "light."

LUCIUS, in ichthyology. See Esox.

LUCONIA. See MAP.".

LUCOPHEREA, in ichthyology. See PERCA.

LUCRETIA, the famous Roman matron, wife of Collatinus, and the cause of the revolution in Rome from a monarchy to a republic; this lady being ravished by Sextus, the eldest son of Tarquin king of Rome, stabbed herself, 509 B. C. See the article CHASTITY. The bloody poignard, with her dead body exposed to the Senate, was the signal of Roman liberty; the expulsion of the Tarquins, and abolition of the regal dignity, was instantly resolved on, and carried into execution. See ROMEx.

LUCRETius, or TITUS LUCRETIUS CAIUS, one of the most celebrated of the Roman poets, was born of an ancient and noble Latin family, and studied at Athens, where he became one of Epicurus's disciples. He acquired great reputation by his learning and eloquence; but in the flower of his age fell into a frenzy, occasioned by a philtrum given him by his wife, who was distracted with fond of him. Lucretius, during the intervals of his madness, put Epicurus's doctrines into verse, and composed his six books De rerum natura, which are still extant. It is said, that he killed himself in a fit of madness, in the 54th year before the Christian æra, when 57 years old. The most correct edition of Lucretius is that of Simon de Coline. The cardinal de Polignac has refuted Lucretius's arguments in his excellent Latin poem intitled ANTI-LUCRETIUS. His poem De rerum natura has been translated into English by Mr Creech.

LUCRINUS LUCUS (anc. geog.), a lake of Campania, between Baie and Puteoli, famous for its outers (Horace, Martial, Juvenal); Lucrinienses (Cicero), the people dwelling on it. Now a perfect bay since the earthquakes in 1538.

LUCULLUS (Lucius Lucinius), a Roman general, celebrated for his eloquence, his victories, and his riches. In his youth he made a figure at the bar; and being afterwards made praetor in Asia, and praetor in Africa, governed those provinces with great moderation and justice. Scarse was he known as a military man, when he twice beat the fleet of Amilcar, and gained two great victories over him. His happy genius was greatly improved by study; for he employed his leisure in reading the best authors on military affairs. Being made consul with Aurelius Cotta, during the third war with Mithridates king of Pontus, he was sent against this prince; and this expedition was attended with a series of victories, which did him more honour than an act of generosity towards his colleague, who, willing to take advantage of his absence to signe him, if some great exploit, happened to fight Mithridates; but was defeated and shut up in Calcedon, where he must have perished, if Lucullus, sacrificing his refreshment to the pleasure of saving a Roman citizen, had not flown to his assistance, and

disengaged him. All Pontus then submitted to Lucullus; who being continued in his government of Asia, entered the territories of Tigranes, the most powerful king in Asia. That prince marched with a formidable army against Lucullus: who defeated him with a handful of men, and killed great numbers of his forces; took Tigranocertes, the capital of his kingdom; and was ready to put an end to the war, when the intrigues of a truce got him deposed, and Pompey nominated in his room. Lucullus having brought home prodigious riches, now gave himself up to excessive luxury; and his table was served with a profusion till that time unknown. He brought from the East a great number of books, which he formed into a library, and gave admittance to all men of learning, who frequented it in great numbers. Towards the end of his life, he fell into a kind of madness; and Lucullus, his brother, was appointed his guardian. He is said to have been the first who brought cherries into Europe, having brought the grafts from the kingdom of Pontus.

LUCUS, in general, denotes a wood or grove sacred to a deity; so called à lucene, because a great number of lights were usually burning in honour of the god (Lucus); a proper common with idolaters, as we learn from Scripture: hence Homer's ἀλέες αἰχμαλώτης.

LUD, a British king mentioned in our old chronicles, and said to have reigned about the year of the world 3878. He is reported to have enlarged and walled about Troy, or New Troy, where he kept his court, and made it his capital. The name of London is hence derived from Lud's town, and Ludgate, from his being buried near it: but this is only one among many other derivations of the name of London, which are at least equally probable. See LONDON.

LUDI, a term used for shows and public representations made by the Romans, for the entertainment of the people. See GAMES.

For an account of the particular games of Greece and Rome, as the Isthmian, Nemean, Olympic, &c. See ISTMHIAN, &c.

LUDIUS, a celebrated painter, lived in the reign of Augustus Caesar, and excelled in grand compositions. He was the first who painted the fronts of houses in the streets of Rome; which he beautified with great variety of landscapes, and many other different subjects.

LUDLOW (Edmund), son of Sir Henry Ludlow, was born at Maidenhead, and educated in Trinity college, Oxford. His father opposing the king's interest, Mr Ludlow joined with the same party, and was present at the battle of Edgehill as a volunteer under the earl of Essex. Upon the death of his father, he was chosen knight of the shire for Wilts, and obtained the command of a regiment of horse for the defence of that county. He was one of King Cha. 1.'s judges: after whole death he was sent by the parliament into Ireland, in quality of lieutenant-general of the horse; which employment he discharged with diligence and success till the death of the lord-deputy Ireton, when he acted for some time as general, though without that title; Cromwell, who knew him to be sincerely in the interest of the commonwealth, always finding out some pretext to hinder the conferring of that character upon him. The last stroke had been given
Ludlow, given by Ludlow to the Irish rebellion, if the surpuration of Cromwell had not prevented it. Under his power he never acted; and though Cromwell used his utmost efforts, he remained inexcusable. After Cromwell's death, he endeavoured to restore the commonwealth; but Charles II. being recalled, he thought proper to conceal himself, and escaped into Switzerland, where he settled. After the revolution, he came over into England, in order to be employed in Ireland against King James: but appearing publicly in London, it gave great offence; and an address was presented by Sir Edward Seymour to King William III. for a proclamation in order to apprehend Colonel Ludlow, attained for the murder of King Charles I. Upon this he returned to Switzerland, where he died. During his retirement in Switzerland he wrote his Memoirs.

Ludlow, a town of Shropshire in England, situated at the confluence of the Teme and Corve, 18 miles from Shrewsbury, and 138 from London. The president of the council of the marches, established by Henry VIII. generally kept his courts in it, by which the town was much benefited, these courts not having been abolished till the 1st of William and Mary. Its neighbourhood to Wales makes it a great thoroughfare, and engages many of the Welsh to send their children of both sexes to it for education. It was incorpored by Edward IV. and among other privileges has that of trying and executing criminals within itself. It is one of the nearest towns in England, with walls and seven gates. It is divided into four wards; and is governed by a bailiff, 12 aldermen, 25 common-councillors, a recorder, a town clerk, steward, chamberlain, coroner, &c. From the castle on the top of the hill on which the town stands is a most delightful prospect. In an apartment of the outer gatehouse Samuel Butler is said to have written the first part of Hudibras. Of this castle, which was besieged and taken by King Stephen some of the offices are fallen down, and great part of it turned into a bowling-green; but part of the royal apartments and the tower of state are still left. The walls were at first a mile in compass, and there was a lawn before it for near two miles, of which much is now inclosed. The battles are very high and thick, and adorned with towers. It has a neat chapel, where are the coats of arms of abundance of Welch gentry, and over the flable doors are the arms of Queen Elizabeth, the earls of Pembroke, &c. This castle was a palace of the prince of Wales, in right of his prinopality. The river Teme has a good bridge over it, several weirs and crofts on it, and turns a great many mills. Here is a large parochial church, which was formerly collegiate; in the choir whereof is an inscription relating to Prince Arthur, elder brother to King Henry VIII. who died here, and whose bowels were here deposited, though it is said his heart was taken up some time ago in a leaden box. In this choir is a cloister, commonly called God's House, where the priests used to keep their consecrated utensils; and in the market-place is a conduit, with a long stone crost on it, and a niche wherein is the image of St. Lawrence, to whom the church was dedicated. On the north side of the town there was a rich priory, whereof there are few ruins to be seen except those of its church. Here are an alms-house for 30 poor people, and two charity-schools where 50 boys and 30 girls are both taught and clothed. It has a market on Monday, and three fairs on Wednesday, Friday, and Saturday. Its fairs are on the Tuesday Easter, Whit-Wednesday, August 27, Sept. 28, and Dec. 8. Provisions are very cheap here; and at the annual horse-races there is the best of company. The country round is exceedingly pleasant, fruitful, and populous, especially that part called the Corve-dale, being the vale on the banks of the river Corve. Ludlow sends two members to parliament.

Ludolph (Job), a very learned writer of the 17th century, was born at Erfurt in Thuringia. He travelled much, and was master of 25 languages; visited libraries, searched after natural curiosities and antiquities every where, and conversed with learned men of all nations. He published A History of Ethiopia, and other curious books.

Ludolph (Henry William), nephew of Job above-mentioned, was born at Erfurt in 1655. He came over to England as secretary to M. Lenthe, envoy from the court of Copenhagen to that of London; and being recommended to Prince George of Denmark, was received as his secretary. He enjoyed this office for some years, until he was incapacitated by a violent disorder; when he was discharged with a handsome pension; after he recovered, he travelled into Muscovy, where he was well received by the czar, and where his knowledge made the Muscovite priests suppose him to be a conjurer. On his return to London in 1694, he was cut for the stone; and as soon as his health would permit, in acknowledgment of the civilities he had received in Muscovy, he wrote a grammar of their language, that the natives might learn their own tongue in a regular method. He then travelled into the East, to inform himself of the state of the Christian church in the Levant; the deplorable condition of which induced him, after his return, with the aid of the bishop of Worcester, to print an edition of the New Testament in the vulgar Greek, to present to the Greek church. In 1705, when such numbers of Palatines came over to England, Mr. Ludolph was appointed by Queen Anne one of the commissioners to manage the charities raised for them; and he died early, the following year. His collected works were published in 1712.

Ludwidgeia, in botany: A genus of the monogynia order, belonging to the tetrandra class of plants; and in the natural method ranking under the 17th order, Calycanthemata. The corolla is terrapetalous; the calyx quadripartite, superior; the capsule tetragonal, quadrilocular, inferior, and polypersomous.

Lux, among physicians, is in general used for a disease of any kind; but in a more particular sense is restrained to contagious and pestilential diseases: thus the lux Gallica, or venerea, signifies the venereal disease. See Medicine. Index.

Luff, the order from the pilot to the steerman to put the helm towards the lee-side of the ship, in order to make the ship fall nearer the direction of the wind. Hence, luff round, or luff a-lee, is the excess of this movement, by which it is intended to throw the ship's head up in the wind, in order to tack her course. A ship is accordingly said to bring her lee when she yields to the effort of the helm, by falling nearer
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Lull nearer to the line of the wind than she had done before. See also HALLING the Wind.

Tackle, a name given by sailors to any large tackle that is not defined for a particular place, but may be variously employed as occasion requires. It is generally somewhat larger than the jigger tackle, although smaller than those which serve to hoist the heavier materials into and out of the vessel, which latter are the main and fore-tackles, the stay and quarter-tackles, &c.

LUG-SAIL, a square-sail, hoisted occasionally on the mast of a boat or smaller vessel upon a yard which hangs nearly at right angles with the mast. There are more particularly used in the barca longas, navigated by the Spaniards in the Mediterranean.

LUGDUNUM (anc. geog.), the capital of the Seguiani in Gallia-Celtica, situated at the confluence of the Arar and Rhodanus; on an eminence, as the Celtic term dune signifies; built by Maximianus Plancus under Augustus, while commanding in that part of Gaul; and whither he led a colony. Now Lyons, capital of and Lyoinois.

LUGGER SHALL, a town of the Baravi in Gallia Belgica. Now Leyden in Holland.

LUGGER SHALLEN (anc. geog.), a town of Gaul in Aquitania, at the foot of the Pyrenees. Now S. Bertrand, in Garcomy.

LUGUEUS TACUS (anc. geog.), a lake of Japydia, the western district of Illyricum, to the south of the Save, and near the head of the Arda. Now commonly called the Zirichnitz Lake, from a small adjoining town. It is locked on every side with mountains; from which scanty currents run down; the lefs in quantity their waters, because drank up by the earth; till at length they are swallowed up in rocky furrows, so formed as to resemble artificial. In thefe the water being brought as to refuse receiving any more, they regurgitate, and return the water with extraordinary celerity; which thus spreading itself, forms a lake, in most places 13 cubits high. These waters afterwards retire with no lefs celerity than they came on, not only through the furrows, but pass through the whole of the bottom, as through a sieve; which when perceived by the inhabitants, they directly stop up the larger apertures, and thus take large quantities of fish; when the lake is dry, they cut down their harvest on the spot where they flowed, and soon again before the inundation comes on: and graft shoots to quick it, that it may be cut down in three weeks time (Lazius, Lernherus).

LUGGERSHALL, a borough of Wiltshire, 22 miles north of Salisbury, and 75 north by west of London. It is an ancient borough by prescription, though but a small hamlet, near the forest of Chute, in a delightful country; and was the residence of several kings. It had formerly a castle. It is governed by a bailiff chosen yearly at the lord of the manor's court.

On the neighbouring downs there used to be horse-races. It has a fair on the 25th of July, and sends two members to parliament.

LUKE (St), the evangelist, and the disciple of the apostles, was originally of Antioch in Syria, and by profession a physician. He particularly attached himself to St Paul, and was his faithful companion in his travels and labours. He went with him to Troas in Macedonia about the year 51. He wrote his Gospel in Achaia about the year 53; and, ten years after, the Acts of the Apostles, which contains a history of 30 years. Of all the inspired writers of the New Testament, his works are written in the most elegant Greek. It is believed that St Luke died at Rome, or in Achaia.

Gospel of St Luke, a canonical book of the New Testament. Some think that it was properly St Paul's Gospel; and that, when the apostle speaks of his Gospel, he means what is called St Luke's. Jerome says, that St Luke digested into writing what St Paul preached to the Gentiles; and Gregory Nazianzen tells us, that St Luke wrote with the assistance of St Paul.

St Luke the Evangelist's Day, a festival in the Christian church, observed on the 18th of October.

LULA, a town of Swedish Lapland; seated at the mouth of the river Lula, on the west side of the gulph of Bothnia, 42 miles south-west of Torne. E. Long. 21.0. N. Lat. 64. 30.

LULIA LAPMARK, a province of Swedish Lapland; bounded by that of Torne on the north, by the Bothnic Gulph on the east, by Pithia Lapmark on the south, and Norway on the west.

LULLI (John Baptist), the most celebrated and most excellent musician that has appeared in France since the revival of learning, was born at Florence. He was taken to France when very young by a person of quality; and he carried the art of playing on the violin to the highest perfection. Louis XIV. made him superintendent of music. Some time after Perinna having introduced operas into France, and quarrelling with his company, he resigned his privilege to Lulli. Operas were then carried on to the utmost perfection by this celebrated musician, and were attended with continual applause. Lulli every year, after this time, gave a piece of his own composition, till his death, which happened in 1687.

LULLY (Raymond), a famous writer, farnamed the Enlightened Doctor, was born in the island of Majorca in 1625. He applied himself with indefatigable industry to the study of the Arabian philosophy, to chemistry, physic, and divinity; and acquired great reputation by his works. He at length went to preach the gospel in Africa; and was stoned to death in Mauritania, at the age of 80. He is honoured as a martyr at Majorca, whither his body was carried. He wrote many treatises on all the sciences, in which he shows much study and industry, but little judgment or solidity. A complete edition of his works has been printed at Mentz. He ought not to be confounded with Raymond Lully of Terraca, farnamed Neophyto, who from being a Jew turned Dominican friar. This last Lully maintained several opinions that were condemned by Pope Gregory XI.

LUMBAGO, a fixed pain in the small of the back. See Medicine—Index.

LUMBARIS, a name given to the arteries and veins which spread over the loins.

LUMBRICAL, a name given to four muscles of the fingers and to as many of the toes.

LUMBRICUS, the Worm, in zoology; a genus of insects belonging to the order of Hemiptera. The body is cylindrical, annulated, with an elevated belt near the middle, and a vent-hole on its side. There are two species of this animal.

1. Lumu-
LUM

1. **Lumbricus terrestris**, the earth or dew worm, Mr. Barlow observes, differs extremely in colour and external appearance in the different periods of its growth, which hasoccasioned people little acquainted with the variations of this kind of animals to make four or five different species of them. The general colour is a dusky red. — They live underground, never quitting the earth but after heavy rains or at the approach of storms, and in the season of their amours. The method to force them out is, either to water the ground with infusions of bitter plants, or to trample on it. The bare motion on the surface of the soil drives them up, in fear of being surprized by their formidable enemy the mole. The winding progress of the worm is facilitated by the inequalities of its body, armed with small, stiff, sharp pointed bristles: when it means to in-line it fall into the earth, these ooze from its body a clamorous liquor, by means of which it slides down. It never damages the roots of vegetables. Its food is a small portion of earth, which it has the faculty of digesting: The superfluity is ejected by way of excrement, under a vermicular appearance. Earth-worms are hermaphroditic, and have the parts of generation placed near the neck: their coagulation is performed on the ground; nothing being more usual than to see it full of holes, which holes are thought to be made by those kind of worms coming to the surface in quest of females. During their custom they would sooner suffer themselves to be crushed than parted.

2. The *marinus*, marine worm, or lug, is of a pale red colour, and the body is composed of a number of annular joints; the skin is feeble and all the rings or joints are covered with little prominences, which render it extremely tough to the touch. It is an inhabitant of the mud about the sea-fllores, and serves for food to many kinds of fish: surprising large ones are to be met with about the Bognor rocks in Sussex, England. The fishermen bait their hooks and nets with it.

For the effects of these animals in the human body, and the method of expelling them, see Medicine-Index.

**Plate cclxxiv.**

**Lunell**o, a village in Italy, which gives name to the Lunellin, a small district in the duchy of Milan, lying along the river Po, and of which Mortarina and Valencia are the principal places. It was ceded to the duke of Savoy in 1707, and confirmed by the treaty of Utrecht in 1713. E. Long. 8. 42. N. Lat. 45. 5.

**Lumino**us, an epithet applied to any thing that shines or emits light.

**Luminous Emanations,** have been observed from human bodies, as also from those of brutes. The light arising from currying a horse, or from rubbing a cat's back, are known to mist. Instances of a like kind have been known on combing a woman's head. Bartholin gives us an account, which he titles *mulier resplendens*, of a lady in Italy whose whole body would shine whenever slightly touched with a piece of linen. These effluvia of animal bodies have many properties in common with those produced from glafs; such as their being lucid, their snapping, and their not being excited without some degree of friction; and are undoubtedly electrical, as a cat's back has been found strongly electrical when stroked. See Electricity, and Light.
LUNAT\(\text{ic}\), in law. Under the general term of non composit\(\text{a}\) mentis (which Sir Edward Coke says is the most legal name) are comprised not only lunatics, but persons under frenzies, or who lose their intellects by disease; those that grow deaf, dumb, and blind, not being born so; or fucht, in short, as are judged by the court of chancery incapable of conducting their own affairs. To these also, as well as idiots, the king is guardian, but to a very different purpose. For the law always imagines, that these accidental misfortunes may be removed, and therefore only constitutes the crown a trustee for the unfortunate persons, to protect their property, and to account to them for all profits received, if they recover, or after their decease to their representatives. And therefore it is declared by the statute 17 Edw. II. c. 10, that the king shall provide for the custody and satisfaction of lunatics, and preserve their lands, and the profits of them, for theirnie when they come to their right mind; and the king shall take nothing to his own use: and if the parties die in such estate, the residue shall be distributed for their souls by the advice of the ordinary, and of course (by the subsequent amendments of the law of administrations) shall now go to their executors or administrators.

On the first attack of lunacy or other occaional in\(\text{s}\)t\(\text{f}\)inity, when there may be hopes of a speedy restitution of reason, it is usual to confine the unhappy objects in private custody under the direction of their nearest friends and relations: and the legislature, to prevent all abuses incident to such private custody, hath thought proper to interpose its authority, by 14 Geo. III. c. 49, for regulating private madhouses. But when the disorder is grown permanent, and the circumstance of the party will bear such additional expence, it is thought proper to apply to the royal authority to warrant a lodging confinement.

The method of proving a person non composit is very similar to that of proving him an idiot. The lord chancellor, to whom, by special authority from the king, the custody of idiots and lunatics is intrusted, upon petition or information, grants a commission in nature of the writ de id\(\text{i}\)st\(\text{is}\) inquirenda, to inquire into the party's state of mind; and if he be found non composit, he usually commits the care of his person, with a suitable allowance for his maintenance to some friend, who is then called his committee. However, to prevent fin\(\text{i}\)ller practices, the next heir is seldom permitted to be of this committee of the person; because it is his interest that the party should die. But, it hath been said, there lies not the same objection against his next of kin, provided, he be not his heir; for it is his interest to preserve the lunatic's life, in order to increase the personal estate by savings, which he or his family may hereafter be entitled to enjoy. The heir is generally made the manager or committee of the estate, if he be in his interest, by good management to keep it in condition: accountably, however, to the court of chancery, and to the non composit himself, if he recovers; or otherwise, to his administrators. See\textit{ Id\(\text{io}\)cy}.

LUNATION, the period or space of time between one new moon and another; also called\textit{ synodical month}. See\textit{ Cycle and Earth}.

LUNDEN, or\textit{ Lunden}, a considerable town of Sweden in Gothland; and capital of the territory of Schon, with an archbishop's see and an university. It was ceded to the Swedes by the Danes in 1658. L. Long. 13° 25'. N. Lat. 55° 40'.

LUNDY-\textit{Island}, situated 50 miles in the sea, off the N.W. coast of Devonshire, is 5 miles long and 2 broad, but so encompassed with inaccessible rocks, that it has but one entrance to it, so narrow that two men can scarce go abreast. It is reckoned in the hundred of Branton. It had once both a fort and a chapel. The south part of it is indifferent good soil, but the north part of it is barren, and has a high pyramidal rock called the Constable. Here are hares, kine, hogs, and goats, with great store of sheep and rabbits; but the chief commodi\(\text{ty}\) is fowl, with which it abounds much, their eggs being very thick on the ground at their season of breeding. No venomous creature will live in this island. In the reign of King Henry VIII. one William Morisco, who had conspired to murder him at Woodstock, fled to this island, which he fortified, turned pirate, and did much damage to this coast, but was taken by surprize at length, with 16 of his accomplices, and put to death.

LUNE,\textit{ Lunula}, in\textit{ Geometry}, a plane in form of a crescent or half-moon, terminated by the circumference of two circles, that intersect each other within.

LUNENBURG, or\textit{ Luneburg Zell}, a principality of Germany, bounded to the north by that of Calenberg, the diocese of Hildesheim, and the duchy of Brunswick; to the north by the duchy of Lauenburg and the Elbe, by the laft of which it is separated from the territory of the imperial city of Hamburg; to the east, by the duchy of Brunswick, the Alte Mark, and the duchy of Mecklenburg; and to the west, by the duchies of Bremen and Verden, the country of Hoya, and the principality of Calenberg. The soil, except along the Elbe, Aller, and jetz, is either sand, heath, or moors. In the more fruitful parts of it are produced wheat, rye, barley, oats, peas, buck wheat, flax, hemp, hops, pulfe, oak, beech, fir, pines, birch, and alder, together with black cattle and horses. The heaths abound with bees and honey, and a small kind of sheep whose wool is long and coarse. Lauenburg is well furnished with salt springs and limestone, and the forest of Gorde with venison. The rivers Elbe, Ilmenau, and Aller, are navigable; and, consequently very advantageous to the country, independent of the fish which they yield. The general diets of this principality are convened by the sovereign twice a year, and held at Zell. They consist of the deputies of the nobility and the towns of Lauenburg, Uelzen, and Zell, who have the nomination of the members of the high colleges, and other officers, jointly with the sovereign.
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Lunenburg reign. There are near 200 Lutheran churches in the county, under two general and 15 subordinate superintendents, several grammar-schools, two Calvinistic churches at Zell, and an academy of exercises at Lunenburg. The manufactures are chiefly linen cloth, cottons, ribbons, stockings, hats,itch, bleached wax, refined sugar, gold and silver wires, all kinds of wooden wares, barges, boats, and ships. The exports of these to Hamburg, Lubeck, and Altena, are considerable. The neighbourhood of these cities, with the facility of conveying goods and merchandise to them and other places; either by land or water, is very advantageous to this country, and contributes greatly to its subsistence. On account of this principality, the king of Great Britain has a seat and voice both in the college of the princes of the empire and of the circle of Lower Saxony. Its quota in the Matricula is 20 horses and 120 foot, or 720 florins in lieu of them. The revenue of the principality arises chiefly from the demesnes, tolls on the Elbe, contributions, duties on cattle, beer, wine, brandy, and other commodities, which altogether must be very considerable; some bawliwaks alone yielding upwards of 20,000 rixdollars.

L U N E N B U R G, the capital of the principality of the same name, is a pretty large town of Germany, on the river Elmen, or the Ilmenau, which is navigable from the town to the Elbe, at the distance of 13 miles. It is 27 miles from Hamburg, 47 from Zell, 6 from Brunswick, 70 from Bremen, 68 from Hannover; and stands in E. Long. 10. 40. N. Lat. 53. 28. Its inhabitants are reckoned at between 8000 and 9000. Formerly this town was one of the Hanze, and an imperial city. Some derive its name from Lina, the ancient name of the Ilmenau; others from Luna the moon, an image of which is said to have been worshipped by the inhabitants in the times of Paganism. Here were anciently several convents, viz. one of minims, another of Premonstratensians, another of Benedictines, and a fourth of Minorites. Out of the revenues of the Benedictine monastery was founded an academy for the martial exercises, where young gentlemen of the princely family of Lunenburg are maintained gratis, and taught French, fencing, riding, and dancing; but foreigners are educated at a certain fixed price. A Latin school was also founded, consisting of four classes, and well endowed out of these revenues. The superintendency and management of these, and the estates appropriated to their maintenance, belongs to the landsdorff, or the auffreiter, who are both chosen from among the Lunenburg nobility. The first came in place of the Popplin abbot, and as such is head of the files of the principality, and president of the provincial college. He has the title of excellency; and in public instruments styles himself by the grace of God landschafi director, and lord of the mansion of St Michael in Lunenburg. The chief public edifices are three parish-churches, the ducal palace, three hospitals, the town-house, the salt-magazine, the anatomical theatre, the academy; the conventual church of St Michael, in which lie interred the ancient dukes; and in which is the famous table eight feet long, and four wide, plated over with chased gold, with a rim embellished with precious stones, of an immense value, which was taken from the Saracens by the emperor Otho, and presented to this church; but in 1698, a gang of thieves stripped it of 200 rubies and emeralds, together with a large diamond, and most of the gold, so that at present but a small part of it remains. Here are some very rich fai springs. Formerly, when there was a greater demand for the salt, upwards of 120,000 tons have been annually boiled here, and sold off; but since the commencement of the present century, the salt trade hath declined greatly. A fifth of the salt made here belongs to the king, but is farmed out. It is said to excel all the other salt made in Germany. This town is well fortified; and has a garrison, which is lodged in barracks. In the neighbourhood is a good lime-stone quarry, and along the Ilmenau ware-houses in which are lodged goods brought from all parts of Germany, to be forwarded by the Ilmenau to Hamburg, or by the Ache to Lubeck, from whence other goods are brought back the same way. The town itself drives a considerable traffic in wax, honey, flax, linen, salt, lime, and beer.

L U N E N S E M A R M O R, in the natural history of the ancients, the name of that species of white marble now known among us by the name of the Carrara marble, and distinguished from the statuary kind by its greater hardness and less splendour. I was ever greatly esteemed in building and ornamental works, and is so still. It is of a very close and fine texture, of a very pure white, and more transparent than any other of the white marbles. It has always been found in great quantities in Italy, and is so to this day. See LUNA.

L U N E T T E, in fortification, an enclosed court-yard, or elevation of earth, made beyond the second ditch, opposite to the places of arms; differing from terracellins only in their situation. Lunettes are usually made in ditches full of water, and serve to the same purpose as fan de brays, to dispute the passage of the ditch. See Fortification.

L U N E T T E, in the manage, is a half-shoefshoe, or such a shoe as wants the spur, i. e. that part of the branch which runs towards the quarters of the foot. Lunette is also the name of two small pieces of felt, made round and hollow, to clap upon the eyes of a vicious horse that is up to bite, and strike with his fore feet, or that will not suffer his rider to mount him.

L U N G S, in anatomy, a part of the human body, serving for respiration. See Anatomy, no. 117.

In the Journal de Medicine for June 1789 is a description of a

Inventor of Inflating the Luxes, invented by M. Gorey physician to the military hospital at Neufbruck, which appears, to be extremely well adapted to the purpose, whilst it may be used with the greatest ease and facility.

This instrument, which the inventor styles apotropos, that is, 'refiner of respiration consists of a double pair of bellows, BCLM, fig. 1, the two different parts of which have no communication with each other. In the lower side B M is an aperture A for a valve constructed on the principles of those of Mr Nairne's air-pump. It consists of a rim of copper, closed at one end by a plate of the same metal, in which plate are seven small holes placed at equal distances. This plate is
is covered with a piece of silk coated with elastic gum, in which are six transverse incisions of two or three lines in length. Each incision is so made as to be situated between two of the holes, and at an equal distance from each: see D, fig. 2. The silk must be made very secure, by a thread passing several times round the rim. It is obvious, that a stream of air applied to that side of the plate which is opposite to the silk, will pass through the holes, and lifting up the silk, escape through the incisions. On the contrary, a stream of air applied to the other side will press the silk upon the plane, and thus close the holes, so that it will be impossible for it to pass through them. This valve opens internally, so as to admit the air from without. At B is another valve, on the same construction, but opening in a contrary direction, thus permitting the air to escape out of the lower part into the tube E, but preventing its entrance. At C is another valve, opening internally to admit the air from the tube E; and at D there is a fourth, opening externally, to discharge the air from the upper part.

The flexible tube E, screwed on at the end C B, being introduced into one of the nostrils, whilst the mouth and the other nostril are closed by an asphyxiant, if we separate the two handles L M, which were close together at the introduction of the tube, it is evident, that the air in the lungs will roll into the upper part through the valve C, whilst the external air will fill the lower part through the valve A: the two handles being again brought into contact, the atmospheric air will be forced into the lungs through the valve B, and at the same time the air in the upper part will be discharged at the valve D. Thus by the alternate play of the double bellows, the lungs will be alternately filled and emptied as in respiration. In using the instrument care should be taken not to be too violent; as the more perfectly the natural motion of respiration is imitated the better.

To prevent any irritations from without injuring the valves A D, fig. 1, the rim is made with a screw, B, fig. 3, in order to receive a cap A A, fig. 3, full of small holes. This screw has also another use. If dephephlogisticated air be preferred, a bladder filled with it, fig. 4, may, by means of the screw A, be fastened to the valve A, fig. 1; and to prevent waists, as this air may serve several times, a flexible tube may be fastened on the valve D, fig. 1, communicating with the bladder by means of the opening d, fig. 4: thus it may be employed as often as the operator thinks proper.

There is a handle K to the partition in the middle, in order that, if it be at any time necessary to use either of the divisions alone, the other may be confined from acting. e, fig. 5, represent the two valves to be applied at the end of the instrument C B, fig. 1: and fig. 6, is a section of the end C B, showing the valves in their proper places.

It is proper to add, that the capacity of the instrument should be proportioned to the quantity of air received into the lungs in inspiration, which Dr Goodwyn has ascertained to be twelve cubical inches or somewhat more. Each division of the instrument, therefore, should be capable of containing that quantity.

**Long-Wort**, in botany. See **Pulmonaria**.

**LUNISOLAR year**, in chronology, the space of 532 common years; found by multiplying the cycle of the sun by that of the moon.

**LUNULA.** See **LUNAE**.

**LUPERCALIA**, feasts instituted in ancient Rome, in honour of the god Pan—The word comes from **Lupercal**, the name of a place under the Palatine mountain, where the sacrifices were performed.

The Lupercalia were celebrated on the 15th of the kalends of March, that is, on the 15th of February, or as Ovid observes, on the third day after the ides. They are supposed to have been established by Evander.

On the morning of this feast, the Luperci, or priests of Pan, ran naked through the streets of Rome, striking the married women they met on the hands and belly with a thong or strap of goat's leather, which was held an omen promising them fecundity and happy deliveries. See **LUPUS**.

This feast was abolished in the time of Augustus but afterwards restored, and continued to the time of the emperor Anastasius.—Baronius says it was abolished by the pope in 496.

**LUPERSI**, a name given to the priests of the god Pan. See **LUPERCALIA**.

The **luperci** were the most ancient order of priests in Rome: they were divided into two colleges or companies, the one called **Fabii** and the other **Quintili**.

To these Caesar added a third, which he called **Julii**.

**LUPINUS, Lupine**, in botany: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, Papilionaceae. The calyx is bilabiate; there are five oblong and five roundish anthers; the legumes are coriaceous. There are seven species, six of them hardy herbaceous flowere, annuals, and one perennial, rising with upright stalks from one to three or four feet high, ornamented with digitate or fingered leaves, and terminated by long whorled spikes of papilionaceous flowers, white, blue, yellow, and rose-coloured. They are all easily raised from seed; and succeed in any open borders, where they make a fine variety.

The seeds of the white lupine, which have a leguminous tail accompanied with a disagreeable bitter one, are said to be anethelmine, both internally taken, and applied externally. Caspar Hoffman cautions against their internal use, and tells us (one of the Arabian writers) that they have sometimes occasioned death. Simon Paulus also says that he saw a boy of eight or ten years of age, after taking a dram of these seeds in powder, feized with exquisite pains in the abdomen, a difficulty of respiration, and almost total loss of voice; and that he was relieved from these complaints by a glass of milk and sugar, which brought away a vast quantity of worms. But Mr Geoffroy observes, very justly, that either these symptoms were owing to the worms, and not to the medicine; or that these seeds, if they have any noxious quality, lose it with their bitterness in boiling; since they were commonly used among the Greeks as food, and recommended by Galen as very wholesome.

**LUPULUS, in botany.** See **Humulus**.

**LUPUS**, in zoology. See **Canis**.

**Lupus-Marinus.** See **Anarrhichas**.

Lurcer, a kind of hunting dog much like a mongrel gundog, with pricked ears, a flagged coat, and generally of a yellowish white colour: they are very swift runners, so that if they get between the barrows and the coisons they seldom miss; and this is their common practice in hunting: yet they use other faculties, as the tumbler does, some of them bringing their game and those are the best. It is also observable, that a lurcher will run down a hare at stretch.

Lure, in falconry, a device of leather, in the shape of two wings, fixed with feathers, and basted with a piece of flesh, to call back a hawk when at considerable distance.

Lurgan, a port and fair town in the county of Armagh and province of Ulter in Ireland, 67 miles from Dublin. It is a flourishing town, agreeably situated in the midst of a much improved country; and the inhabitants are extensively engaged in the linen manufacture. It stands on a gentle eminence, about two miles from Lough Neagh, of which it commands the middle of the lake.

Lurgan-green, a port and fair town of Ireland, in the county of Louth and province of Leinster, 37 miles from Dublin; a mile beyond which is a handsome seat of the earl of Charlemont. It has three fairs in the year.

Luridæ, the name of the 28th order in Linnaeus's fragments of a natural method. See Botany, p. 462.

Lusatia, a marquisate of Germany in upper Saxony, bounded to the east by Silesia, to the west by Mefnia, to the south by Bohemia, and to the north by the marquisate of Brandenburg. Till towards the middle of the 15th century, the Upper Lusatia was called the Mark, i.e. the marquisate or the land of Budiftn and Gorlitz; and the Lower only Lusatia, which it is said, in the Schononic signifies "a woody or marshy country." The air of the Upper Lusatia, which is hilly or mountainous, is better than that of the Lower, a great part of which is moorish and boggy. Both abound in wood, especially the Lower, and turf for fuel. The heath and mountainous tracts are generally barren; but the lower championship and marsh lands are tolerably fertile, producing barley, wheat, rye, oats, barley, buck wheat, peas, lentils, beans, and millet; together with flax, hops, tobacco, some white and red wine, and what is called manna. Of several of these articles, however, considerable quantities are imported. In this country are found also quarries of stone, medicinal springs, bastard diamonds, agates, and Jasper, earths and clays for tobacco-pipes and all sorts of earthen ware, alum, good iron, stone, vitriolic and copper water; uranium is deficient of cattle, fish, and venison. The rivers Spee, the Schwarze or Black Elter, and the Pulznitz, have their sources in the Lusatias, which are also watered by the Neisse and Queis. The ancient inhabitants of this country were the Saxons, who were succeeded by the Vandals, and thence by the Sobers-Wends, a Slavonian people. The present inhabitants, the descendents of the Wends, have an odd dress; and the language is so inarticulate and guttural, that it hath been so curs'd, it might be pronounced without lips, teeth or tongue: but the towns are almost wholly peopled by Germans.

In the Upper Lusatia are six towns which appear at the land-diets, 16 smaller country towns, and four market towns. In the Lower are four diet-towns, 13 country-towns, and two market ones. Both marquisates were formerly subject either to the kings of Bohemia, or electors of Brandenburg: but, in 1620, both were absolutely ceded to the elector of Saxony, in lieu of the 72 tons of gold which he expended in assisting the emperor Ferdinand II. against the Bohemians.

Christianity was first planted in Lusatia in the seventh century, but it was several centuries after that before Popery was fully established. In the 11th century many cloisters were erected in the country; but at the reformation such numbers embraced Lutheranism, that it became the predominant religion and still continues, though there are still several Roman Catholic foundations, churches, market-towns, and villages. The feel of Hessian politics has great influence and esteem here. There are considerable manufactures of woollen and linen stuffs in the Lusatias, especially the Upper. At Budiftn, and in the adjacent country, prodigious quantities of flockings, spatterdashes, caps, and gloves are made. The linen manufactures also flourish here, chiefly in the Upper Lusatia, where all sorts of linen are made, printed, and dyed. Exclusive of these, there are considerable manufactures of hats, leather, paper, gunpowder, iron, glafs, bleached wax, &c.

Though the demand and exportation of these commodities, particularly linens and woollens, is not so great as formerly, yet it is still considerable, and more than overbalances their importations in wool, yarn, silk, wines, spices, corn, fresh and baked fruits, garden stuff, and hops. Difficulties of many years standing have subsisted between the country-artificers and linen-manufacturers on the one side, and the diet towns on the other. The natives of this country are said to have quick natural parts, but to be forbidly pensive. We are told they observe the Saxon laws much better than they did the Bohemian. Learning hath been much esteemed and encouraged in both marquisates since the reformation, but the schools in the six diet-towns of Upper Lusatia, particularly at Gorlitz, Budiftn, and Zittau, great distinction themselves, having handsome stipends. In Lower Lusatia also are some good schools, with stipends for the maintenance of students. Printing is said to be much followed, and brought to great perfection in this country.

In Upper Lusatia, the fates confit, 1st, of those called fiete-foils; 2dly, of the prelates; 3dly, of the gentry and commonalty, under which are comprehended the counts, barons, nobles, and burgesses, poftfors of fces and fief-efates; and, 4thly, of the representatives of the six principal towns. Without the consent of these fates no taxes can be imposed, nor any thing of importance, that regards the public interest. The diets are ordinary or extraordinary. The ordinaries meet once in three years, and the extraordinary when summoned by the sovereign upon particular emergencies. As to ecclesiastical matters, the dean of the
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Lustria, an epithet given by the ancients to the water used in their ceremonies to sprinkle and purify the people. From them the Romanists have borrowed the holy water used in their churches.

Lustral Day, (Dies Lustricus), that wherein the lustrations were performed for a child, and its name given; which was usually the ninth day from the birth of a boy, and the eighth from that of a girl. Others performed the ceremony on the last day of that week wherein the child was born, and others on the fifth day from its birth.

Over this feast-day the goddess Nundina was supposed to preside; the midwives, nurses, and domestics, handed the child backwards, and forwards, around a fire burning on the altar of the gods, after which they sprinkled it with water; hence this feast had the name of amphibromia. The old women mixed salvia and ditt with the water. The whole ended with a sumptuous entertainment. The parents received gifts from their friends on this occasion. If the child was a male, their door was decked with an olive garland; if a female, with wool, denoting the work about which women were to be employed.

Lustration, in antiquity, sacrifice of sacred lustration, by which the ancients purified their cities, fields, armies, or people, destitute of any crime or impurity. Some of these lustrations were public, others private. There were two species or manners of performing lustration, viz. by fire and sulphur, by water, and by air; which last was done by fanning and agitating the air round the thing to be purified. Some of these lustrations were necessary, i. e., could not be dispensed with; as lustrations of houses in times of a plague, or upon the death of any person; others again were done out of choice, and at pleasure. The public lustrations at Rome were celebrated every fifth year; in which they led a victim thrice round the place to be purified, and in the mean time burnt a great quantity of perfumes. Their country lustrations, which they called ambarvalia, were celebrated before they began to reap their corn; in those of the armies, which they called armilustra, some chosen soldiers, crowned with laurel, led the victims, which were a cow, a sheep, and a bull; thrice round the army ranged in battle-array in the field of Mars, to which deity the victims were afterwards sacrificed, after pouring out many imprecations upon the enemies of the Romans. The lustrations of their flocks were performed in this manner: the shepherd sprinkled them with pure water, and thrice surrounded his sheepfold with a composition of fava, laurel, and brimstone set on fire; and afterwards sacrificed to the goddesses Palas an offering of milk boiled, wine, a cake, and millet. As for private houses, they were sprinkled with water, a fumination of laurel, juniper, olive tree, fava, and such like; and the victim commonly was a pig. Lustrations made for particular persons were commonly called expiations; and the victims pisula. There was also a kind of lustration used for infants, by which they were purified girls the third, and boys the ninth, day after their birth, which ceremony was performed with pure water and spittle. See the article AMBARVALIA. In their lustratory sacrifices, the Athenians sacrificed two men, one for the men of their city, and the other for the women. Divers of these expiations were after: some fasted; others abstained from all sensual pleasures; and some, as the priests of Cybele, castrated themselves. The purifiers of the penitents were different according to the different sacrifices. The priests changed their habits according to the ceremony to be performed; white, purple, and black, were the most usual colours. They cast into the river, or at least out of the city, the animals or other things that had served for a lustration or sacrifice of atonement; and thought themselves threatened with some great misfortune when by chance they trod upon them. Part of these ceremonies were abolished by the emperor Constantine, and his successors: the rest sublifted till the Gothic kings were masters of Rome; under whom they expired, excepting what the popes thought proper to adopt and bring into the church.

For the lustration, or rather expiation, of the ancient Jews, see EXPIATION.

Lustre, the glows or brightness appearing on any thing, particularly on manufactures of silk, wool, or fluff. It is likewise used to denote the composition or manner of giving that glow. The lustre of silks is given them by washing in soap,
then clear water, and dipping them in alum water cold. To give fluid a beautiful lute: For every eight pounds of stuff allow a quarter of a pound of linseed; boil it half an hour, and then strain it through a cloth, and let it stand till it is turned almost to a jelly; afterwards put an ounce and a half of gum to dissolve 24 hours; then mix the liquor, and put the cloth into this mixture, rake it out, dry it in the shade, and press it. If once doing is not sufficient, repeat the operation. Curriers gives a lute to black leather first with juice of barberries, then with gum-arabic, ale, vinegar, and Flanders-glue, boiled together. For coloured leather, they use the white of an egg beaten in water. Moroccas have their lute from juice of barberries, and lemon or orange. For hats, the lutes is frequently given with common water; sometimes a little black dye is added: the same lute serves for furs, except that for very black furs they sometimes prepare a lute of galls, copperas, Roman alum, ox's marrow, and other ingredients.

LUSTRE, an appellation given to a branched candle-stick, when made of glas. See BRANCH and JESSE.

LUSTRINGS. A company was incorporated for making, dressing, and intrating alamos and lustrings in England, who were to have the sole benefit thereof, by Stat. 4. and 5. William and Mary. And no foreign filks known by the name of lustrings or alamos are to be imported but at the port of London, &c. Stat. 9. and 10. W. III. c. 43. See SILK.

LUSTRUM, in Roman antiquity, a general mutter and review of all the citizens and their goods, which was performed by the censors every fifth year, who afterwards made a solemn lustration. See the article LUSTRATION.

This custom was first instituted by Servius Tullius, about 180 years after the foundation of Rome. In course of time the lustra were not celebrated so often; for we find the fifth lustrum celebrated at Rome only in the 574th year of that city.

LUTE, or LUTING, among chemists, a mixed, tenacious, rude substance, which grows solid by drying, and, being applied to the juncture of velvets, flops them up so as to prevent the air from getting either in or out. See CHEMISTRY-INDEX.

Lute, is also a musical instrument with strings.—The lute consists of four parts, viz. the table, the body or belly, which has nine or ten sides; the neck, which has nine or ten flops or divisions, marked with strings; and the head or croo, where the fereu for raling and lowering the flings to a proper pitch of tone are fixed. In the middle of the table there is a nole or passage for the sound; there is also a bridge that the strings are fasten to, and a piece of ivory between the head and the neck to which the other extremities of the strings are fitted. In playing, the strings are struck with the right hand, and with the left the fops are prefixed. The lutes of Bologna are esteemed the best on account of the wood, which is said to have an uncommon disposition for producing a sweet sound.

LUTETIA PARISIARUM, (anc. geogr.), a town of the Parisii, in Gallia Celta, situated in an island in the Scenna or Seine. It received its name, as some suppose from the quantity of clay, lutum, which is in its neighbourhood. J. Caesar fortified and embellished it, from which circumstance some authors call it Juli Ci.

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gustativos to check by this authority the rashness of an arrogant monk, which brought disgrace upon their order, and gave offence and disturbance to the whole church.

From these letters, and the appointment of his open enemy Priérias to be his judge, Luther easily saw what sentence he might expect at Rome; and therefore discovered the utmost solicitude to have his cause tried in Germany, and before a less suspected tribunal. He wrote a submissive letter to the pope, in which he promised an unrestrained obedience to his will, for as yet he entertained no doubt of the divine original of the pope’s authority; and by the intercession of the other professors, Cajetan the pope’s legate in Germany was appointed to hear and determine the cause. Luther appeared before him without hesitation; but Cajetan thought it below his dignity to dispute the point with a person so much his inferior in rank: and therefore required him, by virtue of the apostolic powers with which he was clothed, to retract the errors which he had uttered with regard to indulgences and the nature of faith, and to abstain for the future from the publication of new and dangerous opinions; and at the last forbade him to appear in his presence, unless he proposed to comply with what had been required of him.

This haughty and violent manner of proceeding, together with some other circumstances, gave Luther’s friends such strong reasons to suspect that even the imperial safe-conduct would not be able to protect him from the legate’s power and refentment, that they prevailed upon him secretly to withdraw from Augsburg, where he had attended the legate, and to return to his own country. But before his departure, according to a form of which there had been some examples, he prepared a solemn appeal from the pope, ill-informed at that time concerning his cause, to the pope, when he should receive more full intimation with respect to it.—Cajetan, enraged at Luther’s abrupt retreat, and at the publication of his appeal, wrote to the elector of Saxony, complaining of both, and requiring him as he regarded the peace of the church, or the authority of its head, either to seduce that demented monk a prisoner to Rome, or to banish him out of his territories. Frederic had hitherto, from political motives, protected Luther, as thinking he might be of use in checking the enormous power of the see of Rome; and though all Germany rejoiced with his fame, the elector had never yet admitted him into his presence. But upon this demand made by the cardinal, it became necessary to throw off somewhat of his former reserve. He had been at great expense and bestowed much attention on founding a new university, an object of considerable importance to every German prince; and foreseeing how fatal a blow the removal of Luther would be to its reputation, he not only declined complying with either of the pope’s requests, but openly discovered great concern for Luther’s safety.

The situation of our reformer, in the mean time, became daily more and more alarming. He knew very well what were the motives which induced the elector to afford him protection, and that he could by no means depend on a continuance of his friendship. If he should be obliged to quit Saxony, he had no other asylum, and must stand exposed to whatever punishment the rage or bigotry of his enemies could inflict; and so ready were his adversaries to condemn him, that he had been declared a heretic at Rome before the expiration of the 60 days allowed him in the citation for making his appearance. Notwithstanding all this, however, he discovered no symptoms of timidity or remissness; but continued to vindicate his own conduct and opinions, and to inveigh against those of his adversaries with more vehemence than ever. Being convinced, therefore, that the pope would soon proceed to the most violent measures against him, he appealed to a general council, which he affirmed to be the representative of the Catholic church, and superior in power to the pope, who being a fallible man, might err, as St Peter, the most perfect of his predecessors, had done. The court of Rome were equally affiduous in the mean time to crush the author of these new doctrines which gave them so much uneasiness. A bull was issued by the pope, of a date prior to Luther’s appeal, in which he magnified the virtues of indulgences, and subjected to the heaviest ecclesiastical censures all who presumed to teach a contrary doctrine. Such a clear decision of the sovereign pontiff against him might have been very fatal to Luther’s cause, had not the death of the emperor Maximilian, which happened on January 17, 1519, contributed to give matters a different turn. Both the principles and interest of Maximilian had prompted him to support the authority of the see of Rome; but, in consequence of his death, the vicarate of that part of Germany which is governed by the Saxon laws devolved to the elector of Saxony; and, under the shelter of his friendly administration, Luther himself enjoyed tranquillity, and his opinions took such root in different places, that they could never afterwards be eradicated. At the same time, as the election of an emperor was a point more interesting to the pope (Leo X.) than a theological controversy which he did not understand, and of which he could not foresee the consequences, he was so extremely solicitous not to irritate a prince of such considerable influence in the electoral college as Frederic, that he discovered a great unwillingness to pronounce the sentence of excommunication against Luther, which his adversaries continually demanded with the most clamorous importunity.

From the reason just now given, and Leo’s natural aversion to severe measures, a suspension of proceeding against Luther took place for 18 months, though perpetual negotiations were carried on during this interval in order to bring the matter to an amicable issue. The manner in which these were conducted having given our reformer many opportunities of observing the corruption of the court of Rome, its obstinacy in adhering to established errors, and its indifference about truth, however clearly proposed or strongly proved, he began, in 1520, to utter some doubts with regard to the divine original of the papal authority, which he publicly disputed with Erasmus, one of his most learned and formidable antagonists. The dispute was indecisive, both parties claiming the victory; but it must have been very mortifying to the partizans of the Romish church to hear such an essential point of their doctrine publicly attacked.
The Papal authority being once suspected, Luther proceeded to push his inquiries and attacks on one doctrine to another, till at last he began to shake the firmest foundations on which the wealth and power of the church were established. Luther then began to perceive that there were no grounds of reclaiming such an incorrigible heretic; and therefore prepared to denounce the sentence of excommunication against him. The college of cardinals was often assembled, in order to prepare the sentence with due deliberation; and the able canonsiffs were consulted how it might be expressed with unexceptional formality. At last it was decided on the 15th of June 1520. Forty-one propositions, extracted out of Luther's works, were therein condemned as heretical, scandalous, and offensive to pious ears; all persons were forbidden to read his writings, upon pain of excommunication; such as had any of the propositions gathered from the canon law were pronounced an obstinate heretic, excommunicated, and delivered to Satan for the destruction of the flesh; and all secular princes were required, under pain of incurring the same censure, to seize his person, that he might be punished as his crimes deserved.

Luther was not in the least disconcerted by this sentence, which he had for some time expected. He renewed his appeal to his general council; declared the pope to be that antichrist, or man of sin, whose appearance is foretold in the New Testament; declaimed against his tyranny with greater vehemence than ever; and at last, by way of retaliating, having assembled all the professors and students in the university of Wittemberg, with great pomp, and in the presence of a vast multitude of spectators, he called the volumes of the canon law, together with the bull of excommunication, into the flames; he himself, if he did not within sixty days, publicly recant his errors, and burn his books, was pronounced an obstinate heretic, excommunicated, and delivered to Satan for the destruction of the flesh; and all secular princes were required, under pain of incurring the same censure, to seize his person, that he might be punished as his crimes deserved.

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On the accession of Charles V. to the empire, Luther found himself in a very dangerous situation. Charles, in order to secure the pope's friendship, had determined to treat him with great severity. His eagerness to gain this point, rendered him not averse to gratify the papal legates in Germany, who insisted, that, without any delay or formal deliberation, the diet then sitting at Worms ought to condemn a man whom the pope had already excommunicated as an incorrigible heretic. Such an abrupt manner of proceeding, however, being deemed unprecedented and unjust by the members of the diet, they made a point of Luther's appearing in person, and declaring whether he adhered or not to those opinions which had drawn upon him the censures of the church. Not only the emperor, but all the princes through whose territories he had to pass, granted him a safe conduct; and Charles wrote to him at the same time, requiring his immediate attendance on the diet, and renewing his promises of protection from any injury or violence. Luther did not hesitate one moment about yielding obedience; and set out for Worms, attended by the herald who had brought the emperor's letter and safe-conduct. While on his journey, many of his friends, whom the court of Hapsburg, under familiar circumstances, and notwithstanding the same security of an imperial safe-conduct, filled with solicitude, advised and interceded him not to rush wantonly into the midst of danger. But Luther, superior to such fears, silenced them with this reply, "I am lawfully called (said he) to appear in that city; and thither will I go in the name of the Lord, though as many devils as there are tiles on the housetops were there combined against me."

The reception which he met with at Worms, was such as might have been reckoned a full reward of all his labours, if vanity and the love of applause had been the principles by which he was influenced. Greater crowds assembled to behold him than had appeared at the emperor's public entry; his apartments were daily filled with princes and personages of the highest rank; and he was treated with an homage more extraordinary, as well as more flattering, than which any preeminence in birth or condition can command. At his appearance before the diet, he behaved with great decency, and with equal firmness. He readily acknowledged an excess of acrimony and vehemence in his controversial writings; but refused to retract his opinions unless he were convinced of their falsehood, or to consent to their being tried by any other rule than the word of God. When neither threats nor injunctions could prevail on him to depart from this resolution, some of the ecclesiastics proposed to imitate the example of the council of Constance, and, by publishing the author of this pestilent heresy, who was now in their power, to deliver the church at once from such an evil. But the members of the diet refusing to expel the German integrity to freth reproach by a confession of violation of public faith, and Charles being now unwilling to bring a blame upon the beginning of his administration by such an ignominious action, Luther was permitted to depart in safety. A few days after he left the city, a severe edict was published in the emperor's name and by authority of the diet, depriving him, as an obstinate and excommunicated criminal, of all the privileges which he enjoyed as a subject of the empire, forbidding any prince to harbour or protect him, and requiring all to seize his person as soon as the term specified in his protection should be expired.

But this rigorous decree had no considerable effect; the execution of it being prevented partly by the multiplicity of occupations which the commons in Spain, together with the wars in Italy and the Low Countries, created to the emperor; and partly by a prudent precaution employed by the elector of Saxony, Luther's faithful patron. As Luther, on his return from Worms, was palling near Altenbrunn in Thuringia, a number of horsemen in masks rushed suddenly out of a wood, where the elector had appointed them to lie in wait for him, and, surrounding his company, carried him, after dismissing all his attendants, to Worms, a strong castle not far distant. There the elector ordered him to be supplied with everything necessary or agreeable; but the place of his retreat was carefully concealed, until the fury of the present storm against
against him began to abate, upon a change in the political system of Europe. In this solitude, where he remained nine months, and which he frequently called his Parnas, after the name of that island to which the apostle John was banished, he exerted his usual vigour and industry in defence of his doctrines, or in controversy of his adversaries, publishing several treatises, which revived the spirit of his followers, affihliated to a great degree and disheartened, had given little or no check to Luther's edict. But immediately wrote him a letter, distressing and disheartening his retirement, appeared publicly again at Wittemberg, upon the 6th of March 1522. He appeared indeed without the elector's leave; but immediately wrote him a letter, to prevent his taking it ill. The edict of Charles V. as severe as it was, had given little or no check to Luther's doctrine, for the emperor was no sooner gone into Flanders, than his edict was neglected and despised, and the doctrine seemed to spread even faster than before. Caroloftadius, in Luther's absence, had pushed things on faster than his leader; and had attempted to abolish the use of masses, to remove images out of the churches, to fet aside auricular confession, invocation of saints, the abstaining from meats; had allowed the monks to leave their monasteries, to neglect their vows, and to marry; in short, had quite changed the doctrine and discipline of the church at Wittemberg; all which, though not against Luther's sentiments, yet was blamed by him, as being rashly and unseasonably done. Lutheranism was still confined to Germany; it was not got to France; and Henry VIII. of England made the most vigorous acts to hinder it from invading his realm. Nay, he did something more: to show his zeal for religion and the holy see, and perhaps his skill in theological learning, he wrote a treatise, Of the seven sacraments, against Luther's book, Of the Captivity of Babylon, which he presented to Leo X. in October 1521.

The pope received it very favourably, and was so well pleased with the king of England, that he complimented him with the title of Defender of the faith. Luther, however, paid no regard to his kingship; but answered him with great sharpness, treating both his person and performance in the most contemptuous manner. Henry complained of Luther's rude usage of him to the princes of Saxony: and Fiiher, bishop of Rocheftcr, replied to his answer, in behalf of Henry's treatise: but neither the King's complaint, nor the bishop's reply, was attended with any visible effects.

Luther, though he had put a stop to the violent proceedings of Caroloftadius, now made open war with the pope and bishops: and, that he might make the people despise their authority as much as possible, he wrote one book against the pope's bull, and another against the order falsely called the order of bishops. The same year, 1522, he wrote a letter, dated June the 29th, to the assembly of the states of Bohemia; in which he assured them that he was labouring to establish his doctrine in Germany, and exhorted them not to return to the communion of the church of Rome; and he published also, this year, a translation of the New Testament in the German tongue, which was afterwards corrected by himself and Melancthon. This translation having been printed several times, and being in every body's hands, Ferdinand archduke of Austria, the emperor's brother, made a very severe edict to hinder the farther publication of it; and forbade all the subjects of his imperial majesty to have any copies of it, or of Luther's other books. Some other princes followed his example; and Luther was so angry at it, that he wrote a treatise, Of the secular power, in which he accuses them of tyranny and impiety. The diet of the empire was held at Nuremburg, at the end of the year; to which Hadrian VI. sent his brief, dated November the 25th: for Leo X. died upon the 2d of December 1521, and Hadrian had been elected pope upon the 9th of January following. In his brief, among other things, he observes, how he had heard with grief, that Martin Luther, after the sentence of Leo X. which was ordered to be executed by the edict of Worms, continued to teach the same errors, and daily to publish books full of heresies: that it appeared strange to him, that so large and so religious a nation could be seduced by a wretched apolite friar: that nothing, however, could be more pernicious to Christendom; and that therefore he exhorts them to use their utmost endeavours to make Luther, and the authors of these tumults, return to their duty; or, if they refuse and continue obstinate, to proceed against them according to the laws of the empire, and the severity of the last edict.

The resolution of this diet was published in the form of an edict, upon the 6th of March 1522; but it had no effect in checking the Lutherans, who still went on in the same triumphant manner. This year Luther wrote a great many pieces: among the rest, one upon the dignity and office of the supreme magistrate; which Frederic elector of Saxony is said to have been highly pleased with. He sent, about the same time, a writing in the German language to the Waldenses, or Pickards, in Bohemia and Moravia, who had applied to him "about worshipping the body of Christ in the eucharist." He wrote also another book, which he dedicated to the senate and people of Prague, "about the institution of ministers of the church." He drew up a form of laying masses. He wrote a piece, entitled, An example of popish doctrine and divinity: which Dupins calls a satire against men and things who profess a monastic life. He wrote also against the vows of virginity, in his preface to his commentary on 1 Cor. viii. And his exhortations here were, it seems, followed with effects; for soon after, nine nuns, among whom was Catherine de Bore, eloped from the nunneries at Nymphenhen, and were brought by the assistance of Leonard Oppen, a burgess of Torgau, to Wittenberg. Whatevcr offence this proceeding might give to the Papists, it was highly extolled by Luther; who, in a book written in the German language, compares the deliverance of these nuns from the slavery of a monastic life, to that of the Jews which Jesus Christ has delivered by his death. This year Luther had occasion to canonize two of his followers, who, as Melchior Adam relates, were burnt at Bruffels in the beginning of July, and were the first who suffered martyrdom for his doctrine. He wrote also a confolatory epistle to three noble ladies at Mifdia, who were banished from the duke of Saxony's court at Friburg, for reading his books.

In the beginning of the year 1524, Clement VII. sent
sent a legate into Germany to the diet, which was to be held at Nuremberg. Hadrian VI. died in October 1523, and was succeeded by Clement upon the 19th of November. A little before his death he canonized Benno, who was bishop of Meissen in the time of Gregory VII. and one of the most zealous defenders of the holy see. Luther, imagining that this was done directly to oppose him, drew up a piece with this title, *Against the New Idol and Old Deev.* in which he treats the memory of Gregory with great freedom, and does not spare even Hadrian. Clement VII.'s legate represented to the diet of Nuremberg the necessity of enforcing the execution of the edict of Worms, which had been strangely neglected by the princes of the empire; but, notwithstanding the legate's solicitations, which were very prevailing, the decrees of that diet were thought to be inefficacious, that they were condemned at Rome, and rejected by the emperor. It was in this year that the dispute between Luther and Erasmus, about free-will, began. Erasmus had been much moved by the Papists to write against Luther; but he was all along of opinion, that writing to take his difsenting from him in opinion would not be found an effectual way to end the differences and establish the peace of the church. However, tired out at length with the importunities of the pope and the Catholic princes, and dea. ...
Luther. Protestant, when the Protestant religion was first established on a firm basis. See PROTESTANTS AND REFORMATION.

As he had little else to do than to sit down and contemplate the mighty works he had finished: for that a single monk should be able to give the church a rude shock, that there needed but such another entirely to overthrow it, may very well seem a mighty work. He did indeed little else: for the remainder of his life was spent in exhorting princes, states, and universities, to confirm the reformation which had been brought about through him; and publishing from time to time such writings as might encourage, direct, and aid, them in doing it. The emperor threatened temporal punishment with armies, and the pope eternal with bulls and anathemas; but Luther cared for none of their threats. His friend and confederate Melancthon was not so indifferent; for Melancthon had a great deal of softheartedness, moderation, and diffidence in his make, which made him very uneasy, and even sorrowful, in the present disorders. Hence we find many of Luther’s letters written on purpose to support and comfort him under these several difficulties and anxieties.

In the year 1533, Luther wrote a consolatory epistle to the citizens of Osnitz, who had suffered some hardships for adhering to the Augsburg confession of faith; in which, among other things, he says: "The devil is the host, and the world is his inn; so that wherever you come, you shall be found and this ugly host." He had also about this time a terrible controversy with George duke of Saxony, who had such an aversion to Luther’s doctrine, that he obliged his subjects to take an oath that they would never emancipate any kind within, or do anything against it. But Luther, having been accused of sedition, by proving, that he had not only abased his person, but also taught rebellion among his subjects. The elector ordered Luther to be acquainted with this; and so he was told at the same time, that if he did not clear himself of the charge, he could not possibly escape punishment. But Luther easily refuted the accusation, by proving, that he had been so far from stirring up his subjects against him, on the score of religion, that on the contrary he had exhorted them rather to undergo the greatest hardships, and even suffer themselves to be banished.

In the year 1534, the Bible translated by him into German was first printed, as the old privilege, dated at Bibliopolis, under the elector’s hand, flows; and it was published the year after. He also published this year a book against mafles and the consecration of priests, in which he relates a conference he had with the devil upon those points; for it is remarkable in Luther’s whole history, that he never had any conflicts of any kind within, but the devil was always his antagonist. In February 1537, an assembly was held at Smallkald about matters of religion, to which Luther and Melancthon were called. At this meeting Luther was wearied with so grievous an illness, that there were no hopes of his recovery. He was afflicted with the flore, and had a filthpage of urine for 11 days. In this terrible condition he would needs undertake to travel, notwithstanding all that his friends could say or do to prevent him: his resolution, however, was attended with a good effect; for the night after his departure he began to be better. As he was carried along, he made his will, in which he declared his detestation of Popery to his friends and brethren; agreeably to what he often used to say: *Ibis crum view, moriones ero mortuus, papa;* that is, "I was the plague of Popery in my life, and shall continue to be so in my death."

This year the Pope and the court of Rome, finding it impossible to deal with the Protestants by force, began to have recourse to stratagem. They affected therefore to think, that though Luther had indeed carried things on with a high hand and to a violent extreme, yet what he had pleaded in defence of these measures was not entirely without foundation. They talked with a seeming show of moderation; and Pius III. who succeeded Clement VII. proposed a reformation first among themselves, and even went so far as to fix a place for a council to meet at for that purpose. But Luther treated this farce as it deserved to be treated; unmasked and detected it immediately; and, to ridicule it the more strongly, casued a picture to be drawn, in which was represented the pope seated on high upon a throne, some cardinals about him with foxes tails on, and seeming to evacuate upwards and downwards (*sursum deorandum repurgare,* as Melchor Adam expressis it). This was fixed over-against the title-page, to let the readers see at once the scope and design of the book; which was, to expone that cunning and artifice with which those subtle politicians affected to cleanse and purify themselves from their errors and fiderflections. Luther published about the same time A Confutation of the pretended Grant of Constantine to Sylvester Bishop of Rome; and also some letters of John Hus, written from his prison at Constance to the Bohemians.

In this manner was Luther employed till his death, which happened in the year 1546. That year, accompanied by Melancthon, he paid a visit to his own country, which he had not seen for many years, and returned again in safety. But soon after he was called thither again by the earls of Mansfeld, to compose some differences which had arisen about their boundaries. Luther had not been used to such matters; but because he was born at Eisleben, a town in the territory of Mansfeld, he was willing to do his country what service he could, even in this way. Preaching his last sermon therefore at Wittemberg, upon the 17th of January, he left off on the 23d; and at Hall in Saxony lodged with Julius Jonas, with whom he stayed three days, because the waters were out. Upon the 29th, he pulled over the river with his three sons and Dr. Jonas; and being in some danger, he said to the Doctor, "Do not you think it would rejoice the devil exceedingly, if I and you, and my three sons, should be drowned?" When he entered the territories of the earls of Mansfeld, he was received by 100 horsemen or more, and conducted in a very honourable manner; but was at the same time so very ill, that it was feared he would die. He said, that the fits of sickness were often upon him when he had any great business to undertake: of this, however, he did not recover; but died upon the 18th of February, in the
in relation to justification: he also set aside the Apoca-
lypse: both which are now received as canonical in the
Lutheran church.

Luther reduced the number of sacraments to two
viz. baptism, and the eucharist; but he believed the
implication, or consubstantiation, that is, that the
matter of the bread and wine remain with the body
and blood of Christ; and it is in this article that the
main difference between the Lutheran and English
churches consists.

Luther maintained the mass to be no sacrifice; ex-
ploded the adoration of the host, auricular confession,
meritorious works, indulgences, purgatory, the wor-
ship of images, &c. which had been introduced in the
corrupt times of the Romish church. He also op-
posed the doctrine of free-will, maintained predesti-
nation, and asserted our justification to be solely by
the imputation of the merits and satisfaction of Christ.
He also opposed the satiety in the Romish church,
monastic vows, the celibate of the clergy, &c.

LUTHERANS, the Christians who follow the op-
inions of Martin Luther, one of the principal reformers
of the church in the 16th century. See LUTHER.

The Lutherans, of all protestants, are those who
differ least from the Romish church; as they affirm
that the body and blood of Christ are materially pre-
sent in the sacrement of the Lord’s supper, though in
an incomprehensible manner; and likewise represent
some religious rites and institutions, as the use of
images in churches, the distinguishing vesture of the
clergy, the private confession of sins, the use of wafer
in the administration of the Lord’s supper, the form of
exorcism in the celebration of baptism, and other ce-
remonies of the like nature, as tolerable, and some of
them as useful. The Lutherans maintain, with regard
to the divine decrees, that they respect the salvation
or misery of men, in consequence of a previous know-
ledge of their sentiments and characters, and not as
free and unconditional, and as founded on the mere
will of God. Towards the close of the last century,
the Lutherans began to entertain a greater liberality
of sentiment than they had before adopted; though in
many places they persevered longer in severe and
defruiting principles than other Protestant churches.
Their public teachers now enjoy an unbounded liberty
different from the decisions of those symbols or
creeds which were once deemed almost infallible rules
of faith and practice, and of declaring their different
in the manner they judge the most expedient. Motheim
attributes this change in their sentiments to the maxim
which they generally adopt, that Christians were ac-
countable to God alone for their religious opinions;
and that no individual could be justly punished by the
magistrate for his erroneous opinions, while he con-
ducted himself like a virtuous and obedient subject,
and made no attempts to disturb the peace and order
of civil society.

LUTHER, in architecture, a kind of window
over the corinie, in the roof of a building: standing
perpendicularly over the naked part of a wall, and
failing to illuminate the upper story.

Luthers are of various forms: as square semi-
circular, round, called bull’s eye, flat arch, &c.

LUTRA, in zoology. See Mustela.

LUTTI (Benedetto), an eminent painter, born at
Flo-
LUXURY; voluptuousness, or an extravagant indulgence in diet, dress, and equipage.

Luxury, among the Romans, prevailed to such a degree, that several laws were made to suppress, or at least limit it. The extravagance of the table began about the time of the battle of Actium, and continued in great excess till the reign of Galba. Peacocks, cranes of Malta, nightingales, venison, wild and tame fowl, were considered as delicacies. A prohibition of provisions was the reigning topic. Whole wild boars were often served up, and sometimes they were filled up with various small animals, and birds of different kinds: this dish they called the Trojan horse, in allusion to the wooden horse filled with soldiers.
Luxury. Fowls and game of all sorts were served up in whole pyramids, piled up in dishes as broad as moderate tables. Lucullus had a particular name for each apartment; and in whatever room he ordered his servants to prepare the entertainments, they knew by the direction the expense to which they were to go. When he dined in the Apollo, the expense was fixed at 50,000 drachmas, that is L. 1,250. M. Antony provided eight boars for 12 guests. Vitellius had a large silver platter, fated to have cost a million of sesterces, called Mumeron's buckler. In this he blended together the livers of gilt-heads, the brains of pheasants and peacocks, the tongues of phalacrocorax, and the milts of lampreys. Caligula served up to his guests pearls of great value dissolved in vinegar; the same was done also by, Clodius the son of Apollon, the tragedian. Apicius laid aside, 100,000,000 of sesterces, besides a mighty revenue, for no other purpose but to be sacrificed to luxury: finding himself involved in debt, he looked over his accounts, and thought he had the sum of 10,000,000 of sesterces still left, he poisoned himself for fear of being starved to death.

The Roman law to restrain luxury were Lex Orbis, Fami, Didia, Livia, Cornelia, and many others. But all these were too little; for as riches increased acquainted. Again, our purveyors in time past employed the use of pewter only upon dishes and pots, and a few other trifes for service; whereas now they are grown into such exquisite cunning, that they can in a manner imitate by infusion any form or fashion, of cup, dish, salt, bowl, or goblet, which is made by the goldsmiths' craft, though they be so curious and very artificially forged. In some places beyond the sea, a garnish of good flat English pewter (I say flat, because dishes and platters in my time began to be made deep, and like basons, and are indeed more convenient both for sauce and keeping the meat warm) is esteemed so precious as the like number of vessels that are made of fine silver.

What were the ideas of luxury entertained in England about two centuries ago, may be gathered from the following passage of Holinshed; who, in a discourse prefixed to his History, speaking of the increase of luxury, says, "Neither do I speak this in reproach of any man, God is my judge; but to show, that I do rejoice rather to see how God has blessed us with his good gifts, and to behold how that in a time wherein all things are grown to the most exquisite prices, we yet do find means to obtain and achieve such furniture as heretofore was impossible. There are old men yet dwelling in the village where I remain, which have noted three things to be marvelously altered in England within their sound remembrance. One is the multitude of chimneys lately erected; whereas in their young days there were not above two or three, if so many, in most uplandish towns of the realm (the religious houses, and manor places of their lords, always excepted, and peradventure some great pernages), but each made his fire against a reedows [scream] in the hall where he dined his meat and dined. — The second is the great amendment of lodging; for, said they, our fathers and we ourselves have lain full oft on straw pillets covered only with a sheet, under coverlets made of a dogstine or horsehairs (to use their own term), and a good log under their head instead of a bolster. — If it were so that the father or good man of the house had a marrasf, or flock bed and sheets, a fack of chaff to rest his head upon, he thought himself to be as well lodged as the lord of the town. So well were they customed, that pillows (faid they) were thought meet only for women in childbed; as for servants, if they had any sheet above them, it was well; for seldom had they any under their bodies to keep them from prickings straw, that ran oft through their coverlets and their hardened hides. — The third thing they tell of, is the exchange of treene [wooden] platters into pewter, and wooden spoons into silver or tin; for Vol. X.
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Luxury. attained a great height long before Holinshed's time: For in the reign of Edward III. we find no fewer than sevenumptious laws passed in one session of parliament to restrain it. It was enacted, that men or servants of lords, as also of tradesmen and artisans, shall be content with one meal of fish daily, and the other meals, daily, shall be of milk, cheese, butter, and the like. Neither shall they use any ornaments of gold, silk embroidery, nor their wives and daughters any veils above the price of twelvepence. Artificers and yeomen shall not wear cloth above 40s. the whole piece (the finest then being about L. 6 per piece), nor the ornaments before named. Nor the women any veils of silk, but only those of thread made in England. Gentlemen under the degree of knights, not having L. 100 yearly in land, shall not wear any cloth above 45s. marks the whole piece. Neither shall they or their females use cloth of gold, silver, or embroidery, &c. But exceptures having L. 200 per annum or upwards of rent, may wear cloths of five marks the whole piece or cloth; and they and their females may also wear stuff of silk, silver, ribbons, girdles, or furs. Merchants, citizens, burgheurs, and artificers of tradesmen, as well of London as elsewhere, where who have goods and chattels of the clear value of L. 500, and their females, may wear as is allowed to gentlemen and esquires of L. 100 per annum. And merchants, citizens, and burgheurs, worth above L. 1000 in goods and chattels, may (and their females) wear the same as gentlemen of L. 200 per annum. Knights of 200 marks yearly may wear cloth of fine marks the cloth, but no higher; but no cloth of gold, nor furred with ermine; but all knights and ladies having above 400 marks yearly, up to L. 1000 per annum, may wear as they please, ermine excepted; and they may wear ornaments of pearl and precious stones for their heads only. Clerks having degrees in cathedrals, colleges, &c. may wear as knights and esquires of the same income. Plowmen, carter, shepherds, and such like, not having 40s. value in goods or chattels, shall wear no sort of cloth but blanket and reft of lawn of 2d. and shall wear girdles and belts; and they shall only eat and drink sufficient for their stations. And whatsoever other apparel than is prescribed by the above laws shall forfeit the same.

Concerning the general utility of luxury to a state, there is much controversy among the political writers. Baron Montesquieu lays it down, that luxury is necessary in monarchies, as in France; but ruinous to democracies, as in Holland. With regard therefore to Britain, whole government is compounded of both species, it is held to be a dubious question, how far private luxury is a public evil; and, as such, cognizable by public laws. And indeed their legislators have several times changed their sentiments as to this point; for formerly there were a number of penal laws existing to restrain excess in apparel, chiefly made in the reigns of Edward III. IV. and Henry VIII. a specimen of which we have inferred above. But all of them appeared expedient to repeal at an after period. In fact, although luxury will of necessity increase according to the influx of wealth, it may not be the general benefit of commerce to impose, as in the above cited laws, an absolute prohibition of every degree of it: yet, for the good of the public, it may be necessary that such as go beyond proper bounds in eating, drinking, and wearing what by no means is suitable to their station, should be taxed accordingly, could it be done without including those who have a better title to such indulgence. This is certainly, however, a point from which they may be weighed before executed; and, in mercantile countries at least, such restrictions may be found prejudicial, most likely impracticable, especially where true liberty is established. Sir William Temple observes, speaking of the trade and riches, and at the same time of the frugality of the Hollanders, "That some of our maxims are not to certain as current in politics as that encouragement of excess and luxury, if employed in the contemplation of native commodities, is of advantage to trade. It may be fo to that which impoverishes, but not to that which enriches a country. It is indeed less prejudicial, if it lies in native than in foreign wares, but the humour of luxury and expense cannot stop at certain bounds; what begins in native will proceed in foreign commodities; and though the example arise among idle persons, yet the imitation will run into all degrees, even of those men by whose industry the nation subsists. And besides, the more of our own we spend, the less we shall have to fend abroad; and fo it will come to pass, that while we drive a vast trade, yet, by buying much more than we sell, we shall come to be poor at last."

LYBIA, or LIBYA, a name anciently given to all that part of Africa lying between the borders of Egypt and the river Trion, and comprehending Cyrenaica, Marmarica, and the Regio Syrtha. See these articles.

LYCEUM, Λυκείον, in antiquity the name of a celebrated school or academy at Athens, where Aristotle explained his philosophy. The place was composed of poriicaces, and trees planted in the quincunx form, where the philosophers disputed walking. Hence phi~ophy of the Lyceum is used to signify the philosophy of Aristotle, or the Peripatetic philosophy. Suidas observes, that the Lyceum took its name from its habitation, which had been originally a temple of Apollo Lyceus; or rather a portico or gallery built by Lyceus son of Apollo; but others mention it to have been built by Pith utanus or Pericles.

LYCEUS (anc. geog.), a mountain of Arcadia, sacred to Jupiter; whence Jupiter Lyceum (Pliny). Sacred also to Pan (Virgil); and hence Lyceus, the rites performed to Pan on this mountain; which Evander carrying with him to Latium, were called Lyceana (Virgil).

LYCAON (lab. hik.), the first king of Arcadia, son of Pelasgus and Meliboea. He built a town called Lycofora, on the top of mount Lycaon, in honour of Jupiter. He had many wives, by whom he had a daughter called Calitoph, and 50 sons. He was succeeded on the throne by Nyctimus, the eldest of his sons. He lived about 1820 years before the Christian era.—Another king of Arcadia celebrated for his cruelties. He was changed into a wolf by Jupiter, because he offered human victims on the altar of the god Pan. Some attribute this metamorphosis to another cause. The sins of mankind, as they relate, were become so enormous, that Jupiter visited the earth to punish wickedness and impiety. He came to Arcadia, where he was
LYCIA, a country of Asia Minor, bounded by the Mediterranean on the south, Caria on the west, Pamphylia on the east, and Phrygia on the north. It was anciently called Mileos and Tremites, from the Mileae, or Solymi, a people of Crete, who came to settle there. The country received the name of Ly西亚 from Lycus, the son of Pandion, who established himself there. The inhabitants have been greatly commended by all the ancients for their sobriety and justice. They were conquered by Croesus king of Lydia, and afterwards by Cyrus. Though they were subject to the power of Pericles, yet they were governed by their own kings, and only paid a yearly tribute to the Persian monarch. They became part of the Macedonian empire when Alexander came into the east, and afterwards were ceded to the house of the Seleucidae. The country was reduced into a Roman province by the emperor Claudius.

LYCUM, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 23rd order, Caryophyllae. The calyx is monophyllous, oblong, and smooth; there are five unguiculated petals; with the segments of the limb almost bifid; the capsule quinquiseptic.

Species, &c. 1. The Chaledonica, or Chaleconia scarlet lychnis, hath a frayed perennial root; upright, straight, hairy, annual stalks, rising three or four feet high; garnished with long, spear-pointed, close-fitting leaves, by pairs opposite; and the stalk crowned by a large, compact, flat bunch of beautiful scarlet or flame-coloured flowers, appearing in June and July. Of this there are varieties, with single scarlet flowers, with large double scarlet flowers of exceeding beauty and elegance, with pale-red flowers, and with white flowers. Of these varieties, the double scarlet lychnis is superior to all for size and elegance; the flowers being large, very double, and collected into a very large bunch, exhibit a charming appearance; the single scarlet kind is also very pretty; and the others effect an agreeable variety with the scarlet kinds. 2. The discia, or dicous lychnis, commonly called bachelor's button, hath frayed perennial roots; upright stalks, branching very diffuse and irregular, two or three feet high; having oval, acute-pointed, rough leaves, by pairs opposite; and all the branches terminated by clusters of discios flowers of different colours and properties in the varieties; flowering in April and May. The varieties are the common single red-flowered bachelor's button, double red, double white, and single white-flowered. The double varieties are exceedingly ornamental in their bloom: the flowers large, very double, and continue long in blow; the single red sort grows wild by ditch sides and other moist places in many parts of England; from which the doubles were accidentally obtained by culture in gardens. The flowers are often dioecious, i. e. male and female on distinct plants.

3. The vicaria, or vicous German lychnis, commonly called catchfly, hath fibrous perennial roots; crowned by a tuft of long grancy leaves close to the ground; many erect, straight, single stalks, rising a foot and an half or two feet high, exuding from their upper part a viscid or clammy matter; garnished with long narrow leaves, by pairs opposite; and terminated by many redish purple flowers, in clusters one above another, forming a fort of long hoarse spike; all the flowers with entire petals, flowering in May. Of this also there are varieties with single red flowers, with double red flowers, and with white flowers. The double variety is considerably the most eligible for general culture, and is propagated in plenty by parting the roots. All the varieties of this species emitting a glutinous liquid matter from their stalks, flies happening to light thereon sometimes stick and entangle themselves, whence the plant obtains the name Catch-fly. 4. The flos-cuculi, cock-flower lychnis, commonly called ragged-robin, hath fibrous perennial roots; upright, branchless, channelled stalks, rising near two feet high; garnished with long, narrow, spear-shaped leaves, in pairs opposite; and terminated by branchy foot-stalks, sustaining many purple deeply quadrifid flowers, appearing in May. The flowers having each petal deepiy quadrifid in a torn or ragged like manner, the plant obtained the cant name of Ragged-robin. There are varieties with single flowers and double flowers. The double sort is a large, very multiple, fair flower: it is an improved variety of the single, which grows wild in most moist meadows, and is rarely cultivated; but the double, being very ornamental, merits culture in every garden. All the four species and respective varieties are very hardy; all fibrous rooted, the roots perennial; but are annual in stalks, which rise in spring, flower in summer, succeeded in the fall by plenty of seed in autumn, by which all the single varieties may be raised in abundance, but the doubles only by dividing the roots, and some by cuttings of the flower-stalks.
LYCOMEDES, a king of Scyros. He was son of Apollo and Parnathoe. He was secretly entrusted with the care of young Achilles, whom his mother Thetis had disguised in woman's clothes, to remove him from the Trojan war, where he knew he must unavoidably perish. Lycomedes has rendered himself famous for his treachery to the Phrens, who had implored his protection when driven from his throne of Athens by the usurper Mnelheus. Lycomedes, as it is reported, either envious of the fame of his illustrious guests, or bribed by the envoys of Mnelheus, led Thessus to an elevated place, on pretense to shew him the extent of his dominions, and perfidiously threw him down a precipice, where he was killed.

LYCOPERDON, in botany: A genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus is roundish, and full of farinaceous seeds. There are 10 species, of which the following are the most remarkable.

1. The tuber, truffles, or subterraneous puff-balls, is a native of woods both in Scotland and England. It is a subterraneous fungus, growing generally in clusters three or four inches under ground, without any visible root. The figure of it is nearly spherical, the size of a potato; the exterior coat at first white, afterwards black, and fluted with pyramidal or polyhedrous tubercles; the internal substance solid and callous, of a dirty white or pale-brown colour, grained like a nutshell, or when ripe, and throws off a light yellow powder, which blown into the mouth, is said to intoxicate bees. See Cent. Mag. July 1766. The Italians fry the great variety, and indeed any of the others when young, and cut them with salt and oil, according to the relation of Marigli.

LYCOPERSON. See SOLANUM.

LYCOPODIUM, or CLUB-MOSS; a genus of the natural order of muffel, belonging to the cryptogamia class of plants. The antherae are bivalved and fiddle; there are no calyptra. There are 24 species; of which the following are the most remarkable.

1. The clubium, or common club-mosses, is common in dry and mountainous places, and in fir forests. The flalk is profusely branched, and creeping, from a foot to two or three yards long; the radicles woody. The leaves are numerous, narrow, lanceolated, acute, often incurved at the extremity, terminating with a long white hair, and every where surrounding the flalk. The peduncles are erect, firm, and naked (except being thinly felt with lanceolate scales), and arise from the end of the branches. They are generally two or three inches long and terminated with two cylindrical yellowish spikes, imbricated with oval-acute scales, finely lacerated on the edges, and ending with a hair. In the ace or base of the scale is a kidney-shaped capsule, which bursts with elasticity when ripe, and throws out a light yellow powder, which blown into the flame of a candle, flashes with a small explosion. The Swedes make matts of this moss to rub their shoes upon. In Russia, and some other countries, the powder of the capsules is used in medicine to heal galls in children, chops in the skin, and other sores. It is also used to powder over official pills, and to make artificial lightning at theatres. The Poles make a decoction of the plant, and, dipping a linen cloth into it, apply it to the heads of persons afflicted with the diffuse called the place palatina, which is said to be cured by this kind of fomentation.

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LYCOPOLIS, or LYCON, (anc. geog.) so called from the worship of wolves. **Lycopolis**, the people; **Lycopites**, the district. There were two towns of this name, one in the Delta, or lower Egypt, near Sky, in Bosphorus, and some other places, the inhabitants make use of this plant instead of alum, to fix the colours in dying. The Highlanders also sometimes take an infusion of it as an emetic and cathartic: but it operates violently; and, unless taken in a small dose, brings on giddiness and convulsions. Linnaeus informs us, that the Swedes use a decoction of it to destroy lice on swine and other animals.

LYCOPHORON, a famous Greek poet and grammarian, born at Colchi in Euxina, flourished about 304 B.C. and, according to Ovid, was killed by an arrow. He wrote 20 tragedies; but all his works are lost, except a poem intitled *Claisanda*, which contains a long train of predictions, which he supposes to have been made by Callandra, Priam's daughter. This poem is extremely obscure. The best edition of it is that of Dr Potter, printed at Oxford in 1697, folio.

LYCOPSIS, in botany: A genus of the monogy- 

nia order, belonging to the penstemon class of plants; and in the natural method ranking under the 41st order, **Asteriflie**. The corolla has an incarvated tube.

LYCOPUS, in botany: A genus of the monogy- 

nia order, belonging to the diastema class of plants; and in the natural method ranking under the 14th order, **Verticillate**. The corolla is quadrifid, with one of the leguminous ecarted; the stamina standing a-

LYGURIA, a festival observed by the Spartans, in memory of their lawgiver Lycurgus, whom they honoured with a temple and an anniversry sacrifice.

LYMPHÉA, were artificial caves or grottos a-

mongst the Romans, furnished with a great many tubes, cans, and various hydraulic apparatus, thro' which the water gushed out upon the spectators un- 

expectedly whilst they were admiring the beautiful arrangement of the shell-work in the grotto.

LYCOPOLIS, near

LYCOPOLIS, near

LYMPHÉA. and call out a fine yellow powder. These capsules Linnaeus supposes to be *antithes*, or male parts of 

LYCURGUS, the celebrated legislator of the

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Spartans, was the son of Eunomes king of Sparta. 

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Lydia (anc. geog.), a celebrated kingdom of Asia Minor.—All the ancient writers tell us, that Lydia was first called Mæonia or Mæonia, from Mæon, king of Phrygia and Lydia; and that it was known under no other denomination till the reign of Arts, when it began to be called Lydia from his son Lydus. Bochart finding in his learned collection of Phcenian words the verb lus, signifying “to wind,” and observing that the country we are speaking of is watered by the Maeander so famous for its windings, concludes that it was thence named Lydia, or Lydus. As to the ancient name of Mæonia, he takes it to be a Greek translation of the Phcenian word lud; wherein he agrees in some measure with Stephanus, who derives the name of Mæonia from Mæon the ancient name of the Mæander. Some take the word mæonia to be a translation of a Hebrew word signifying “metal,” because that country, say they, was in former times enriched above any other with mines. Though Lydia and Mæonia are by most authors indifferently used for one and the same country, yet they are sometimes distinguished; that part where mount Tmolos stood, watered by the Pæolus, being properly called Mæonia; and the other, lying on the coast, Lydia. This distinction is used by Homer, Callimachus, Dionysius, and other ancient writers. In after ages, when the Ionians, who had planted a colony on the coast of the Egean Sea, began to make some figure, that part was called Ionia, and the name of Lydia given to the ancient Mæonia.—Lydia, according to Pliney, Ptolemy, and other ancient geographers, was bounded by the Mytis Major on the north, by Caria on the south, by Phrygia Major on the east, and Ionia on the west, lying between the 37th and 39th degrees of north latitude. What the ancients style the kingdom of Lydia was not confined within these narrow boundaries, but extended from Halys to the Egean sea. Pliney’s description includes Eolia, lying between the Hermus and the Calus.

As to the origin of the Lydians, Josephus, and after him all the ecclesiastical writers, derive them from Lud shem’s fourth son; but this opinion has no other foundation than the multitude of names. Some of the ancients will have the Lydians to be a race of the Mæonians, of Phrygians, Mæonians, or Lydians. Others finding some conformity in religion and religious ceremonies between the Egyptians and Tufans, who were a Lydian colony, conclude them, without any farther evidence, to be originally Egyptians. All we know for certain is, that the Lydian nation, as it is manifest from their very tables, for Artes, Tantalus, Pelops, Niobe, and Arachne, are all said to have been the children of Lydus. And Zanthis in his Lydiana, quoted by Stephanus, informs us, that the ancient city of Afcalon, one of the five fairs of the Philistines, mentioned in the books of Joshua and the Judges, was built by one Afcalus a Lydian, whom Achiamus king of Lydia had appointed to command a body of troops which he sent, we know not on what occasion, into Syria. The Heracleae, or kings of Lydia, descended from Heracles, began to reign before the Trojan war; and had been preceded by a long series of sovereigns sprung from Artes, and hence styled Atyads: a strong proof of the antiquity of that kingdom.

The Lydians began very early to be ruled by kings whose government seems to have been truly despotick and the crown hereditary. We read of three distinct races of kings reigning over Lydia, viz. the Atyads, the Heracleae, and the Mermnadæ.

The Atyads were so called from Artes the son of Cotys and grandson of Mænes the first Lydian king. But the history of this family is obscure and fabulous. The Atyads were succeeded by the Heracleæ, or the descendants of Heracles. For Heracles being, by the direction of the oracle, told as a flame to Omphale a queen of Lydia to expiate the murder of Iphitus, had, during his captivity, by one of her flaves, a son named Cleitus, who was the first of the Heracleæ that ascended the throne of Lydia. This race is said to have reigned 503 years, the father succeeding the son for 22 generations. They began to reign about the time of the Trojan war. The last of the family was the unhappy Candales, who loft both his life and his kingdom by his imprudence. An event of which we have the following account. By Herodotus, Candales had a wife whom he passionately loved, and believed the most beautiful of her sex. He extolled her charms to Gyges his favourite, whom he used to intrust with his most important affairs; and the more to convince him of her beauty, resolved to show her to him quite naked: he accordingly placed her in the porch of her chamber where the queen used to undress when she went to bed, ordering him to retire after he should have seen her, and take all possible care not to be observed. But notwithstanding all the caution he could use, the plainly discovered him going out; and though she did not doubt but it was her husband’s connivance, yet the passion that night in a seeming tranquillity, supposing her resentment till next morning, when the scene for Gyges, and resolutely told him that he must either by his death stow for the criminal action he had been guilty of, or put to death Candales the contriver of it, and receive both her and the kingdom of Lydia for his reward. Gyges at first earneaily begged of her that she would not drive him to the necessity of such a choice. But finding that he could not prevail with her, and that he must either kill his master or lose himself, he chose the latter part of the alternative. Being led by the queen to the same place where her husband had posted him the night before, he stabbed...
Gyges having thus possessed himself of the kingdom of Lydia, sent many rich and valuable presents to the oracle of Delphi, among others, six cups of gold weighing 30 talents, and greatly esteemed for its weight in gold; a circumstance which shows how early the art of painting began to be in request, for Candaules was contemptuous with Romulus.

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prove dangerous to himself, and therefore resolved to put a stop, if possible, to his progress. In taking this resolution, which might probably be attended with the most important consequences, he was desirous to learn the will of heaven concerning the issue of the war. The principal oracles which he consulted were those of Branchis in Ionia, of Hammon in Libya, and of Delphi in Greece. Amongst these respected shrines, the oracle of Delphi maintained its ascendant as the most faithful interpreter of fate. Croesus was fully persuaded of its veracity; and desirous generously to compensate for the trouble which he had already given, and still meant to give, the priests of Apollo, he sacrificed 3000 oxen to the god, and adorned his shrine with dedications equally valuable for the workmanship and for the materials; precious vessels of silver, ewers of iron beautifully inlaid and enamelled; various ornaments of pure gold, particularly a golden lion weighing ten talents, and a female figure three cubits or near five feet high. In return for these magnificent presents, the oracle, in ambiguous language, flattered Croesus with obtaining an easy victory over his enemies, and with enjoying a long life and a prosperous reign. The god at the same time enjoined him to contract an alliance with the most powerful of the Grecian states.

Elevated with these favourable predictions of Apollo, Croesus prepared to yield a ready obedience to the only condition required on his part for the accomplishment of his aspiring purpose. Not deeming himself sufficiently acquainted with the affairs of Greece, to know what particular republic was meant by the oracle, he made particular inquiry of those well informed concerning the state of Europe; and discovered, that among all the members of the Grecian confederacy, the Athenians and Lacedemonians were justly intitled to the pre-eminence. In order to learn which of these communities deserved the epithet of most powerful of the Grecian states.

The Lydians dispatched with this important commission, soon discovered that the Athenians, after having been long harassed by internal dissensions, were actually governed by the tyrant Pisistratus. The Spartans, on the other hand, though anciently the worst regulated of all the Grecian communities, had enjoyed domestic peace and foreign prosperity ever since they had adopted the wise institutions of Lycurgus. After that memorable period, they had repeatedly conquered the warlike Argives, triumphed over the hardy Arcadians, and notwithstanding the heroic exploits of Aristomenes subdued and enslaved their unfortunate rivals of Megara. To the Lydian ambassadors, therefore, the Spartan republic appeared to be pointed out by the oracle as the community whose alliance they were enjoined to solicit. Having repaired accordingly to Sparta, they were introduced not only to the king and female, but as the importance of the negotiation required, to the general assembly of the Lacedemonians, to whom they, in few words, declared the object of their mission: "We are sent, O Lacedemonians! by Croesus, king of the Lydians and of many other nations, who being commanded by the oracle of Apollo to seek the friendship of the most powerful people of Greece, now summons you, who justly merit that epithet, to become his faithful allies, in obedience to the will of the god whose authority you acknowledge."

The Lacedemonians, pleased with the alliance of a warlike king, and still more with the fame of their valor, readily accepted the proposal. To the strict connection of an offensive and defensive league, they joined the more respected ties of sacred hospitality. A few years before this transaction, they had sent to purchase gold at Sardis for making a flame of Apollo. Croesus had on that occasion gratuitously supplied their want. Remembering this generosity, they gave the Lydian ambassadors at their departure, as a present for their matter, a vessel of brags containing 300 amphoras (above 12 hogheads), and beautifully carved on the outside with various forms of animals.

Croesus, having thus happily accomplished the design recommended by the oracle, was eager to set out upon his intended expedition. He had formerly entered into alliance with Amasis king of Egypt, and Lysanetus king of Babylon. He had now obtained the friendship of the most warlike nation of Europe. The newly-raised power of Cyrus and the Persians seemed incapable of withstanding such a formidable confederacy. Elevated with these flattering ideas of his own invincible greatness, Croesus waited not to attack the Persian dominions until he had collected the strength of his allies. The faning impetuousity of his temper unexperienced in adversity, unfortunately precipitated him into measures no less ruinous than daring. Attended only by the arms of Lydia, and a numerous band of mercenaries, whom his immense wealth enabled him at any time to call into his service, he marched towards the river Halys; and having crossed with much difficulty that deep and broad stream, entered the province of Cappadocia, which formed the western frontier of the Median dominions. That unfortunate country soon experienced all the calamities of invasion. The Pherian plain, the most beautiful and the most fertile district of Cappadocia, was laid waste; the ports of the Euxine, as well as several inland cities, were plundered; and the inoffensive inhabitants were either put to the sword or dragged into captivity.

Encouraged by the unsatisfying softness of the natives of those parts, Croesus was eager to push forwards; and if Cyrus did not previously meet him in the field, he had determined to proceed in triumph to the mountains of Persia. Against this dangerous resolution he was in vain exhorted by a Lydian named Sandanis; who, when asked his opinion of the war, declared it with that freedom which the princes of the East have in every age permitted, amidst all the pride and caprices of despotic power, to men distinguished by the gifts of nature or education. "You are preparing, O king, to march against a people who lead a laborious and a miserable life; whose daily subsistence is often denied them, and is always scanty and precarious; who drink only water, and who are clothed with the skins of wild beasts. What can the Lydians gain by the conquest of Peria? they who enjoy all the advantages of which the Persians are destitute? For my part I deem it a blessing of the gods, that they have not excited the warlike poverty of these miserable barbarians to invade and plunder the luxurious wealth of Lydia." The moderation of this advice was rejected by the fatal presumption of Croesus; who confounding the
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the dictates of experienced wisdom with the mean suggestions of pusillanimity, diffused the counsellor with contempt.

Meanwhile, the approach of Cyrus, who was not of a temper to permit his dominions to be ravaged with impunity, afforded the Lydian king an opportunity of bringing the war to more speedy issue than by his intended expedition into Persia. The army of Cyrus gradually augmented on his march, the tributary princes cheerfully contributing with their united strength towards the assistance of a master whose valour and generosity they admired, and who now took arms to protect the safety of his subjects, as well as to support the grandeur of his throne. Such was the rapidity of his movement, especially after being informed of the destructive ravages of the enemy in Cappadoea, that he arrived from the shores of the Caspian to those of the Euxine Sea before the army of Croesus had provided the necessaries for their journey. That prince, when apprised of the neighbourhood of the Persians, encamped on the Persian plain; Cyrus likewise encamped at no great distance; frequent skirmishes happened between the light troops; and at length a general engagement was fought with equal fury and perseverance, and only terminated by the darkness of night. The loss on both sides hindered a renewal of the battle. The numbers, as well as the courage of the Persians, much exceeded the expectation of Cyrus. As they discovered not any intention to harass his retreat, he determined to move back towards Sardis, to spend the winter in the amusements of his palace; and after amusing his numerous allies to his standard, to take the field early in the spring with such increase of force as seemed sufficient to overpower the Persians.

But this design was defeated by the careful vigilance of Cyrus. That experienced leader allowed the enemy to retire without molestation; carefully informing himself of every step which they took, and of every measure which they seemed determined to pursue. Patiently watching the opportunity of a just revenge, he waited until Croesus had re-entered his capital, and had disbanded the foreign mercenaries, who composed the most numerous division of his army. It then seemed the proper time for Cyrus to put his Persians in motion; and such was his celerity, that he brought the first news of his own arrival in the plain of Sardis. Croesus, whose firmness might well have been shaken by the imminence of this unforeseen danger, was not wanting on the present occasion to the duties which he owed to his fame and the lustre of the Lydian throne. Though his mercenaries were disbanded, his own subjects, who served him from attachment, who had been long accustomed to victory, and who were animated with a high sense of national honour, burned with a desire of enjoying an opportunity to check the daring insolence of the invaders. Croesus indulged and encouraged this generous ardour. The Lydians in that age fought on horseback, armed with long spears; the strength of the Persians consisted in infantry. They were so little accustomed to the use of horses, that camels were almost the only animals which they employed as beasts of burden. This circumstance suggested to a Mede, by name Harpagus, a stratagem, which being communicated to Cyrus, was immediately adopted with approbation by that prince. Harpagus, having observed that horses had a strong aversion to the shape and smell of camels, advised the Persian army to be drawn up in the following order: All the camels which had been employed to carry baggage and provisions were collected into one body, arranged in a long line, and placed at a due distance. The Median horse (for a few squadrons of these followed the standard of Cyrus) formed the rear of the army. As the troops on both sides approached to join battle, the Lydian cavalry, terrified at the unusual appearance of the camels, mounted with men in arms, were thrown into disorder, and turning their heads, endeavoured to escape from the field. Croesus, who perceived the confusion, was ready to depair of his fortune; but the Lydians abandoning their horses, prepared with uncommon bravery to attack the enemy on foot. Their courage seemed better fated; but unaccustomed as they were to this mode of fighting, they were received and repelled by the experienced valour of the Persian infantry, and obliged to take refuge within the fortified strength of Sardis, where they imagined themselves secure. The walls of that city bid defiance to the rude art of attack, as then practised by the most warlike nations. If the Persian army should invest it, the Lydians were provided with provisions for several years; and there was reason to expect, that in a few months, if not weeks, they would receive such assistance from Egypt, Babylonia, and Greece (to which countries they had already sent embassadors), as would oblige the Persians to raise the siege.

The Lydian ministers dispatched into Greece met with great sympathy from the Spartans. That people were particularly observant of the fate of treaties; and while they punished their enemies with unexampled severity, they behaved with generous compa.ssion towards those whom they had once accepted as allies. They immediately resolved therefore to send him a speedy and effectual relief; and for this purpose assembled their troops, made ready their vessels, and prepared every thing necessary for the expedition.

The valour of the Spartans might perhaps have upheld the sinking empire of Lydia; but before their armament could set sail, Croesus was no longer a sovereign. Norwithstanding the strength of Sardis, that city had been taken by storm on the 20th day of the siege; the walls having been scaled in a quarter which, appearing altogether inaccessible, was too carelessly guarded. This was effected by the enterprize of Hyrereades a Mede, who accidentally observed a sentinel defend part of the rock in order to recover his helmet. Hyrereades was a native of the mountainous province of Mardia, and being accustomed to clamber over the dangerous precipices of his native country, resolved to try his activity in passing the rock upon which he had discovered the Lydian. The design was more easily accomplished than he had reason to expect: emulation and success encouraged the bravest of the Persians to follow his example: these were supported by greater numbers of their countrymen; the garrison of Sardis was surprized; the citadel formed;
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LYING-IN-WOMEN. See MIDWIFERY.

LYING-To, or LYING-By, the situation of a ship, when she is retarded in her course, by arranging the sails in such a manner as to counteract each other with nearly an equal effort, and render the ship almost immovable, with respect to her progressive motion, or head-way. A ship is usually brought to by the main and fore-top sails, one of which is laid aback, whilst the other is full; so that the latter pushes the ship forward, whilst the former resists this impulse by forcing her after. This is particularly practised in a general engagement, when the hostile fleets are drawn up in two lines of battle opposite each other. It is also used to wait for some other ship, either approaching or expected; or to avoid piloting a dangerous course, especially in dark or foggy weather, &c.

LYME-KING a sea-port town of Dorsetshire in England, 148 miles from London. It lies near the sea, on the very borders of Devonshire, in a cavity between two rocky hills, which makes it difficult of access. It is about five furlongs long, and contains about 200 houses. As it lies on the declivity of a hill, the houses make a good show, one above another; and some of them are built of freestone, and covered with blue flate. The corporation consists of a mayor (who is justice of peace during his mayoralty and the year after, and in the third year both justice and coroner), a recorder, 15 capital burgesses, and a town-clerk. This place had formerly a very flourishing trade to Spain, the Straits, Newfoundland, and the West Indies; during which the customs amounted some years to 16,000. But it stands on such a high steep rock, that the merchants are obliged to load and unload their goods at a place a quarter of a mile off, called the Cobb, originally built in the reign of Edward III. which costs a great sum to maintain, but forms such a harbour as perhaps is not to be equalled in the world, the ships being sheltered by a high thick stone wall, raised in the main sea a good way from the shore, broad enough for carriages and warehouses, and the custom-house officers have one upon it. The cellars of the low part of the town near the sea, are however often overflowed by the spring-tides 10 or 12 feet. There are guns planted for defence both of the Cobb and the town, the shore here being very proper for batteries. The custom-house stands on pillars, with the corn-market under it. There is an alms-house in church-street, also Presbyterian and Anabaptist meeting-houses. The town-hall is near Broad-street. The church stands at the east end of the town on a rising ground. The market here is Friday, and there are two fairs in the year. We read, that, in 774, the Saxon King Kinwulf gave land hereabouts to the church of Sherborne, for the boiling of salt there to supply its necessities. At this place the duke of Monmouth landed in 1685. A few years ago above £2000 worth of gold and silver coin of Char. I. and II. were discovered by some labourers.

LYMINGTON, a borough town of Hampshire in England, 97 miles south-west of London. It stands about a mile from the channel, running between the main land and the Isle of Wight; and has a harbour for...
LYNCHURUS. Days, and two tiers:

Pha, of Legeus, married Hypermnestra, one of the
nymphs of Danaus. See Hypermnestra.

LYMPHA'TI, was a name given by the Romans
to such as were seized with madness. It is supposed
to be used for Nympia'tis, because the ancients imagined
that every person who had the misfortune to see a
nymph was instantly struck with phrenzy. Lympia'tis
may indeed signify "madmen," as derived from lyn-
pha, "water" over which element the nymphs were
thought to preside. But it appears most likely, that
distracted people were called Lympia'tis, from the cir-
cumstance of madmen's being affected with the hydra-
phobia, or dread of water after the bite of a mad dog;
for this peculiarity, in cases of canine madness, was
not unknown to the Romans.

LYNEUS, in fabulous history, one of the 50 sons
of Egeus, married Hypermnestra, one of the 50 daugh-
ters of Danaus. See Hypermnestra.

LYNEUS, in fabulous history, one of the Argo-
nae, who went with Jason in the expedition to ob-
tain the golden fleece. He was of great use to the
Argonauts, by enabling them to avoid the sand-banks
and rocks they found in their way. The poets say, that
Lynceus had so piercing a sight, that it could not only
penetrate to the bottom of the sea, but even to hell.
Some mythologists suppose, that this fable is taken from
Lynceus's skill in observing the stars, and discovering
the mines of gold and silver concealed in the earth.

LYNCURIIUM, a stone thought to be the same
with the toarumini. The name is derived from Λύς
"lynx," and υών urine.

LYNCURIUS LAPIIS, a stone capable of produ-
cing mushrooms.

In the Ephemerides of the Curious we find men-
tion made of a stone, so called by Dr John George
Wolckamcrer, who was one in Italy, which never cea-
sest to produce in a few days mushrooms of an
excellent flavour by the most simple and easy pro-
cess imaginable. "It is (say he) of the bigness of an
ox's head, rough and uneven on its surface, and
on which also are perceived some clefts and crevices.
It is black in some parts, and in others of a lighter
and greyish colour. Internally it is porous, and nearly
of the nature of the punice-flone, but much hea-
der: and it contains a small piece of flint, which is
so incorporated with it as to appear to have been for-
cast at the same time the stone itself received its for-
mat. This gives room to judge, that those stones have been
produced by a fat and vicid juice, which has the pro-
perity of indurating whatever matter it infiltrates into.
The stone here spoken of, when it has been lightly
covered with earth, and sprinkled with warm water,
produces mushrooms of an exquisite flavour which are
usually round, sometimes oval, and whose borders, by
their inflexions and different curvities represent some
measure human ears. The principal colour of these
mushrooms is sometimes yellowish, and sometimes of a
bright purple; but they are always disseminated with
different spots, of a deep orange colour, or red brown;
and when these spots are recent, and still in full bloom, Lyncuriius,
they produce a very agreeable effect to the sight. But Lyn
curiius
what appears admirable is, that the part of the stalk
which remains adhering to the stone, when the mush-
room has been separated from it, grows gradually and
petrifies in time, so that it seems that this fungi
to relores to the stone the nutritive juice it received from
it, and that it thus contributes to its increase." John
Bapift Porta pretends, that this stone is found in fe-
veral parts of Italy; and that it is not only to be met
with at Naples, taken out of mount Vesuvius, but al-
so on mount Pantherico, in the principality of Arca-
lino; on mount Garganus, in Apulia; and on the sum-
mit of some other very high mountains. He adds, that
the mushrooms which grow on those sorts of stones, and
are usually called fungi lynceus, have the property of
dissolving and breaking the stone of the kidneys and
bladder; and that, for this purpose, nothing more is
required than to dry them in the shade, and being re-
duced to powder, to make the patient, fasting, take
a sufficient quantity of this power in a glass of white-
wine, which will so cleanse the excretory ducts of the
urine, that no stones will ever after be collected in
them.

As to the form of those mushrooms, their root
is fomy, uneven, divided according to its longitudinal
direction, and composed of fibres as fine as hairs, in-
terwoven one with another. Their form, on first shoo-
ing out, resembles a small bladder, scarce then larger
than the bud of a vine; and if in this state they are
squeezed between the fingers, an aqueous subacid li-
quor issues out. When they are at their full growth,
their pedicle is of a finger's length, larger at top than
at bottom, and becomes infinitely slenderer in propor-
tion as it is nearer the earth. Thefe mushrooms are
also formed in an umbrella, and variegated with an in-
finitiy of little specks situated very near one another.
They are smooth and even on the upper part, but un-
derneath leafy like the common mushrooms. Their
ant is likewise very agreeable, and the ficks are not
debarr'd eating of them when they have been drenched
in a proper manner. Curiosity having prompted some
naturalists and physicians to submit these stones to a
chemical analysis, in order to be more competent judges
of the ufe they might be put to in medicine, there
first came forth, by distillation, an infipid water, and
afterwards a spiritious liquor. The retort having been
heated to a certain point, there arose an oil, which had
nearly the smell and flavour which will so cleanse the excretory
the urine, that no stones will ever after be collected in
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LYN

Lynn-regis It has had 15 royal charters; and is governed by a mayor, high-steward, under-steward, recorder, 12 aldermen, and 18 common-council men. It has two churches, besides St Nicholas, a chapel of ease to St Margaret's, a presbyterian and a quakers meeting-house, with a bradewell or workhouse, and several almshouses, and a free-school. In September 1741 the spires of its two churches were both blown down by a storm of wind; and that of St Margaret's, which was 193 feet in height, having beat in the body of the church, it has been since rebuilt, towards which king George II. gave L. 1000, and the late earl of Orford, then Sir Robert Walpole, L. 500. This church was formerly an abbey, and afterwards one of the largest parish-churches in England. The town-house, called Trinity-hall, is a noble old fabric; and to the Exchange, which is of free-flone, with two orders of columns. St Nicholas's chapel is very ancient, and reckoned one of the fairest and largest of the kind in England. It has a bell-tower which is perpendicular. In the great market-place a statue of the first Monday in the month, the mayor, aldermen, preachers, &c. meet to hear and determine all controversies amicably, for preventing law-suits. This was first established in 1588, and is called The Feast of Reconciliation. The markets are on Tuesdays and Saturdays; and it has two fairs: one of which, beginning Feb. 14, lasts for a fortnight, and is called Lynn-mart; the other is a cheese-fair on Oct. 6. The adherence of this town to king John and to Henry VIII. as abovementioned, are not the only instances of its loyalty to its sovereigns; for, in the late civil wars, it held out for king Charles I. and sustained a formal siege of above 18,000 men of the parliament-army, for above three weeks; but, for want of relief, was obliged to surrender, and submit to the terms of paying 10s. a-head for every inhabitant, and a month's pay to the soldiers, to save the town from plunder. There are more gentry, and consequently more gaiety in this town than in Yarmouth or even Norwich; there being fuch plenty of eatables and drinkables, that Spelman says Ceres and Bacchus seem to have established their magazines at this place; the east side abounding with corn, sheep, rabbits, hares, &c. the west side with cheese, butter, black-cattle, swans, and the wild-fowl common to marshes, besides the abundance of sea and river fish; so that he thinks there is no place in Great Britain, if in Europe, has such a variety in so small a compas of ground. At a small distance from the town stands a mount called the Lady's or Red Mount, where was once a chapel dedicated to the Virgin Mary, which was a resting-place for pilgrims on their way towards her convent at Walthingham. The king's fish-pond, or quay, where the greatest part of the imported wines is landed and put into large vaults, is a handsome square, with brick buildings, in the centre whereof is a statue of king James I. People pass hence into the fen-country, and over the famous washes into Lincolnshire in boats, which are often lost, by venturing out at an improper season and without guides.

LYNX, in zoology. See Felis.

LYON King of Arms. See King; and Law, &c. civiii. 16.

This office is of great antiquity and respect in Scotland; and although the precise time of its institution is unknown, yet it must have been as early as the introduction of armorial figures as hereditary marks of gentility and distinction into that country, which was in the 14th century. His regalia are, a crown of gold, with a crimson velvet-cap, a gold tassel, and an ermine lining; a velvet-rope reaching to his feet, with the arms of the kingdom embroidered thereon before and behind in the proper uncultures; a triple row of gold chain round his neck, with an oval gold medal pendant thereon, on one side of which is the royal bearing, and on the other St Andrew with his croft enamelled in proper colours, and a baton of gold enamelled green powde-
Lyonet's rank is superior to that of any other king of arms, as he holds his office immediately from the sovereign by commission under the great seal; whereas the kings of arms in England are deputies to the Earl Marshal, and act under his authority. Formerly Scotland was divided into two provinces, the one on the north and the other on the south side of Forth; and these provinces were under the management of two deputies appointed by the Lord Lyon to superintend the execution of all the business of his office. Before the revolution, the Lord Lyon, at his admission into office, was most solemnly crowned by the sovereign or his commissioner, in presence of the nobility, the officers of state, and other great men, after a suitable sermon preached in the royal chapel; and his crown was of the same form with the imperial crown of the kingdom. On solemn occasions he wears the regalia above described; at all other times, he wears the oval gold medal or badge on his breast, suspended by a broad green ribbon. He has the absolute disposal of all the offices in his own court, and of the heralds and pursuivants places. The messengers at arms throughout Scotland are also created by him, and are amendable to his jurisdiction. And the powers vested in him by his commission are the same with those of the sovereign in all matters relative to the marks of gentility.

Lyonet (Peter), an ingenious naturalist, and member of several learned societies, was born at Maastricht, and was descended from a very ancient and respectable family of Lorraine. He had (nearly attained his seventh year before he displayed an uncommon strength and agility in all bodily exercises; but he was not less diligent in the improvement of his mind. Being placed at the Latin school, he learned chronology, and exercised himself in Latin, Greek, and French poetry, as also in Hebrew, logic, and the Cartesian physics. He was particularly fond of the study of languages, whereof he understood no less than nine, living and dead. Having entered the university of Leyden, he studied the Newtonian philosophy, geometry, algebra, &c.; but his father (who was a clergyman), desiring he should attach himself to divinity, he reluctantly abandoned the former studies, as his passion for them was not easily to be overcome. He at the same time applied himself to anatomy, and also to music and drawing. He began afterwards to practise sculpture: and performed several pieces in wood, some of which are preserved, and have been greatly admired by the artists. After this, he betook himself to drawing portraits of his friends from life; whereon, after three or four months practice, he became a great proficient. Having attained the degree of candidate in divinity, he resolved to study law, to which he applied himself with so much zeal, that he was promoted at the end of the first year. Arrived at the Hague, he undertook the study of deciphering; and became secretary of the ciphers, translator of the Latin and French languages, and patent-master, to their High Mightinesses. Meanwhile, having taken a strong liking to the study of insects, he undertook an historical description of such as are found about the Hague, and to that end collected materials for several volumes; and having invented a method of drawing adapted thereto, he enriched this work with a great number of plates, universally admired by all the connaisseurs who had seen them. In the year 1742 was printed at the Hague a French translation of a German work, the 'Theology of Insects,' by Mr Leffer. Love of truth engaged Mr Lyonet to defer the publication of his above-mentioned description, and to make some observations on that work, to which he has added two most beautiful plates, engraved from his designs. This performance caused his merit to be universally known and admired. The celebrated M. de Beaunour had the above translation reprinted at Paris, not so much on account of the work itself as of Mr Lyonet's observations; and believed on it, as did also many other authors, the highest encomiums. He afterwards executed drawings of the fresh water polygus for Mr Trembley's beautiful work, 1744. The ingenious Wandelaar had engraved the first five plates; when Mr Lyonet, who had not witnessed this operation, concerned at the difficulties he experienced in getting the remaining eight finished in the proper style, he required, resolved to perform the task himself. He accordingly took a lection of one hour of Mr Wandelaar, engraved three or four small plates, and immediately began upon the work itself, which he performed in such a manner as drew on him the highest degree of praise, both from Mr Trembley and from many other artists, particularly the celebrated Van Goü, who declared that the performance astonished not only the amateurs, but also the most experienced artists. In 1748 he was chosen member of the Royal Society of London. In 1749 he began (by mere chance) his amazing collection of horns and shells, which, according to the universal testimony of all travellers and amateurs who have visited it, is at present the most beautiful, and certainly one of the most valuable, in Europe. In 1753 he became member of the newly-established Dutch Society of Sciences at Haarlem; and in 1757, after the celebrated M. le Cat, professor in anatomy and surgery, and member of almost all the principal societies in Europe, had seen Mr Lyonet's incomparable Traité Anatomique de la Cheville qui rouge le Bois de Santé, with the drawings belonging to it (which work was afterwards published), he was elected member of the Royal Academy of Sciences of Rome, whereof M. le Cat was perpetual secretary. After the publication of this treatise, he became, in 1760, member of the Royal Academy of Sciences of Berlin; in 1761, of the Imperial Academy of Naturalists; and, in 1762, of the Imperial Academy of Sciences at St Peterburg. In order to enable such as might be desirous of following him in his intricate and most astonishing discoveries respecting the structure of this animal, Mr Lyonet published, in the 'Tranactions of the Dutch Society of Sciences at Haarlem,' a description and a plate (as he also afterwards did in French at the beginning of his Traité Anatomique) of the instrument and tools he had invented for the purpose of dissection, and likewise of the method he used to ascertain the degree of strength of his magnifying glasses. Notwithstanding all this labour, which was considerably increased by the extensive correspondence which he for many years carried on with several learned and respectable personages, he still found means to,
Concerning the number of strings with which this instrument was furnished, there is great controversy. Some assert it to be only three; and that the sounds of the two remote were acute, and that of the intermediate one a mean between these two extremes: that Mercury, the inventor, resembled those three chords to as many seasons of the year, which were all that the Greeks reckoned, namely, Summer, Winter, and Spring: aligning the acute to the first, the grave to the second, and the mean to the third.

Others assert that the lyre had four strings; that the interval between the first and the fourth was an octave; that the second was a fourth from the first, and the fourth the same distance from the third, and that from the second to the third was a tone.

Another class of writers contend that the lyre of Mercury had seven strings. Nichomacus, a follower of Pythagoras, and the chief of them, gives the following account of the matter: "The lyre made of the shell was invented by Mercury; and the knowledge of it, as it was conveyed by him of seven strings, was transmitted to Orpheus. Orpheus taught the use of it to Thamyris and Linus; the latter of whom taught it to Hercules, who communicated it to Amphion the Theban, who built the seven gates of Thebes to the seven strings of the lyre." The same author proceeds to relate, "That Orpheus was afterwards killed by the Thracian women; and that they are reported to have cast his lyre into the sea, which was afterwards thrown up at Antium, a city of Lepcis: that certain fishermen finding it, they brought it to Terpander, who carried it to Egypt, exquisitely improved, and, flowing it to the Egyptian priests, afforded himself the honour of its invention."

This difference among authors seems to have arisen from their confusing together the Egyptian and the Grecian Mercury. — The invention of the primitive lyre with three strings was due to the first Egyptian Hermes, as mentioned under that article. — The lyre attributed to the Grecian Mercury is described by almost all the poets to be an instrument of seven strings.
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Boethius gives a different history of the scale, and tells us, that the system did not long remain in such narrow limits as a tetrachord. Chasboas, the son of Athias, or Atys, king of Lydia, added a fifth string; Hygrois, a sixth; Terpander, a seventh; Lycammon of Samos, an eighth. But all these accounts are irreconcilable with Homer's hymn to Mercury, where the chelys, or tefiudo, the invention of which he ascribes to that god, is said to have had seven strings. There are many claimants among the musicians of ancient Greece to the stringed instruments that were afterwards added to these, by which the scale, in the time of Aristoxenus, was extended to two octaves. Athenæus, more than once, speaks of the nine-stringed instrument; and Ion of Chios, a tragic and lyric poet and philosopher, who first recited his pieces in the 82d olympiad, 452 B. C. mentions, in some verses quoted by Euclid, the ten-stringed lyre; a proof that the third conjoint tetrachord was added to the scale in his time, which was about 50 years after Pythagoras is supposed to have constructed the octachord.

The different claimants among the Greeks to the fame musical discoveries, only prove, that music was cultivated in different countries; and that the inhabitants of each country invented and improved their own instruments, some of which happening to resemble those of other parts of Greece, rendered it difficult for historians to avoid attributing the fame invention to different persons. Thus the single flute was given to Minerva and to Marys; the syrinx or aulula, to Pan; and to Cybele; and the lyre or cithara, to Mercury, Apollo, Amphion, Linus, and Orpheus. Indeed, the mere addition of a string or two to an instrument without a neck, was so obvious and easy, that it is scarcely possible not to conceive many people to have done it at the same time.

With respect to the form of the ancient lyre, as little agreement is to be found among authors as about the number of strings. The best evidence concerning it are the representations of that instrument in the hands of ancient statues, bas-reliefs, &c. See Plate CCLXXV, where Fig. 1. is a representation of the tefiudo, or lyre of Amphion, in front, as it appears on the base of the celebrated Toro of Arfane at Rome. This admirable work, confisting of four figures bigger than the life, besides the toro, or bull, was found in Caracalla's baths, where the Arfane Hercules was likewise discovered; and, except

(a) It has been already related, that the lyre invented by the Egyptian Mercury had but three strings; and by putting these two circumstances together, Dr Burney observes, that we may perhaps acquire some knowledge of the progress of music, or at least, of the extension of its scale, in the highest antiquity.

Mefo, in the Greek music, is the fourth found of the second tetrachord of the great system, and first tetrachord invented by the ancients, answering to our A, on the fifth line in the base. If this sound then was added to the former three, it proves two important points: first, that the most ancient tetrachord was that from E in the base to A; and that the three original strings in the Mercurian and Apollonian lyre were tuned E, F, G, which the Greeks called Hypate Mefo, Parhypate Mefon, Mefon Diaton. The addition therefore of Mefo to these, completed the first and most ancient tetrachord, E, F, G, A.

The string Ichanos, then, being added to these, and answering to our D on the third line in the base, extended the compass downwards, and gave the ancient lyre a regular series of five sounds in the Dorian mode, the most ancient of all the Greek modes; and the two strings called Hypate and Parhypate, corresponding with our B and C in the base, completed the tetrachord, or seven sounds, B, C, D, E, F, G, A, a compass that received no addition till after the time of Pindar, who calls the instrument then in use the secto-tongued lyre.
The Lyre held by Terpophilus, in the picture of that muse dug out of Herculaneum.

3. The Abydlian lyre, or lyre in use at present in the province of Tigre, from a drawing of Mr Bruce, communicated to Dr Burdett. "This instrument (says he) has sometimes five, sometimes six, but most frequently seven strings, made of the thongs of raw sheep or goat skins, cut extremely fine, and twisted; they soon, are very subject to break in dry weather, and have scarce any found in wet. From the idea, however, of this instrument being to accompany and sustain a voice, one would think that it was better mounted formerly. "The Abydlians have a tradition, that the lyre in Ethiopia, by tambourine, and tambourine, were brought from Egypt into Ethiopia, by Thoth, in the very first ages of the world. The flute, kettle-drum, and trumpet, they say, were brought from Palestine, with Menelek, the son of their queen of Saba by Solomon, who was their first Jewish king.

"The Lyre in Ambaric is called bog, the sheep; in Ethiopia, it is called melasko; the verb melasko signifies to strike strings with the fingers; no plectrim is ever used in Abydliam; so that melasko, being literally interpreted, will signify the 'fretted instrument played upon with the fingers.'

"The sides which constitute the frame of the lyre were anciently composed of the horns of an animal of the goat kind called agazan, about the size of a small cow, and common in the province of Tigre. I have seen several of these instruments very elegantly made of such horns, which nature seems to have shaped on purpose. Some of the horns of an African species of this animal may be seen in M. Buffon's History of the king of France's cabinet. They are bent, and left regular than the Abydlians; but after fire-arms became common in the province of Tigre, and the woods were cut down, this animal being more scarce, the lyre has been made of a light red wood; however, it is always cut into a spiral-twisted form, in imitation of the ancient materials of which the lyre was composed. The making I find was one of these instruments made of wood. "The kingdom of Tigre, which is the largest and most populous province of Abydliam, and was during many ages the seat of the court, was the first which received letters and civil and religious government; it extended once to the Red Sea; various reasons and revolutions have obliged the inhabitants to resign their seacoast to different barbarous nations, pagan and Mahometan; while they were in possession of it, they say that the Red Sea furnished them with tortoise shells, of which they made the bodies of their lyres, as the Egyptians did formerly, according to Apollodorus and Lucian; but having now lost that resource, they have adopted, in its place, a particular species of gourd, or pumpkin, very hard and thin in the bark, still imitating with the knife the squares, compartments, and figure of the shell of the tortoise.

"The lyre is generally from three feet to three feet six inches high; that is, from a line drawn through the point of the horns, to the lower part of the base of the sounding-board. It is exceedingly light, and easy of carriage, as an instrument should naturally be in a rugged and mountainous a country.

"When we consider the parts which compose this lyre, we cannot deny it the earlist antiquity. Man in his first state was a hunter and a fisher, and the oldest instrument was that which partakes most of that state. The lyre composed of two principal pieces, owes the one to the horns of an animal, the other to the shell of a fish.

"It is probable, that the lyre continued with the Ethiopians in this rude state as long as they confined themselves to their rainy, steep, and rugged mountains; and afterwards, when many of them descended along the Nile in Egypt, its portability would recommend it in the extreme heats and want of theirs way. Upon their arrival in Egypt, they took up their habitation in caves, in the sides of mountains, which are inhabited to this day. Even in these circumstances, an instrument larger than the lyre must have been inconvenient and liable to accidents in those caverns; but when these people increased in numbers and courage, they ventured down into the plain, and built Thebes. Being now at their ease, and in a fine climate, all nature flourishing around them, music and other arts were cultivated and refined, and the imperfect lyre was extended into an instrument of double its compass and volume. The size of the harp could be now no longer an objection; the Nile carried the inhabitants everywhere easily and without effort; and we may naturally suppose in the fine evenings of that country, that the Nile was the favourite scene upon which this instrument was practised; at least the sphinx and Anubis upon its head, seem to hint that it was someway connected with the overflows of that river." See Harp.

4. An Etruscan lyre, with seven strings, in the collection of Etruscan, Greek, and Roman antiquities, published from the cabinet of the Hon. Sir William Hamilton, Vol. i. Naples 1766. Pl. cix. With respect to this instrument, it is worthy of observation, that though the vase upon which it is represented is of such indubitable and remote antiquity, the tail-piece, bridge, belly, and found holes have a very modern appearance, and manifest a knowledge in the construction of musical instruments among the Etruscans superior to that of the Greeks and Romans in much later times. The lower part of the instrument has much the appearance of an old bass viol, and it is not difficult to discover in it more than the embryo of the whole viol family. The strings lie round, as if intended to be played on with a bow; and even the crois lines on the tail-piece are such as we frequently see on the tail-pieces of old viols.

5. The Tripodian lyre of Pythagoras the Zacynthian, from a bass-relief in the Maecen palace at Rome representing the whole choir of the muses. Athenæus gives the following account of this extraordinary instrument, lib. xiv. cap. 15. p. 679. "Many ancient instruments are recorded (says Artemon), of which we have so little knowledge, that we can hardly be certain of their existence; such as the tripod of Pythagoras the Zacynthian, which, on account of its difficulty, continued in use but a short time. It resembled in form the Delphic tripod, whence it had its name. The legs were equidistant, and fixed upon
Bellows for inflating the lungs in order to restore suspended respiration.

Plate CCLXIV

Fig. 1

Ancient Lyres

Fig. 3

Lucanus

Fig. 4

Fig. 6
**LYS**

Lyric upon a moveable base that was turned by the foot of the player; the strings were placed between the legs of the foot; the vane at the top served for the purpose of a found board, and the strings of the three sides of the instrument were tuned to three different modes, the Doric, Lydian, and Phrygian. The performer sat on a chair made on purpose; strking the strings with the fingers of the left hand, and using the plectrum with the right, at the same time turning the instrument with his foot to which ever of the three modes he pleased; so that by great practice he was enabled to change the modes with such velocity, that those who did not see him would imagine they heard three different performers playing in three different modes. After the death of this admirable musician, no other instrument of the same kind was ever constructed.

6. A lyre in the famous ancient picture dug out of Herculaneum, upon which Chiron is teaching the young Achilles to play. See CHIRON.

LYRIC-POETRY, was such as the ancients sung to the lyre or harp.—It was originally employed in celebrating the praises of gods and heroes, and its characteristic was sweetness. Who was the author of it is not known. It was much cultivated by the Greeks; and Horace was the first who attempted it in the Latin language. Anacreon, Alcaeus, Stesichorus, Sappho, and Horace, were the most celebrated lyric poets of antiquity.

LYRID, among the ancients, a kind of musicians who played on the lyre and sung at the same time. This appellation was also given to such as made it their employment to sing lyric poems composed by others.

LYS, or LIS. See LIS.

LYS, the name of a measure used by the Chinese in estimating distances. Two hundred lys make 60 geographical miles, which are equal to one degree.

LYSANDER, a famous Spartan general. See SPARTA.

LYSANDRIA, a Samian festival, celebrated with games and sacrifices in honour of the Lacedemonian general Lyander. It was anciently called herse; but this name the Samians abolished by a public decree.

LYSIARCH, an ancient magistrate, who superintended the sacred games, and presided in matters of religion in the province of Lydia. He was created in a council consisting of deputies from all the provincial cities, in number 23. The lysiarchs were both heads of the council and pontiffs of the province.

LYSIAS, an ancient Grecian orator, was born at Syracuse in the 60th Olympiad. At 15, he went to Thurion, a colony of the Athenians; and when grown up, allotted in the administration of the government there many years. When about 47 years of age, he returned to Athens; whence, being afterwards banished by the 50 tyrants, he went to Megara. Upon his return, Thrasybulus would have had him employed again in state matters; but this not taking place, he spent the remainder of his life as a private man. He was very familiar with Socrates, and other illustrious philosophers. He proceeded to teach the art of speaking, not that he pleaded at the bar himself, but he supplied others with speeches. "Fuit Lyssmachia Lylias in causis forensibus non verius" (says Cicero), fed egregie suis scriptis et agitatis legibus," &c. Quinti.-LYSIPPUS, a celebrated Greek statuary, was born at Sicyon, and at first followed the butylæum of a locksmith which he quitted in order to practise painting; but he afterwards applied himself entirely to sculpture; in which he acquired an immortal reputation, and made a great number of statues that were the admiration of the people of Athens and Rome. His grand statue of the fun represented in a car drawn by four horses, was worshiped at Rhodes; he made several statues of Alexander and his favourites, which were brought to Rome by Metelius after he had reduced the Macedonian empire; and the statue of a man wiping and anointing himself after bathing, being particularly excellent, was placed by Agrippa before his baths in that city. He lived in the time of Alexander the Great, about 354 B.C.; and left three sons, who were all famous sculptors.

LYTHRUM, PURPLE LOOSESTRIFE, in botany. A genus of the monogyne order belonging to the pentandria class of plants; and in the natural method ranking under the 20th order, Rotaece. The corolla is rotaceous; the capsule globular, beaked, and ten-valved. There are ten species, but only four are commonly cultivated in gardens. These are hardy, herbaceous perennials and biennials, rising with erect stalks from 18 inches to two or three feet high; garnished with narrow entire leaves; and terminated by spikes and clusters of monopetalous, rotated, five-parted spreading flowers of white and yellow colours. They are easily propagated by seeds, and will thrive in any soil or situation.

LYSIMACHIA, a loosestrife, in botany: A genus of the monogyne order belonging to the pentandria class of plants; and in the natural method ranking under the 20th order, Rotaece. The corolla is rotaceous; the capsule globular, beaked, and ten-valved. There are ten species, but only four are commonly cultivated in gardens. These are hardy, herbaceous perennials and biennials, rising with erect stalks from 18 inches to two or three feet high; garnished with narrow entire leaves; and terminated by spikes and clusters of monopetalous, rotated, five-parted spreading flowers of white and yellow colours. They are easily propagated by seeds, and will thrive in any soil or situation.
LYTTELTON (Edward), lord Lyttelton, keeper of the great seal in the reign of Charles I., was eminent for his probity and his moderation at the commencement of that monarch's disputes with his subjects. Without forfeiting his fidelity to the king, he preserved the esteem of parliament till 1644, when he was made colonel of a regiment in the king's army at York. He died in 1645. Besides several of his speeches which have been printed, he wrote reports in the common pleas and exchequer printed at London in 1663, in folio; several arguments and discourses, &c.

LYTTELTON (George lord) eldest son of Sir Thomas Lyttelton, bart., descended from the great judge Lyttelton, was born in 1600, at seven months; and the midwife fopping him to be dead, threw him carelessly into the cradle; where, had not some signs of life been taken notice of by one of the attendants, he might have never recovered. He received the elements of his education at Eaton-school, where he showed an early inclination to poetry. His pastoral and some other light pieces were originally written in that Seminary of Learning; from whence he was removed to the University of Oxford, where he pursued his classical studies with uncommon avidity, and sketched the plan of his Persian Letters, a work which afterwards procured him great reputation, not only from the elegance of the language in which they were composed, but from the excellent observations they contained on the manners of mankind.

In the year 1728, he set out on the tour of Europe; and, on his arrival at Paris, accidentally became acquainted with the honourable Mr. Poyntz, then the British minister at the court of Versailles; who was so struck with the extraordinary capacity of this young traveller, that he invited him to his home, and employed him in many political negotiations, which he executed with great judgment and fidelity.

Mr. Lyttelton's conduct, while on his travels, was a lesson of instruction to the rest of his countrymen. Instead of lounging away his hours at the coffee-houses frequented by the English, and adopting the fashionable fables and vices of France and Italy, his time was passed alternately in his library and in the society of men of rank and literature. In this early part of his life, he wrote a poetical epistle to Dr. Ayloough, and another to Mr. Pope, which show singular taste and correctness.

After continuing a considerable time at Paris with Mr. Poyntz, who, to use his own words, behaved like a second father to him, he proceeded to Lyons and Geneva; and from thence to Turin, where he was honoured with great marks of friendship by his Sardinian majesty. He then visited Milan, Venice, Genoa, and Rome, where he applied himself closely to the study of the fine arts; and was, even in that celebrated metropolis, allowed a perfect judge of painting, sculpture, and architecture.

During his continuance abroad, he constantly corresponded with Sir Thomas, his father. Several of his letters are yet remaining, and place his filial affection in a very distinguished light. He soon after returned to his native country, and was elected representative for the borough of Ockhampton in Devonshire; and behaved so much to the satisfaction of his constituents, that they several times re-elected him for the same place without putting him to the least expense.

About this period, he received great marks of friendship from Frederic prince of Wales, father of his present majesty: and was, in the year 1757, appointed principal secretary to his royal highness, and continued in the strictest intimacy with him till the time of his death. His attention to public business did not, however, prevent him from exercising his poetical talent. A most amiable young lady, Miss Fortescue, inspired him with a passion, which produced a number of little pieces, remarkable for their tenderness and elegance; and he had a happy facility of striking out an extempore compliment, which obtained him no small share of reputation. One evening being in company with lord Cobham and several of the nobility at Stowe, his lordship mentioned his design of putting up a bust of lady Sisfolk in his beautiful gardens; and, turning to Mr. Lyttelton, said, "George, you must furnish me with a motto for it." "I will, my lord," answered Mr. Lyttelton; and directly produced the following couplet:

Her wit and beauty for a court were made,
But truth and goodness fill her for a Shade.

When Mr. Pitt, the late earl of Chatham, lost his commission in the guards, in consequence of his spirited behaviour in parliament, Mr. Lyttelton was in waiting at Leicester house, and, on hearing the circumstance, immediately wrote these lines:

Long had thy virtue mark'd thee out for fame,
Far far superior to a corret's name;
This generous Walpole saw, and grieved to find
So mean a post disgrace that noble mind;
The fervile standard from thy free-born hand
He took, and bade thee lead the patriot-band.

In the year 1742, he married Lucy, the daughter of Hugh Fortesque, Esq.; of Fillleigh in the county of Devon, the lady above-mentioned, whose exemplary conduct, and uniform practice of religion and virtue, established his conjugal happiness upon the most solid basis.

In 1744, he was appointed one of the lords commissioners of the treasury; and, during his continuance in that station, constantly exerted his influence in rewarding merit and ability. He was the friend and patron of the late Henry Fielding, James Thomson, author of the Seasons, Mr. Mallet, Dr. Young, Mr. Hammond, Mr. Welf, Mr. Pope, and Voltaire. On the death of Thomson, who left his affairs in a very embarrased condition, Mr. Lyttelton took that poet's sister under his protection. He revived the tragedy of Coriolanus, which that writer had not put the last hand
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hand to; and brought it out at the theatre-royal, Covent-garden, with a prologue of his own writing, in which he so affectionately lamented the loss of that delightful bard, that not only Mr Quin, who spoke the lines, but almost the whole audience, spontaneously burst into tears.

In the beginning of the year 1746, his felicity was interrupted by the loss of his wife, who died in the 29th year of her age; leaving him one son, Thomas, the late lord Lyttelton; and a daughter, Lucy, who some time since married lord viscount Valentia. The remains of his amiable lady were deposited at Over-Arley in Worcestershire; and an elegant monument was erected to her memory in the church of Hagley, which contains the following inscription written by her husband:

Made to engage all hearts, and charm all eyes: Tho' meek, magnanimous; tho' witty, wise; Polite, as all her life in courts had been; Yet good, as all her temper from the miracles of Christ, and her eloquence was sweeter than her song, Her mind was virtue by the graces dress'd. Her form was beauty in a living state, Her mind was virtue by the graces dress'd.

Besides these beautiful lines, Mr Lyttelton wrote a monody on the death of his lady, which will be remembered while conjugal affection and a taste for poetry exist in this country.

His judicious observations on the conversion and apostleship of St Paul, were written at the desire of Gilbert Weft, in consequence of Mr Lyttelton's affecting, that beside all the proofs of the Christian religion, which might be drawn from the prophecies of the Old Testament, from the necessary connection it has with the whole system of the Jewish religion, from the miracles of Christ, and from the evidence given of his resurrection by all the other apostles, he thought the conversion of St Paul alone, duly considered, was of itself a demonstration sufficient to prove Christianity to be a divine revelation. Mr Weft was struck with the thought; and assured his friend, that so compendious a proof would be of great use to convince those unbelievers that will not attend to a longer series of arguments; and time has shown he was not out in his conjecture, as the tract is esteemed one of the best defences of Christianity which has hitherto been published.

In 1754, he resigned his office of lord of the treasury, and was made cofferer to his majesty's household, and sworn of the privy-council: Previous to which, he married, a second time, Elizabeth daughter of field-marshal Sir Robert Rich, whose indifferet conduct gave him great uneasiness, and from whom he was separated by mutual consent, a few years after his marriage.

After being appointed chancellor and under-treasurer of the court of exchequer, he was, by letters-patent dated the 19th of November 1757, 31 Geo. II. created a peer of Great Britain, by the title and style of lord Lyttelton, baron of Frankies, in the county of Worcestershire. His speeches on the Scotch and mutiny bills in the year 1747, on the Jew bill in 1753, and on the privilege of parliament in 1762, showed found judgment, powerful eloquence, and inflexible integrity. During the last ten years he lived chiefly in retirement, in the continual exercise of all the virtues which can ennoble private life. His last work was Dialogues of the Dead, in which the morality of Cambray and the spirit of Fontenelle are happily united.

He was suddenly seized with an inflammation of the bowels, in the middle of July 1773, at his seat at Hagley; which termi rated in his death, on the 22d of that month. His last moments were attended with unimpaired understanding, unaffected greatness of mind, calm resignation, and humble but confident hopes in the mercy of God. As he had lived universally esteemed, he died lamented by all parties. A complete collection of his works has been published since his decease, by his nephew George Aycough, Esq.

M.

M a liquid consonant, and the twelfth letter in the alphabet.

It has one unvaried sound, and is pronounced by striking the upper lip against the lower; in which the pronunciation of this letter agrees with that of b; the only difference between the two consisting in a little motion made in the nose in pronouncing m, and not in b: whence it happens that those who have taken cold, for m ordinarily pronounce b; the nose in that case being disabled from making the necessary motion.

All consonants are formed with the aid of vowels; in em the vowel precedes, in be it follows; and m is never mute.

Quintilian observes, that the m sometimes ends Latin words, but never Greek ones; the Greeks always changing it in that case into n, for the sake of the better sound.

M is also a numeral letter, and among the ancients was used for a thousand; according to the verse,

M capit ell numeri, quem quinque milli ten. vi.

When a dash is added to the top of it, as m, it signifies a thousand times a thousand.

Y y 2
MAC

M. as an abbreviation, stands for Manlius, Marcus, Martinus, and Mricius: M. A. signifies magister artium, or master of arts; MS. manuscript, and MSS. manuscripts.

M., in astronomical tables, and other things of that kind, is used for meridional or southern; and sometimes for meridian or midday.

M. in medicinal prescription, is frequently used to signify a maniple or handfull: and it is sometimes also put at the end of a recipe, for mixture "a mingle;" or for mixture "a mixture." Thus, m. s. julipium, signifies a mixture and make a julep.

M. in law, the brand or figma of a person convicted of manslaughter, and admitted to the benefit of his clergy. It is to be burnt on the brawn of his left thumb.

MAAT (John). See Blankop.

MARA, in botany: A genius of the triandria order, belonging to the dioscia class of plants. The perianthium of the male is trifid; that of the female is as in the male; the fruit is a plum two-celled superior.

MABILLON (John), a very learned writer of France in the 17th century, was born at Perre-monte, on the frontiers of Champagne, in 1632. He was educated in the university of Rheims, and afterwards entered into the abbey of the Benedictines of St. Remy. In the year 1663, he was appointed keeper of the treasuries and monuments of France at St. Dennis; but having unfortunately broke a looking-glass there, which was pretended to have belonged to Virgil, he defied leave of his superiors to quit an employment which frequently obliged him to tell things he did not believe. Next year he went to Paris: and was very serviceable to Father d'Achery, who was devious of having some young monk who could assist him in compiling his Spicilegium. This made him known. Soon after the congregation of St. Maur having formed a design of publishing new editions of the fathers, revised from the MSS. in the libraries of the Benedictines, Mabillon was charged with the edition of St. Bernard, which he prepared with extraordinary diligence. After that, he published many other works, which are evidences of his vast capacity and industry. In 1682, he was employed by Mr. Colbert in examining some ancient titles relating to the royal family. The year following he went into Germany, to search the archives and libraries of the ancient abbeys for what was most curious and proper to illustrate the history of the church in general, and that of France in particular. He has published an account of this journey. In 1689, he undertook another journey into Italy, by order of the king of France; and returned the year following with a very noble collection. He placed in the king's library above 3000 volumes of rare books, printed and in MSS. and composed two volumes of the pieces which he had discovered in the country. He was highly esteemed for his virtues as well as his learning.

MACCO, or MACAU. See Lemur.

MACAO, a town of China, in the province of Canton, seated in an island at the mouth of the river Tae. The Portuguese have been in possession of the harbour for 150 years. Formerly they had a great trade here; but now they have only a fort with a small garrison. The houses are built after the European manner; and there is a Chinese mandarin, as well as a Portuguese governor, to take care of the town and the neighbouring country. E. Long. 112° 13'. N. Lat. 22° 12'.

MACAO, in ornithology. See PSEITACUS.

MACARIANS, in ecclesiastical history, the followers of Macarius, an Egyptian monk, who was distinguished towards the close of the fourth century for his sanctity and virtue. In his writings there are some superstitious tenets, and also certain opinions that are tainted with Origenism. The name has been also applied to those who adopted the sentiments of Macarius a native of Ireland, who, about the close of the ninth century, propagated in France the error afterwards maintained by Averrhoes that one individual intelligence or soul performed the spiritual and rational functions in all the human race.

MACARONI. See FoLENGIO, and the next article.

MACARONIC, or MACARONIAN, a kind of burlesque poetry, consisting of a jumble of words of different languages, with words of the vulgar tongue Latinized, and Latin words modernized. Macaroni among the Italians; as has been observed by Callius Rhodiginus, signifies a coarse clownish man; and because this kind of poetry is patched out of several languages, and full of extravagant words, &c. the Italians, among whom it had its rise, gave it the name of macaronian, or macaronic poetry. Others choose to derive it from macaronibus, from macaroni, a kind of confection made of meal not boiled, sweet almonds, sugar, and the white of eggs, accounted a great dainty among the country-people in Italy; which, from their being composed of various ingredients, occasioned this kind of poetry, which consists of Latin, Italian, Spanish, French, English, &c. to be called by their name.

Example.—A bold fellow in the macaronic style, says,

\[\text{Enflavi omnes oradoneis \& regimandois, \&c.}\]

Another example:

\[\text{Archelos psilofiers saramique manum,}\]
\[\text{Et grandem esimenta que inopinum fallaruelle est;}\]
\[\text{Porsumque alio trubiliante corda elpohre, \&c.}\]

Theol. Folengio, a Benedictine monk of Nantua, was the first who invented, or at least cultivated, this kind of verse. See FoLENGIO.

The best pieces of this kind are the Béllius, of PoLengio, and Maccaronis Forza by Stefonio a Jesuit, among the Italians; and the Beatus veritabilis super terribilis eisuenta pazianarium de Caelius, among the French. The famous Rabelais first transferred the macaronic style out of the Italian verfe into French prose; and on the model thereof formed some of the best things in his Pantagruel. We have little in English in the macaronian way; nothing scarce, but some little loose pieces collected in Camden's remains. But the Germans and Netherlanders have had their macaronic poets; witness the Cererum Catholicum von Calviniss, of one Martinius Hancius Frizius, which contains about 1200 verses, all the words whereof begin with the letter C.

MACARSKA,
MACCABEUS (Judas). See JUDAS.

MACCABEES, two apocryphal books of scripture, containing the history of Judas and his brothers, and Maccabees, their wars against the Syrian kings in defence of their religion and liberties, so called from Judas Maccathias, furnamed Maccabees, as some say from the word מָכַבֵּה מַכָּבִיא, formed of the initials of מַכָּבֵה מַכָּבִיא, q. d. Whoe is like unto thee, O Lord, among the gods? which was the motto of his standard; whence those who fought under his standard were called Maccabees, and the name was generally applied to all who suffered in the cause of the true religion, under the Egyptian or Syrian kings. The first book of the Maccabees is an excellent history, and comes nearest to the style and manner of the sacred historians of any extant. It was written originally in the Chaldee language. Of the Jerusalem dialect, and was extant in this language in the time of Jerom. From the Chaldee it was translated into Greek, from the Greek into Latin. It is supposed to have been written by John Hyrcanus the son of Simon, who was prince and high priest of the Jews near 30 years, and began his government at the time where this history ends. It contains the history of 40 years, from the reign of Antiochus Epiphanes to the death of Simon the high priest; that is from the year of the world 3829 to the year 3869; 111 years before Christ. The second book of the Maccabees begins with two epistles sent from the Jews of Jerusalem to the Jews of Egypt and Alexandria; to exhort them to observe the feast of the dedication of the new altar erected by Judas on his purifying the temple. The first was written in the 169th year of the era of the S leucide, i.e. before Christ 144; and the second in the 188th year of the same era, or 153 before Christ; and both appear to be furious. After these epistles follows the preface of the author to his history, which is an abridgment of a larger work, composed by one Jason, a Jew of Cyrene, who wrote in Greek the history of Judas Maccabees and his brethren, and the wars against Antiochus Epiphanes, and Eupator his son. This second book does not by any means equal the accuracy and excellency of the first. It contains a history of about 15 years, from the execution of Heliodorus's commissio, who was sent by Seleucus to fetch away the treasures of the temple, to the victory obtained by Judas Maccabees over Nicanor; that is, from the year of the world 3829, to the year 353, 147 years before Christ.

There are in the Polyglot bibles, both of Paris and London, Syriac versions of both these books; but they, as well as the English versions which we have among the apocryphal writers in our Bibles, are derived from the Greek. There is also a third book of the Maccabees, containing the history of the persecution of Ptolemy Philopator against the Jews in Egypt, and their sufferings under it, and seems to have been written by some Alexandrian Jew in the Greek language, not long after the time of Strabo. It is in most of the ancient manuscript copies of the Greek Septuagint, particularly in the Alexandrian and Vatican, but was never inserted into the vulgar Latin version of the Bible, nor consequently into any of the English copies. Moreover, Josephus's history of the martyrs that suffered under Antiochus Epiphanes, is found in some manuscript Greek Bibles, under the name of the fourth book of the Maccabees.
MACBETH, a Scots nobleman in the 11th century, nearly allied to Duncan king of Scotland.—Not contented with carving the king's authority, he carried his petulant ambition so far as to put him to death; and, chasing Malcolm Kenmure his son and heir into England, usurped the crown. Siward earl of Northumberland, whose daughter Duncan had married, undertook, by the order of Edward the Confessor, the protection of the fugitive prince. He marched with an army into Scotland; defeated and killed Macbeth; and restored Malcolm to the throne of his ancestors. Shakespeare has made this transfiguration the subject of one of his best tragedies.

MACBRIDE (Dr David) an eminent physician and philosopher, was descended from an ancient family in the county of Galloway in Scotland. His grandfather, a clergyman, had settled in Ireland about the end of the last century, as minister to a Presbyterian congregation at Belfast; and his father, who followed the same line, was settled at Ballymony in the county of Antrim, where he married, and where our author was born in April 1726. After a proper school-education, and having passed some time under the tuition of an eminent surgeon in his native place, he was sent to the university of Glasgow. Having there completed the usual course of scientific studies, he came to Edinburgh for the further prosecution of medical science. After a short stay here, a war then prevailing between France and Britain, he was induced to go on board the navy in the station of a surgeon's mate. In the service of his country he continued for several years; and after discharging for some time the duties of an assistant, he was raised to the rank of surgeon. In this situation, he first turned his thoughts towards the discovery of a remedy for the seafury. It was not, however, at this period, that either chance or reasoning suggested to him the employment of an article which has since been attended with the most beneficial consequences. Here he had an opportunity only of observing the symptoms, of studying the nature, and of lamenting the consequences, of the disease.

The termination of the war by the peace of Aix-la-Chapelle put a period to Dr Macbride's employment as a naval surgeon. He had now probably obtained much medical knowledge in the school of experience; but he was enabled that he had still much to acquire in that of science. An ardent keenness to mingle in active life had led him from the schools of medicine at an earlier period than could have been wished; and an earnest desire to find his future practice in the best established principles led him back to them, when a judgment, matured by years, and informed from the observation of facts, rendered him capable of hearing teachers with greater advantage. He returned therefore to Edinburgh, and again entered on the career of academical pursuits, under the tuition of Dr Monro, and these other teachers, whose abilities raised the fame of the medical school at this place. But not satisfied with the instructions to be had from any one set of professors, the celebrity of the medical teachers in London led him also to visit that capital. There he particularly became the pupil of those distinguished lecturers, Dr Hunter and Dr Smellie. And while from the former he laboured to acquire an accurate surgical knowledge, from the latter he endeavoured to obtain the true principles of midwifery considered as a science. At the same time, he was no less industrious in improving himself in the useful practice of both arts by attention at hospitals.

Thus prepared for the exercise of his profession about the end of the year 1745, he fixed his residence in Dublin in the character of surgeon and accoucheur. If amiable manners, and extensive knowledge of his profession, could alone have been sufficient introductions to practice, he might in a short time have looked for a competent share of business in that capital; but while he had to combat that objection which very generally arises from youth, his progress was also not a little retarded by an uncommon degree of modesty. Hence for several years he remained almost in a state of obscurity, and was employed by but few people either of rank or fortune. But, if it is to be regretted that for many years his time was not so fully employed in the lucrative part of his profession as was due to his merit it ought still to be remembered, that this essentially promoted the cause of science; for by this means his genius and industry were directed to medical researches; and were productive of discoveries which will with honour transmute his name to latest posterity. These, though some of them might have been successfully turned to his own emolument, were freely communicated to the world in different publications; and he did not show greater ingenuity in making discoveries, than liberality of sentiment in publishing them for the advantage of others.—His first publication intitled, "Experimental Essays on Medical and Philosophical Subjects," made its appearance in the year 1754.—These Essays are five in number: 1. On the fermentation of alimentary mixture and the digestion of the food. 2. On the nature and properties of fixed air. 3. On the different kinds of antiseptics. 4. Of the dissolvent power of quicklime. 5. Of the fea-scurvy. The merit of all these is sufficiently known and acknowledged; but the last of them is unquestionably the most important; the method therein proposed of both the prevention and cure of that dreadful disease the scurvy, having been confirmed by repeated and undeniable observation.

Having thus equally distinguished himself as an ingenious philosopher and able practitioner, the world were no now flow in bellowing upon him the tribute of applause to which he was intitled. His name was enrolled with honour in the lists of many learned societies, and the university where his studies had first been commenced, were proud to confer upon him the degree of Dr of Medicine.

The reputation, however, of being a distinguished author, was to him a but secondary object: and his talents were not confined to the advancement of medicine alone. Having successfully discovered a considerable improvement in the art of tanning, with that spirit of generosity which is ever the concomitant of real worth, he speedily and freely communicated it to the public, by publishing, first, "An Account of a New Method of Tanning," and afterwards, "Instructions for carrying on the New Method of Tanning." As a mark of approbation for this liberal conduct, as well as a testimony of respect for his ingenuity, prizes were conferred upon him by the Societies of Arts both in London and Dublin. But his last and most
MACE, an ancient weapon, formerly much used by the cavalry of all nations. It was commonly made of iron; its figure much resembles a chocolate mill; and is carminative, an ailriment, is made of copper or silver gilt, ornamented with a crown, globe, and croft, and is now the chief insignia of authority throughout Great Britain. Similar to the ancient maces, were those staves at the end of which iron or leaden balls armed with spikes were suspended by chains: they were till lately carried by the pioneers of the trained-bands or city militia.

MACE, in the materia medica, the second coat of covering of the kernel of the nutmeg, is a thin and membranaceous substance, of an oleaginous nature, and a yellowish colour: being with fragments of an inch in length, which are divided into a multitude of ramifications. It is of an extremely fragrant, aromatic, and agreeable flavour; and of a pleasant, but acid, oleaginous taste.

Mace is carminative, stomachic, and astringent; and polishes all the virtues of nutmeg, but has less astrignency.—The oils of mace and nutmeg, whether prepared by distillation or expression, are so much of the same nature, that they may be indifferently used for one another on all occasions. They give ease in colics, and often in nephritic cases, taken internally from one drop to five or six of the distilled oil, on an equal quantity of the expressed; and externally, they are of use in rub paralytic limbs: they also assist digestion; and will often stop vomitings and hiccoughs, only by being rubbed on the region of the stomach. The nurfes have a custom of applying oil of mace by expression to childrens navels to ese their gripes, and that often with success: and we are assured, by authors of credit, that when rubbed on the temples, it promotes sleep.

MACEDON, or MACEDONIA, a most celebrated kingdom of antiquity, was bounded on the east by the Ægæan sea; on the south by the Ætolian sea or Adriatic; on the north, first by the river Strymon and the Scardian mountains, but afterwards by the river Néssus or Neus. In a direct line the whole country extended only 150 miles in length; but the windings of the coast lengthened it out to three times that extent; in which almost every convenient situation was occupied by a Grecian sea-port. The country was naturally divided by the Thermaic and Strymonic gulfps, into the provinces of Pheros, Calcs, and Pangræs. The middle region, which took its name from a city of Euboea from whence it was originally peopled, was very fertile and pleasant; the inland country, being diversified by lakes, rivers, and arms of the sea, was extremely convenient for inland navigation, while the towns of Amphipolis, Potidea, Acmades, and many others, afforded marls for the commerce of the republics of Greece, as well as of Thrace and Macedon. On one side of this district were the mountains of Pangræs, and on the other the plains of Pheros. The Pangræs
MACEDON [360]

Macedon. mountains, which extended 90 miles towards the east and the river Nestus, though proper neither for corn nor pasture, produced plenty of timber for ship-building; while the southern branches of the mountain contained rich veins of gold and silver; but these, though wrought successively by the Thessians and the Athenians, were only brought to perfection by Philip of Macedon, who extracted from them gold and silver to the value of 200,000. Sterling annually. Pieria extended 50 miles along the Thermaic gulf, to the confines of Thessaly and mount Pindus. The inland part of the country was beautifully diversified with hilly hills and fountains; and so admirably calculated for solitary walks and retreat, that the ancients looked upon it to be the favourite haunt of the muses, and accordingly contained rich veins of gold and silver; while wrought by the Macedonians and their barbarous neighbours begun to suffer an interruption; and in 691 B.C. the kingdom was invaded by the Illyrians. At first they did considerable damage by their Illyravages; but the Macedonian monarch, Argaeus, having decoyed them into an ambush, cut off great numbers, and obliged the remainder to leave the kingdom. In the reign of his successors, however, they returned, and occasionally proved very troublesome enemies till the reigns of Philip and Alexander. The mean time the kingdom of Macedon began to be affected by those great events which took place of invasion by

In the mean time the kingdom of Macedon began to be affected by those great events which took place in other parts of the world. Cyrus having overthrown the Babylonian empire, and conquered all the western part of Asia, established a mighty monarchy, which threatened all the eastern parts of Europe with subjection. The Greeks, however, having now emerged from their barbarism, and acquired great knowledge in the art of war, were able to resist effectually this very formidable power; but the kingdom of Macedon, obscure and unconnected, was obliged to yield, and though not formally made a province of the Persian empire, was nevertheless accounted in some sort as under the vailage and protection of the Persians. Alcetas, who ascended the Macedonian throne about the time that the Persian monarch was established, had the dexterity to preserve his dominions from the encroachments of the Greeks on the one hand, and of the Persians on the other; but in the reign of his successor Amyntas a formal demand was made of submission to the great King Darius, by sending him a present of earth and water. Seven ambassadors were sent on this errand by Megabizus, one of the officers of Darius. They were impudently entertained by Amyntas; but having attempted to take some indecent liberties with the Macedonian women, Alexander the king's son caufed them all to be murdered. This rash action had had almost proved the ruin of the kingdom; but Alexander found means to pacify the Persians, and Georgia the general sent against him by Megabizus, by showing him his sister Hygea, a very beautiful woman, with whom the Persian fell in love at first sight, and afterwards married her.

From this time the Macedonians were accounted the faithful allies of the Persians; and, through the interest of his son-in-law, Amyntas obtained the country. In the neighbourhood of mount Haemos and Olympus, at the same time that the city of Albaund in Phrygia was given to Amyntas the nephew of Alexander. The Macedonians distinguished themselves in the time of

The little colony of Argives led into Emathia by Caranus would soon have been overwhelmed by the barbarous nations who surrounded it, had not this prince and his subjects taken care to ingratiate themselves with their neighbours, rather than to attempt to subdue them by force of arms. They introduced to them the Greek religion and government, and in the knowledge of many useful arts; adopting themselves, in some degree, the language and manners of the barbarians; importing to them in return some part of the Grecian civilization and polite behaviour. Thus they gradually associated with the fierce and warlike tribes in their neighbourhood; and this prudent conduct, being followed by succeeding generations, may be looked upon as one of the causes of the Macedonian greatness.

Caranus, dying after a reign of three years, left the kingdom to his son Caranus; who having considerably enlarged his dominions, was succeeded by Thurnyss, and he by Perdiccas I. This last prince is by Thu- ccipides and Herodotus accounted the founder of the Macedonian monarchy; though his history is obs¬ furred by fable, that nothing certain can now be known concerning it. In process of time, however, the good understanding which had subsisted between the Macedonians and their barbarous neighbors began to suffer an interruption; and in 691 B.C. the kingdom was invaded by the Illyrians. At first they did considerable damage by their Illyravages; but the Macedonian monarch, Argaeus, having decoyed them into an ambush, cut off great numbers, and obliged the remainder to leave the kingdom. In the reign of his successors, however, they returned, and occasionally proved very troublesome enemies till the reigns of Philip and Alexander.

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Alexander I. was succeeded by his son Perdiccas II, who according to Dr Gillies, "inherited his father's abilities, though not his integrity." But from his duplicity abovementioned both to Greeks and Persians, it does not appear that he had much to boast of as to the latter quality. In the Peloponnesian war he espoused the cause of the Spartans against the Athenians, from whom he was in danger by reason of their numerous settlements on the Macedonian coast, and their great power by sea. For some time, however, he ammied the Athenians with a show of friendship; but at last, under pretence of enabling Olynthus and some other cities to recover their liberties, he affixed in destroying the influence of the Athenians in those places, in hopes of establishing that of the Macedonians in its stead. But this design failed of success; the Olynthian confederacy was broken, and the members of it became subjects to Sparta, until at last, by the misfortunes of that republic, they became sufficiently powerful not only to re Bill the encroachments of the Macedonians, but to make considerable conquests in their country.

Perdiccas II. was succeeded about 416 B.C. by Archelaus I. He enlarged his dominions by the conquest of Pydna, and other places in Pieria, though his ambition seems rather to have been to extend his dominions than greatly to extend them. He facilitated the communication between the principal towns of Macedonia, by cutting straight roads through most part of the country; he built walls and fortresses in such places as afforded a favourable situation; encouraged agriculture and the arts, particularly those subservient to war; formed magazines of arms; raised and disciplined a considerable body of cavalry; and in a word, says Dr Gillies, added more to the solid grandeur of Macedonia than had been done by all his predecessors put together. Nor was he regardant of the arts of peace. His palace was adorned by the works of Grecian painters. Euripides was long entertained at his court; Socrates was earnestly solicited to live there, after the example of this philosophic poet, formed by his precepts and cherished by his friendship: men of merit and genius in the various walks of literature and science we invited to reside in Macedonia, and treated with distinguished regard by a monarch duly attentive to promote his own glory and the happiness of his subjects."

This great monarch died after a reign of six years, a space by far too short to accomplish the magnificent projects he had formed. After his death the kingdom fell under the power of usurpers or weak

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wicked monarchs. A number of competitors for the throne; and these by turns called in to their assistance the Thracians, Illyrians, Thessalians; the Olynthian confederacy, Athens, Sparta, and Thebes. Bardylis, an active and daring chief, who, from being head of a gang of robbers, had become sovereign of the Illyrians, entered Macedon at the head of a numerous army, depoited Amyntas II., the father of Philip, and set up in his place one Argeus, who confined to become tributary to the Illyrians. Another candidate for the throne, named Pausanias, was supported by the Thracians, but, by the assistance of the Thessalians and Olynthians, Amyntas was enabled to resume the government. After his restoration, however, the Olynthians refused to deliver up several places of importance belonging to Macedonia which Amyntas had either entrusted to their care, or which they had taken from his antagonist. Amyntas complained to Sparta; and that republic, which had already formed schemes of the Olynthian war with it, was readily complied with the thians.

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Of Archa-

II.

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ordered the remainder of the archers and cavalry to pursue; while he himself advanced at the head of the heavy armed foot with such celerity that they began to fall into disorder. The Olynthians allowed them to proceed, and the Lacedaemonians very imprudently advanced just under the towers and battlements of the city. The townsmen then mounted the walls, and discharged upon them a shower of darts, arrows, and other missile weapons, while the flower of the Olynthian troops, who had been purposely posted behind the gates, felled forth and attacked them with great violence. Teleutias attempting to rally his men, was slain in the first onset; the Spartans who attended him were defeated, and the whole army left dispersed with great slaughter, and obliged to shelter themselves in the towns of Acanthus, Apollonia, Spartolus, and Potidaea.

The Spartans, undisputed by this terrible disaster, next sent their King Ageipolis with a powerful reinforcement to Macedon. His presence greatly roused the spirits of the Lacedaemonian allies, and his rapid success seemed to promise a speedy termination to the war, when he himself died of a febrilitie. He was succeeded in the throne by his brother Cleombrotus, and the city of Pella was now completely blocked up by land, while a squadron of Lacedaemonian galleys blocked up the neighbouring port of Mycebera. The Olynthians, however, held out for nine or ten months, but at last were obliged to submit on very humiliating conditions. They formally renounced all claim to the dominion of Chalcis; they ceded the Macedonian cities to their ancient governor; and in consequence of this Amyntas left the city of Aegae or Edessa, where till now he had held his royal residence, and fixed it at Pella, a city of great strength and beauty, situated on an eminence, which together with a plain of considerable extent was defended by impregnable morsels, and by the rivers Axius and Lydias. It was distant about 15 miles from the Aegan sea, with which it communicated by means of the above-named rivers. It was originally founded by the Greeks, who had lately conquered and peopled it; but in consequence of the misfortunes of Olynthus, it now became the capital of Macedon, and continued ever after to be so.

Amyntas, thus fully established in his dominion, continued to enjoy tranquillity during the remaining part of his life. The reign of his son Alexander was short, and disturbed by invasions of the Illyrians; from whom he was obliged to purchase a peace. He left behind him two brothers, Perdiccas and Philip, both very young; so that Pausanias again found means to usurp the throne, being supported not only by the Thracians, but a considerable number of Greek mercenaries, as well as a powerful party in Macedon itself. In this critical juncture, however, Iphicrates the Athenian happening to be on an expedition to Amphipolis, was addressed by Eurydice the widow of Amyntas, so warmly in behalf of her two sons, whom she preferred to him, that he interested himself in their behalf, and got Perdiccas the elder established on the throne. He was induced also to this piece of generosity by the kindnss which Eurydice and her husband had formerly shown to himself, and he likewife saw the advantages which must ensue to his country from a connexion with Macedon. During the minority of the young prince, however, his brother Ptolemy, who was his guardian, openly aspired to the throne; but he was deposed by the Theban general Pelopidas, who reinfeated Perdiccas in his dominions; and in order to secure, in the most effectual manner, the dependence of Macedon upon Thebes, carried along with him thirty Macedonian youths as hostages; and among them Philip, the younger brother of the king. Perdiccas now, elated by the protection of such powerful allies, forgot Iphicrates and the Athenians, and even disputed with them the right to the city of Amphipolis, which had been deereed to them by the general council of Greece, but which his opposition rendered impossible for them to recover. In consequence of the truth he put in these new allies, also, it is probable that he refused to Bardyllis the Illyrian the tribute which the Macedonians had been obliged to pay him; which occasioned a war with that nation.

In this contest the Macedonians were defeated with the loss of 4000 men, Perdiccas himself being taken prisoner, and dying soon after of his wounds.

The kingdom was now left in the most deplorable state. Amyntas, the proper heir to the throne, was an infant; the Thebans, in whom Perdiccas had placed so much confidence, were deprived of the sovereignty of Greece; the Athenians, justly provoked at the ungrateful behaviour of the late monarch, showed an hostile disposition; the Illyrians ravaged the west, and the Paeonians the north quarter of the kingdom; the Thracians still supported the cause of Pausanias, and proposed to send him into Macedon at the head of a numerous army; while Argaeus, the formal rival of Amyntas, renewed his pretensions to the throne, and by flattering the Athenians with the hopes of recovering Amphipolis, easily induced them to support his claims; and in consequence of this they fitted out a fleet, having on board 3000 heavy armed soldiers, which they sent to the coast of Macedon.

Philip, the late king's brother, no sooner heard of Philip's defeat and death, than he set out privately from his residence in Thessalus, and on his arrival in Macedon found matters in the situation we have just now described. Fired with an infaatible ambition, it is very probable that from the very first moment he had resolved to seize the kingdom for himself; yet it was not till after he had pretended that he assumed the throne only to preferve it for his nephew. Philip, as has already been mentioned, was carried off as a hostage by Pelopidas, but for a long time past had remained in such obscurity, that historians disagree as to his place of residence; some placing him in Thebes, and others in Macedon. It is certain, however, that from the age of 15 he had been very much in the family of Epaminondas, from whose lessons he could not but derive the greatest emulation. It is probable also that he attended this celebrated general in many of his expeditions; and it is certain, that, with an attendance fuitable to his rank, he visited most of the principal republics, and showed an attention to their institutions, both civil and military, far superior to his years. Having easy access to whomever he pleased, he cultivated the friendship of the first people in Greece. Even in Athens,
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The new king being thus left at liberty to regulate his domestic concerns, began to circumscribe the power of his chief subjects; who, especially in the more remote provinces, paid very little regard to the authority of the kings of Macedon; sometimes, even in times of public calamity, throwing off their allegiance altogether, and assuming an independent government over considerable tracts of country. To counteract the ambition of these chiefs, Philip chose a body of Wannmen for companions.

The appearance of the Athenian fleet before Methone, with that of Argeus at the head of a numerous army in Peria, filled the whole country with consternation; and Philip, who was by no means deficient in talents necessary to recommend himself to the good graces of the people, took the opportunity of obtaining Amyntas' seat aside, and himself declared king, for which indeed the danger of the times afforded a very plausible pretext. Argeus, in the mean time, advanced with his Athenian allies towards Edessa, or Eage, the ancient capital of the Macedonian empire, where he hoped to have been amicably received, but finding the gates shut against him, he turned back to Methone. Philip harried him in his retreat, cutting off great numbers of his men, and afterwards defeated him in a general engagement, in which Argeus himself, with the flower of his army, were cut in pieces, and all the rest taken prisoners.

This first instance of success contributed greatly to raise the spirits of Philip's party; and he himself took care to improve it in the best manner possible. Having taken a great number of prisoners, both Macedonians and Athenians, he determined, by his treatment of them, to ingratiate himself with both parties. The former were called into his presence, and, after a gentle reprimand, admitted to swear allegiance to him; after which they were distributed through the army; the Athenians were entertained at his table, distinguished without ransom, and their baggage restored. The prisoners were let alone, allowed time to return to their native city and to spread abroad the news of Philip's generosity, when they were followed by ambassadors from Macedonia with proposals for peace. As he knew that the loss of Amphipolis had greatly irritated them, he now thought proper to renounce his jurisdiction over that city; and it was accordingly declared free and independent, and subject only to the government of its own free and equal laws. This artful conduct, together with his kind treatment of the prisoners, so wrought upon the minds of the Athenians, that they conferred to the renewal of a treaty which had formerly subsisted between them and his father Amyntas. Thus he found means to remove all jealousy of his ambition or the schemes he might afterwards undertake to their prejudice; and only this to induce them to engage in a ruinous war with their allies, which occupied their attention until Philip had an opportunity of getting his matters so well established that it was impossible to overthrow them.

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Macedon, who swelled it to 16,000, only rendered that order of battle more unwieldy and inconvenient. Instead of this, Philip, according to our author, employed himself in procuring arms, horses, and other necessary materials for war; and in introducing a more severe and exact military discipline than had formerly been known in Macedon.

While the king took these last methods to render himself secure at home and formidable abroad, the Paeonians again began to make incursions into the kingdom. The death of Agis their king, however, who was a man of great military skill, deprived them almost of every power of resistance when they were attacked. Philip, of consequence, over-ran their country with little opposition, and reduced them to the state of tributaries to Macedon. No sooner was this accomplished, then he undertook a winter's campaign against the Illyrians, who had long been the natural enemies of Macedon. They had now extended their territory to the east; by which means the Macedonians were excluded from the harbours on the coast of the Adriatic. This was a grievance to Philip, who seems early to have meditated the raising of a naval power; neither could he hope in safety should the kingdom be left open to the incursions of a barbarous enemy; for which reason he determined at once to humble those enemies in such a manner that they should no longer be in a situation to give him any disturbance. After an ineffectual negotiation, he was met by Bardyllis at the head of a considerable body of infantry, but with only 400 horse. They made a gallant resistance for some time; but being unable to cope with such a skilful general as Philip, they were defeated with the loss of 7000 men, among whom was their leader Bardyllis, who fell at the age of 50.

By this disaster the Illyrians were so much disheartened, that they sent ambassadors to Philip, humbly begging for peace on any terms. The conqueror granted them the same conditions which had been imposed upon the Paeonians, viz. the becoming tributary, and yielding up to him a considerable part of their country. That part of which lay to the eastward of a lake named Lycaenidaus he annexed to Macedon: and probably built a town and settled a colony there: the country being fertile, and the lake abounding with many kinds of fish highly esteemed by the ancients. This town and lake were about 50 miles distant from the Ionian sea; and such was the ascendency which the arms and policy of Philip acquired over his neighbours, that the inhabitants of all the intermediate districts adopted the language and manners of their conquerors; and their territory, hitherto unconnected with any foreign power, sunk into such absolute dependence upon Macedon, that many ancient geographers supposed it to be a province of that country.

Philip had no sooner reduced the Illyrians, than he began to put in execution greater designs than any he had yet attempted. The rich coasts to the southward of Macedon, inhabited chiefly by Greeks, presented a strong temptation to his ambition and avarice. The confederacy of Olynthus, after having thrown off the yoke of Sparta, was become more powerful than ever, and could send into field an army of 10,000 heavy armed troops, besides a number of cavalry in proportion. Most of the towns in Chalcidice were become tributary. It was its allies or subjects; so that this populous and wealthy province, together with Pangaenus on the right, and Pieria on the left, of both which the cities were either independent or subject to the Athenians, formed a barrier not only sufficient to guard against any incursions of the Macedonians, but which was even formidable to them. But though Philip was sensible enough of the importance of those places, he considered the conquest of Amphipolis as more necessary at the present time. By the possession of this place Macedon would be connected with the sea, and would be secured in many commercial advantages, which could not but contribute greatly to the prosperity of the kingdom at large; a road was likewise opened to the woods and mines of Pangaenus, the former of which were so necessary to the raising of a naval power; and the latter for the establishment of a proper military force. This city had indeed been declared independent by Philip himself in the beginning of this reign; but this was only to prevent a rupture with the Athenians, who still affected their right to it as an ancient colony; though, by reason of the perfidy of Charidemus, a native of Eubea, they had hitherto failed in their attempts to recover it. The Amphipolitans, however, having once enjoyed the sweets of liberty, prepared to maintain themselves in their independence. In the mean time the hostile designs of Philip, which all his precaution had not been able to conceal, alarmed the inhabitants to such a degree, that they thought proper to put themselves under the protection of the Athenians. By them they were readily received into the confederacy; and, trusting to the strength of their new allies, behaved in such an intemperate manner to Philip, that he was not long of finding a specious pretext for hostility; at which the Olynthians, greatly alarmed, sent ambassadors to Athens requesting their assistance against such a powerful enemy. Philip, however, justly alarmed at such a formidable conspiracy, sent agents to Athens, with such expedition that they arrived there before any thing could be concluded with the Olynthian deputies. Having gained over the popular leaders of that place, he deceived and flattered the magistrates and senate in such an artful manner, that a negotiation was instantly set on foot, by which Philip engaged to conquer Amphipolis for the Athenians, upon condition that they surrendered to him the strong forts of Pydna, a place which he represented as of much left importance to them; promising also to confer upon them many other advantages, which, however, he did not specify at that time. Thus the Athenians, deceived by the perfidy of their own magistrates, elated with the hopes of recovering Amphipolis, and outwitted by the superior policy of Philip, rejected with disdain the proffers of the Olynthians.

The ambassadors of Olynthus returned home highly disgraced with the reception they had met with; but had scarce time to communicate the news to their countrymen, when the ambassadors of Philip arrived at Olynthus. He pretended to condole with them on the alteration they had received at Athens; but testified his surprise that they should court the assistance of that fiant and haughty republic, when they could avail themselves of the powerful kingdom of Macedon, which

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Philip now lost no time in executing his purposes on Amphipolis; and pressed the city to close, that the people were glad to apply to the Athenians for relief. Accordingly they dispatched two of their most eminent citizens, Herax and Stratoes, to reprent the danger of an alliance between Philip and the Olymolphians, and to protested their sorrow for having so deeply offended the parent state. This representation had such an effect, that though the Athenians were then deeply engaged in the civil war, they would probably have paid some attention to the Amphipolitans, had not Philip taken care to send them a letter with fresh assurances of friendship, acknowledging their right to Amphipolis, and which he hoped shortly to put into their hands in terms of his recent agreement. By these specious pretences the Athenians were persuaded to pay as little regard to the deputies of the Amphipolians as they had already done to those of the Olymolphians; so that the city, unable to defend itself alone against so powerful an army, surrendered at last at discretion of the year 357 B.C.

Philip still proceeded in the same cautious and politic manner in which he had begun. Though the obstinate defence of the Amphipolitans might have furnished a pretext for severity, he contented himself with banishing a few of the popular leaders from whom he had most cause to dread opposition, treating the rest of the inhabitants with all manner of clemency; but took care to add Amphipolis to his own dominions, from which he was determined that it never should be separated, not withholding the promises he had made to the Athenians. Finding that it was not his interest at this time to fall out with the Olymolphians, he cultivated the friendship of that republic with great affiduity; took the cities of Pydna and Potidea, which he readily yielded to the Olymolphians, though they had given him but little assistance in the reduction of these places. Potidea had been garrisoned by the Athenians; and them the artful king bent back without remonstrance, lamenting the necessity of his actions which obliged him, contrary to his inclination, to oppose their republic. Though this was rather too gross, the Athenians at present were so much engaged with the foreign war, that they had not leisure to attend to the affairs of other nations. Philip made the best use of his time, and next projected the conquest of the gold mines of Thrace. That rich and fertile country was now held by one Cotys, a prince of such weak intellectual faculties, that the superflition of the Greeks, into which he was newly initiated, had almost entirely subverted his reason; and he wandered about in quest of the goddess Minerva, with whom he fancied himself in love. The invasion of the Macedonians, however, awaked him from reverie; and Cotys, finding himself destitute of other means of opposition, attempted to fly the progress of the enemy by a letter. To this Philip paid no regard: the Thracians were instantly expelled from their possessions at Crenide, where there were very valuable gold mines. These had formerly been worked by colonies from Thebes and Athens; but the colonists had long since been expelled by the barbarous Thracians, who knew not how to make use of the treasure they were in possession of. Philip took the trouble to defend into the mines himself, in order to inspect the works; and having caused them to be repaired, planted a Macedonian colony at Crenide, bestowed upon it the name of Philippi, and drew annually from the gold mines to the value of near 1000 talents, or 200,000 l. sterling; an immense sum in those days. The coins struck here were likewise called Philippi.

Philip having obtained this valuable acquisition, settled the next took upon him to settle the affairs of Thrace, where every thing was in confusion. This country had been formerly oppressed by Alexander tyrant of Philip: after whose death three others appeared, viz. Tituphorus, Phileolus, and Lycopbron, the brothers-in-law of Alexander, who had likewise murdered him. By the united efforts of the Thessalians and Macedonians, however, these usurpers were easily overthrown, and effectually prevented from making any disturbances for the future; and the Thessalians, out of a mistaken gratitude, surrendered to Philip all the revenues arising from their fairs and tourns of commerce, as well as all the conveniences of their harbours and shipping; a concession which Philip took care to secure in the most effectual manner.

Having now not only established his sovereignty in the most effectual manner, but rendered himself very powerful and formidable to his neighbours, Philip determined to enjoy some repose from his fatigue. Having formed an alliance with Arybbas king of Epirus, Olympia, he, in the year 357 B.C. married Olympia, the sister of that prince; a match thought the more eligible, as the kings of Epirus were supposed to be defended from the encroachments of the Athenians by the friendship of Philip, with great pomp, and several months were spent in shows and diversions during which Philip showed such an extreme propensity to vice of every kind, as disgraced him in the eyes of his neighbours, and most probably laid the foundation of his future domestic unhappiness. So much was this behaviour of the Macedonian monarch taken notice of by the neighbouring states, that the Paeonians and Illyrians threw off the yoke, engaging in their schemes the king of Thrace, and notwithstanding the immense state of that prince, their expeditions were now carried on with more judgment, and was unequal with barbarians. Philip, however, not. gaining success, withdrew his disciplined, got warning of his danger in sufficient time to prevent the bad consequences which might have ensued had the confederates got time to bring their matters to a proper bearing. Early in the spring 356 he took the field with the flower of the Macedonian troops. Having marched in person against the Paeonians and Thracians, he dispatched Parmenio his best general into Illyria. Both entered; but Philip returned victorious from Thrace, he received an account of the victory.
victory gained by Parmenio; a second messenger informed him of a victory gained by his chariot at the Olympic games; and a third, that Olympias had been delivered of a son at Pella. This was the celebrated Alexander, to whom the diviners prophesied the highest prosperity and glory, as being born in such auspicious circumstances.

A short time after the birth of Alexander, Philip wrote a letter to the philosopher Aristo, with whom he chose for preceptor to his young son. The letter was written with great brevity, containing only the following words: "Know that a son is born to us. We thank the gods not for so much for their gift, as for bestowing it at a time when Aristotle lives. We assure ourselves that you will form him a prince worthy of his father, and worthy of Macedon." He next set about the farther enlargement of his territories, which were already very considerable. Paeonia was now one of his provinces; on the east his dominions extended to the sea of Thasos, and on the west to the lake Lymneus. The Thessalians were in effect subject to his jurisdiction, and the possession of Amphipolis had secured him many commercial advantages; he had a numerous and well-disciplined army, with plentiful resources for supporting such an armament, and carrying through the other schemes suggested by his ambition; though his deep and impenetrable policy rendered him more truly formidable than all these put together. His first scheme was the reduction of Olynthus, the most populous and fertile country on the borders of Macedon; after which his ambition prompted him to acquire the sovereignty of all Greece. By this decree all Greece was again involved in the war. It was from gaining any farther advantage than they had already done; saying, as he drew off his men, that they did not retreat through fear, but like rams, in the following extraordinary manner, if we may give the siege of Methone. Philip, having taken part with the Phocians, Lycephon, one of the Thessalian tyrants, whom Philip had formerly deprived of his authority, had again found means to re-establish his authority; and his countrymen having taken Thebes, Philip called in Onomarchus the Phocien general to protect him against the power of Philip, by whom he was sensible that he would soon be attacked. The king accordingly marched into Thessaly with a considerable army, defeated Phyllus the brother of Onomarchus, whom the latter had sent into the country with a detachment of 7000 men. After this he besieged and took the city of Pegase, driving the enemy towards who retreated with the whole army; and Philip, though inferior in numbers, did not decline the engagement. The Phocians at first gave ground, on which the Macedonians pursued, but in good order; but coming near a precipice, on the top of which Onomarchus had posted a detachment of soldiers, the latter rolled down stones and fragments of the rock in such a manner as did dreadful execution, and threw them into the utmost disorder. Philip, however, rallied his troops with great presence of mind, and prevented the Phocians from gaining any farther advantage than they had already done; saying, as he drew off his men, that they did not retreat through fear, but like rams, in order to strike with the greater vigour. Nor was he long before he made good his assertion; for having recruited his army with the greatest expedition, he returned into Thessaly at the head of 20,000 foot and 600 horse, where he was met by Onomarchus. The Macedonians at this time were superior in number to all the rest of the enemies; and Philip moreover took care to re-educate and kindle them; that their quarrel was that of heaven, and that their enemies had been guilty of sacrilege, by profaning the temple of Delphi. That they might be still more encouraged in the cause, he put crowns of laurel on their heads. Thus fired by enthusiasm, and having besides the advantage of numbers, the Phocians were altogether unable to withstand them. They threw away their
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he was still enabled to make a very formidable appearance; and the Phocians took the field with great prospect of success.

Philip now thought it time to throw off the mask Philip entirely, for which the proceeding of the Athenians, gages in particular their league with Olynthus, furnished him the quarter with a plausible pretext; and the revenging fuch horrid sacrilege as had been committed at Delphi seemed to give him a title to march at the head of an army into Greece. The superstitious of the Greeks, however, had not yet blinded them to such a degree, but they could easily perceive that Philip’s piety was a mere pretence, and that his real design was to invade and conquer the whole country. The Athenians no sooner heard of the march of the Macedonian army than they dispatched, with all expedition, a strong guard to secure the pass of Thermopylae; so that Philip was obliged to return greatly chagrined and disappointed. Their next step was to call an assembly to deliberate upon the measures proper to be taken in order to restrain the ambition of the Macedonian monarch; and this assembly is rendered memorable by the first appearance of Demosthenes as an orator against Philip. Athens for some time had been in a very alarming situation. They were deeply involved in the sacred war; their northern possessions were continually insulted and plundered by Philip; while a number of his mercenary partisans drew off the public attention to such a degree, that, instead of taking measures to counteract that ambitious prince, they amused themselves with speculations about the designs of the Perian monarch, who was preparing for war against the Cyprians, Egyptians, and Phocians. I-locrates the celebration orator, and Phocion the statesman, joined the multitude in their present opinion, though not from any mercenary motives, but purely from a sense of the unready conduct of the Athenians; who, they said, could not contend with a prince of the vigour and activity of Philip; and they were exhorsted them by all means to cultivate the friendship of Philip, whom they could not oppose with any probability of success. I-locrates, indeed, greatly wished for an expedition into Asia, and looked upon Philip to be the only general capable of conducting it, though at present the Greeks had no pretence for making war upon the Persians, but that of revenging former injuries; and on this subject he addressed Philip himself, and it is even said, to I-locrates, by the power of his rhetoric, prevailed upon Philip and the Athenians to lay aside their animosities for a short time, and content to undertake this expedition in conjuncture.

If this coalition, however, did really take place, it was of very short duration. The views of Phocion and I-locrates were violently opposed by Demosthenes, who, says the historian, “had been at great pains to cultivate, and in which he is said to have excelled all men that ever existed.”

In his first address to the people, this celebrated orator exhorted them to awake from their indolence, and to assume the direction of their own affairs. They had been too long governed, he said, by the incapacity...
O Macdon. city of a few ambitious men, to the great disadvantage as well as disgrace of the community. In the first place, an orator who had placed himself at the head of a faction of no more than 300 or 400, availed himself and his followers of the carelessness and negligence of the people to rule them at pleasure. From a confederation of their pretense weaknesses and corruption, as well as of the designs and commotions of the neighboring powers, he advised them to abandon all romantic and distant schemes of ambition; and instead of carrying their arms into remote countries, to prepare for repelling the attacks which might be made upon their own dominions. He insisted also upon a better regulation of their finances, a more equal distribution of the public burdens, in proportion to the abilities of those upon whom they were laid, and upon the retrenching many superfluous expenses. Having pointed out in a strong light the vigorous conduct of Philip; and shewn by what means he had attained to such a respectable footing in the world, he next laid down a proper plan for their military operations. He told them, that they were not yet prepared to meet Philip in the field; they must begin with protecting Olynthus and the Chersonesus, for which it would be necessary to raise a body of 2000 light armed troops, with a due proportion of cavalry, which ought to be transported under a proper convoy to the islands of Lemnos, Thasos, and Scatthos, in the neighborhood of Macedonia. In these they would enjoy all kinds of necessaries in abundance, and might avail themselves of every favourable incident, to appear at the first summons of their allies; and either to repel the incursions of the Macedonians, or harass their territories. While this was going on, more vigorous preparations might be made for war at home; and it was proposed, that only the fourth part of the Athenian citizens should enlist, and no more supplies were wanted at present but 90 talents. But notwithstanding the moderation of these proposals, and the urgent necessities of the state, it was impossible to prevail upon the indefatigable and careless Athenians to provide for their own safety. They appear, indeed, at this time, to have been desperately funk in effeminacy and dissipation; which disposition Philip took care to encourage to the utmost of his power. There was an assembly in the city called the Sixty, from their confiding originally of that number, who met expressly for the purposes of extinguishing all care about public affairs, and to intoxicate themselves with every kind of pleasure they had in their power. With this assembly Philip was so well pleased, that he sent them money to support their extravagances; and so effectually did they answer his purposes, that all the eloquence of orators could not counteract the speeches of orators much his inferiors when backed by Macedonian gold.

Philip himself, as we have already hinted, was excessively debauched in his private character, and the most infamous stories are related of him by the ancient writers, particularly by Demosthenes. Theopompus too, an author who flourished in the time of Alexander, and was rewarded and honoured by that monarch, also speaks of him in such terms as we cannot with decency relate; but these accounts coming from the avowed enemies of the king, are scarcely to be credited; and perhaps policy, as well as inclination, might contribute somewhat to this scandalous behaviour, that Macedon, he might thereby recommend himself to the liberties of Athens, and prevent even many of the more thinking part of the people from suspecting his designs. But in whatever excesses he might at times indulge himself, he never lost sight of his main object, the subjugation of the Greek states. On pretense of being in want of money to defray the expense of his buildings, he borrowed money at a very high price throughout the whole country; and this he found an easy matter to do, as the dissipation of the Delphic treasurers had rendered cash very plentiful in Greece. Thus he attached his creditors firmly to his own interest; and on pretense of paying debts, was enabled without molestation to bellow a number of pensions and gratuities upon the Athenian orators, who by their treacherous harangues contributed greatly to the ruin of their country; at least as far as it could be ruined by subjection to a prince who would have obliged them to remain at peace, and apply themselves to useful arts. These he himself encouraged in a very eminent degree. The greatest part of his time was employed at Pella, which city he adorned in the most magnificent manner with temples, theatres, and porticoes. He invited, by liberal rewards, the most ingenious artists in Greece; and as many of these met with very little encouragement in their own country, great numbers flocked to him from all quarters. In the government of his people, also, Philip behaved with the utmost impartiality; listening with condescension to the complaints of the meanest of his subjects; and keeping up a constant correspondence with those whom he thought worthy of his acquaintance; from which, it is not easy to imagine how he could be so guilty of the vices we have already mentioned from some ancient historians.

The fate of Olynthus was now soon determined. This city, which held the balance of power between Athens and Macedon, was taken and plundered, and the inhabitants sold for slaves; but the chief hope of Philip was in putting an end to the Phocian war. For this purpose he attempted neutrality, that he might thereby become the arbiter of Greece. His hopes were well founded; for the Thebans, who were at the head of the league against the Phocians, solicited him on the one side, and the states confederate with the Phocians did the like on the other. He answered neither, yet held both in dependence. In his heart he favoured the Thebans, or rather placed his hopes of favouring his own cause in that state; for he well knew, that the Athenians, Spartans, and other states allied with Phocis, would never allow him to pass his inconstancy, and lead an army into their territories. So much respect, however, did he show to the ambassadors from these states, particularly Ctesiphon and Phrynion, who came from Athens, that they believed him to be in their interest, and reported as much to their masters. The Athenians, who were now dissolved in ease and luxury, received this news with great satisfaction; and named immediately ten plenipotentiaries to go and treat of a full and lasting peace with Philip. Among these plenipotentiaries were Demosthenes and Megacles, the most celebrated orators in Athens. Philip gave directions that these ambassadors should be treated with the utmost civility; naming at the same time, three of his...
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his ministers to confer with them, viz. Antipater, Parmenio, and Eurypylus. Demosthenes being obliged to return to Athens, recommended it to his colleagues not to carry on their negotiations with Philip's deputies; but to proceed with all diligence to court, there to confer with the king himself. The ambassadors, however, were far from following his instructions, that they suffered themselves to be put off for three months by the arts of Philip and his ministers.

In the mean time, the king took from the Athenians such places in Thrace as might best cover his frontiers; giving their plenipotentiaries, in their stead, abundance of fair promises, and the strongest assurances that his good will should be as beneficial to them as ever their colonies had been. At last a peace was concluded; but then the ratification of it was deferred till Philip had poissessed himself of Pherae in Thessaly, and fixed himself at the head of a numerous army: then he ratified the treaty; and dismissed the plenipotentiaries with assurances, that he would be ready at all times to give the Athenians proofs of his friendship on their return to Athens, which this matter came to be debated before the people. Demosthenes plainly told them, that, in his opinion, the promises of Philip ought not to be relied on, because they appeared to be of little significance in themselves; and came from a prince of so much art, and so little fidelity, that they could derive no authority from their maker. Achilles, on the other hand, gave it as his sentiment, that the king of Macedon's assurances ought to give them full satisfaction. He said, that for his part, he was not politician enough to see anything of difficulty or diminution in the king's conduct, that there was great danger in dejecting princes; and that the fairest method of putting men upon deceit was to show that we suspected them of it. The rest of the plenipotentiaries concurred with Achilles; and the people, desirous of quiet and added to pleasure, easily gave credit to all that was said, and decreed that the peace should be kept. All this was the easier brought about, because Phocion, the wrothiest man in the republic, did not oppose Philip; which was owing to his having a just sense of the fate his country was in. He conceived, that the Athenians of those times were nothing like their ancestors; and therefore as he expressed himself on another occasion, he was desirous, since they would not be at the head of Greece themselves, that they would at least be upon good terms with that power which would be so.

Philip, who knew how to use as well as to procure opportunity, while the Athenians were in this good humour, passed Thermopylae, without their knowing whether he would fall on Phocis or Thebes; but he quickly undeceived them, by commanding his soldiers to put on crowns of laurel, declaring them thereby the trophies of Apollo, and himself the lieutenant general of that god. He then entered Phocis with an air of triumph; which so terrifyed the Phocians, whom he had caus'd to be proclaimed sacrilegious persons, that they immediately dismissed all thoughts of defence, and without more ado submitted to his mercy. Then, on the Phocian war, which had so long employed all Greece, was ended without a stroke; and the judgment on the Phocians remitted to the Amphictyons, or grand council of Greece. By their decree the walls of three Phocian cities were demolished, the people were forbidden to inhabit in any but villages, to pay a yearly tribute of 60 talents, and never to make use either of houses or arms till they had repaid to the temple of Apollo the money they had sacrilegiously carried from there. Their arms were taken from them, broken to pieces, and burnt; their double voice in the council was taken from them, and given to the Macedonians. Other orders were made for settling the affairs both of religion and state throughout Greece: all of which were executed by Philip with great exactness and moderation, he paying the most profound respect to the council; and, when he had performed its commands, retiring peaceably with his army back to Macedon, which gained him great reputation.

At Athens alone, the justice and piety of Philip was not understood. The people began to see, though a little too late, that they had been abused and deceived by those who had negociated the late peace. They saw, again, that, through their acceptance of it, the Phocians opposed by were destroyed; that Philip was become master of the Thermopylae, and might enter Greece when he pleased; that, in abandoning their allies, they had abandoned themselves; and that, in all probability, they might soon feel the weight of his power, whom they had so foolishly trusted: they therefore began to take new and hasty measures; they ordered that the women should retire out of the villages into the city, their walls be repaired, and their forts newly strengthened. They seemed inclined to question Philip's election into the council of the Amphictyons, because it had been done without their consent, and even proceeded to an open war. In all likelihood they had carried things to extravagancy, if Demosthenes had not intercepted. He told them, that though he was not for making the peace, he was however for keeping it, and that if he saw no manner of occasion for their entering into so unequal a contest as would needs ensue, if they took up arms, not only against Philip, but against all the states concerning with him in the late transactions. This seems to have cooled the rage of the Athenians: and to have brought them to think of ruining Philip by degrees, as by degrees they had raised him.

The fame of his achievements without the bounds of Macedon having dispossessed the subjects of Philip to hope every thing from his conduct, and the several states of Greece to desire above all things his friendship; that prudent monarch laid hold of this favourable situation to fix his dominion on such a stable foundation, as that a reverse of fortune should not immediately destroy it. To this end, while he carried on his negotiations through Greece, he like-wise kept his army in exercise, by taking several places in Thrace, which terribly incommoded the Athenians. Diocrates, who had the government of the Athenian colonies in these parts, perceiving well what end Philip had in view, did not stay for instructions from home; but having raised with much expedition a considerable body of troops, taking advantage of the king's being absent with his army, entered the adjacent territories of Philip, and wasted them with fire and sword.

The king, who, on account of the operations of the camp...
campaign in the Chersonese, was not at leisure to repel Diopithes by force, nor indeed could divide his army without imminent hazard, chafe, like an able general, rather to abandon his enemies to insults, which might be afterwards revenged, than, by following the dictates of an ill-tempered passion, to hazard the loss of his veteran army, whereon lay all his hopes. He contented himself, therefore, with complaining to the Athenians of Diopithes's conduct, who, in a time of peace, had entered his dominions, and committed such devastations as could scarce have been justified in a time of war. His partisans supported this application with all their eloquence. They told the Athenians, that unless they recalled Diopithes, and brought him with all their force to the aid of Athens, they must either for the friendship of Philip or of any other prince or state; neither could they justly complain, if, prompted by such a precedent, others should break faith with them, and fall without the least notice upon their dominions. Demosthenes defended Diopithes; and undertook to shew that he deserved the praise and not the censure of the Athenians. Those of the other party began then to charge him with crimes of a different nature; they alleged, that he oppressed the subjects and maltreated the allies of Athens. Demosthenes replied, that of these things there were as yet no proofs; that when such should appear, a single gully might be sent to bring over Diopithes to abide their judgment, but that Philip would not come if they sent a fleet; whence he inferred, that they ought to be cautious, and to weigh well the merits of this cause before they took any resolution.

He said, that it was true Philip had not as yet attacked Attica, or pretended to make a descent on their territories in Greece, or to force his way into their ports; when it came to that, he was of opinion they would hardly be able to defend themselves; wherefore he thought such men were to be esteemed as thwarted with crimes of a different nature; they alleged, that he oppressed the subjects and maltreated the allies of Athens. Demosthenes replied, that of these things there were as yet no proofs; that when such should appear, a single gully might be sent to bring over Diopithes to abide their judgment, but that Philip would not come if they sent a fleet; whence he inferred, that they ought to be cautious, and to weigh well the merits of this cause before they took any resolution.

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Macedon. of Philip, the continual clamour of the Athenians against him, and his dethroning at pleasure the petty princes of Thrace, made him now regarded in another light. When therefore he led his troops against Perinthus, or Great King, as he was called by the Greeks, sent his letters mandatorily to the governors of the maritime provinces, directing them to supply the place with all things in their power; in consequence of which they filled it with troops, granted subsidies in ready money, and sent besides great convoys of provisions and ammunition. The Byzantines also, supporting their own turn would be next, exerted their utmost endeavours for the preservation of Perinthus: sending their flowers of their youth, with all other necessities for an obstinate defence. The consequence of all this was, that Philip found himself obliged to raise the siege with great loss.

That the reputation of the Macedonian arms might not sink by this disgrace, Philip made war on the Sicilians and Triballians, both of whom he defeated; and then formed a design of invading Attica, though he had no fleet to transport his troops, and knew very well that the Thessalians were not to be depended on if he attempted to march through the Pisa, and that the Thebans would even then be ready to oppose his march. To obviate all these difficulties, he had recourse to Athens itself; where, by means of his partisans, he procured his old friend Aeschines to be sent their deputy to the Amphictyons. This seemed a small matter, and yet was the hinge on which his whole project turned. By that time Aeschines had taken his seat, a question was raised in the council, whether the Locrians of Amphipolis had not been guilty of sacrilege in ploughing the fields of Cyrrhus in the neighbourhood of the temple of Delphi. The assembly being divided in their opinions, Aeschines proposed to take a view; which was accordingly decreed. But when the Amphictyons came in order to see how things stood, the Locrians, either jealous of their property, or spurred thereto by the suggestions of some who saw farther than themselves, fell upon those venerable persons so rudely, that they were compelled to secure themselves by flight. The Amphictyons decreed, that an army should be raised, under the command of one of their own number, to chastise the delinquents; but as this army was to be composed of troops sent from all parts of Greece, the appearance at the rendezvous was so incon siderable, that the Amphictyons sent to command them durst undertake nothing. The whole matter being reported to the council, Aeschines in a long and eloquent harangue, showed how much the welfare and even the safety of Greece depended on the deference paid to their decrees; and after inveighing against the want of public spirit in such as had not been the patrons at the time appointed by the council, he moved that they should elect Philip for their general, and pray him to execute their decree. The deputies from the other states, conceiving that by this expedient their respective confidants would be free from any farther trouble or expense, came into it at once; whereupon a decree was immediately drawn up, purporting that ambassadors should be sent to Philip of Macedon, in the name of Apollo and the Amphictyons, once more to require his assistance, and to notify to him, that the states of Greece had unanimously chosen him their general, with full power to act as he thought fit against such as had opposed the authority of the Amphictyons. Thus of a sudden Philip acquired all that he sought; and having an army readvance of this event, he immediately proceeded to execute the commands of the Amphictyons in appearance, but in reality to accomplish his own designs. For having passed into Greece with his army, instead of attacking the Locrians, he seized immediately upon Euria, a great city of Phoci on the river Cephissus.

The Athenians in the mean time were in the utmost confusion on the news of Philip's march. However by the advice of Demosthenes, they invited the Thebans to join them against the common enemy of Greece. Philip endeavoured as much as possible to prevent this confederacy from taking place; but all his efforts proved ineffectual. The Athenians raised an army, which marched immediately to Eleusis, where they were joined by the Thebans. The confederates made the best appearance that had ever been seen in Greece, and the troops were exceedingly good; but unfortunately the generals were men of no conduct or skill in the military art. An engagement ensued at Cheronea; where Alexander commanded one wing of the Macedonian army, and his father Philip the other. The confederate army was divided according to the different nations of which it consisted; the Athenians having the right and the Boeotians the left. In the beginning of the battle the confederates had the better; whereupon Stratocles an Athenian commander cried out, "Come on brother soldiers, let us drive them back to Macedon," which being overheard by the king, he said very coolly to one of his officers, "These Athenians do not know how to conquer." Upon this he directed the files of the phalanx to be straitened; and drawing his men up very close, retired to a near by hill where, when the Athenians were eager in their pursuit, he rushed down with impetuousity, broke, and routed them with prodigious slaughter. The orator Demosthenes behaved very unbecomingly in this engagement; for he deserted his post, and was one of the first that fled: nay, we are told, that a flake catching hold of his robe, he, not doubting but it was an enemy, cried out, "Alas! spare my life."

This victory determined the fate of Greece; and as it appeared from this time we must reckon Philip supreme lord of all the Grecian states. The first use he made of this power was to convene a general assembly, wherein he was recognised generally, and with full power appointed their leader against the Persians. Having, by virtue of his authority, settled a general peace among them, and appointed the quota that each of the states should furnish for the war, he dismissed them; and returning to Macedon, began to make great preparations for this new expedition. His pretence for making war on the Persians at this time was the assistance given by the Persians to the city of Perinthus, as already mentioned. In the mean time, however, the king, by reason of the dissensions which reigned in his family, was made quite miserable. He quarrelled with his wife Olympias to such a degree, that he divorced her, and married another woman named Cleopatra. This produced a quarrel between him and his son Alexander,
Alexander, Macedon.; which also came to such a height, that Alexander retired into Epirus with his mother. Some time afterwards, however, he was recalled, and a reconciliation took place in appearance; but in the mean time a conspiracy was formed against the king's life, the circumstances and causes of which are very much unknown. Certain it is, however, that it took effect, as the king was exhibiting certain shows in honour of his daughter's marriage, with the king of Epirus. Philip, having given a public audience to the ambassadors of Greece, went next day in state to the theatre. All the seats were early taken up; and the shows began with a splendid procession, wherein the images of the 12 superior deities of Greece were carried, as also the image of Philip, habited in like manner, as if he now made the 13th, at which the people shouted aloud. Then came the king alone, in a white robe, crowned, with his guards at a considerable distance, that the Greeks might see he placed his safety only in his confidence of the loyalty of his subjects. Pausanias, the assassin, however, had fixed himself close by the door of the theatre; and observing that all things fell out as he had foreseen, they took his opportunity when the king drew near him, and plunging his sword in his left side, laid him dead at his feet. He then fled as fast as he was able towards the place where his horses were; and would have escaped, had not the tug of a vine caught his shoe and thrown him down. This gave time to those who pursued him to come up with him; but instead of securing him, in order to extort a discovery of his accomplices, they put an end to his life.

With regard to the character of this monarch, it appears certain, that he was one of the most eminent persons that ever sat on a throne. Had he lived for some time longer, he would in all probability have subdued the Persians, which was in truth less difficult than what he had already done. 'Had that event taken place (says Dr. Gillies), the undertakings of his long and successful reign would have been enabled and illuminated by the splendor of extensive foreign conquest. Philip would have reached the height of such renown as is obtained by the habits of activity, vigilance, and fortune, in the pursuit of unbounded greatness; and in the opinion of posterity, would perhaps have surpassed the glory of all kings and conquerors who either preceded or followed him. Yet, even on this supposition, there is not any man of sense and probity, who, if he allows himself time for serious reflection, would purchase the imagined grandeur and prosperity of the king of Macedon at the price of his artifices and his crimes; and to a philosopher, who considered either the means by which he had obtained his triumphs, or the probable consequences of his dominion over Greece and Asia, the boly ambition of this mighty conqueror would appear but a deceitful scene of splendid misery.

No sooner did the news of Philip's death reach Athens, than, as if all danger had been past, the inhabitants showed the most extravagant signs of joy. Demosthenes and his party put on chaplets of flowers, and behaved as if they had gained a great victory. Phocion reproached them, for this reason; he remembered that "the army which had beaten them at Chaeronea was left behind by one." This reproach, however, had very little effect. The people heard with pleasure all the harsh things which the orators could say of the young Alexander king of Macedon, whom they represented as a giddy wrong-headed boy, ready to grasp all things in his imagination, and able to perform nothing. The affairs of Macedon indeed were in a very distracted state on the accession of Alexander: for all the neighbouring nations had the same notion of the young king with the Athenians; and being irritated by the usurpation of Philip, were well revoluted; and the states of Greece entered into a confederacy against him. The Persians had been contriving to transfer the war into Macedon; but as soon as the news of Philip's death reached them, they behaved as if all danger had been over. At the same time Attalus, one of the Macedonian commanders aspiring to the crown, and fought to draw off the soldiers from their allegiance.

In the counsels held on this occasion, Alexander's best friends advised him rather to make use of diffamation than force, and to cajole those whom they thought he could not subdue. These advices, however, were ill-suited to the temper of his monarch. He thought that vigorous measures only were proper, and therefore immediately led his army into Thessaly. Here he harangued the princes to effectually, that he had thoroughly gained them over to his interests, and was declared by them general of Greece; upon which he returned to Macedon, where he caused Attalus to be felonized and put to death.

In the spring of the next year (325 B.C.) Alexander resolved to subdue the Triballians and Illyrians, who inhabited the countries now called Bulgaria and Selonvania, and had been very formidable enemies to the Macedonian power. In this expedition he discovered, though then but 20 years of age, a surprising degree of military knowledge. Having advanced to the passage of Mount Hames, he found that the barbarians had posted themselves in the most advantageous manner. On the tops of the cliffs, and at the head of every passage, they had placed their carriages and wagons in such a manner as to form a kind of parapet with their shafts inwards, so that when the Macedonians should have half ascended the rock, they might be able to pull these heavy carriages down upon them. They reckoned the more upon this contrivance, because of the close order of the phalanx, which, they imagined, would be terribly expelled by the soldiers wanting room to stir, and thereby avoid the falling waggons. But Alexander, having directed his heavy-armed troops to march, gave orders, that, where the way would permit, they should open to the right and left, and suffer the carriages to go through; but that, in the narrow passes, they should throw themselves on their faces with their shields behind them, that the carts might roll over them. This had the desired effect, and the Macedonians reached the enemy's works without the loss of a man. The dispute was then quickly decided; the barbarians were driven from their posts with great slaughter, and left behind them a considerable booty to the conquerors.

The next exploits of Alexander were against the Goths, the Thracians, and the other nations inhabiting the country on the other side of the Danube. Them he also overcame; showing in all his actions the
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73 The Thebans revolt on the news of his death.

74 Thebes taken and destroyed.

75 Number of the army with which he invaded Asia.

76 Sets out on his expedition.

77 Consequence of his victory.

the most perfect skill in military affairs, joined with the greatest valour. In the mean time, however, all Greece was in confusion by a report which had been confidently spread abroad, that the king was dead in Illyria. The Thebans, on this news, seized Amyntas and Timolaus, two eminent officers in the Macedonian Gar- rison which held their citadel, and dragged them to the market-place, where they were put to death without either form or proces, or any crime alleged against them. Alexander, however, did not suffer them to remain long in their mistake. He marched with such expedition, that in seven days he reached Pella in Thessaly; and in six days more he entered Boeotia, before the Thebans had any intelligence of his passing the Isthmopyle. Even then they would not believe that the king was alive; but inferred that the Macedonian army was commanded by Antipater, or by one Alexander the son of Aesopus. The rest of the Greeks, however, were not so hard of belief; and therefore sent no assistance to the Thcbans, who were thus obliged to bear the consequences of their own folly and obstinacy. The city was taken by storm, and the inhabitants were for some hours massacred without distinction of age or sex; after which the houses were demolished, all except that of Pindar the fa- mous poet, which was spared out of respect to the mer- it of its owner, and because he had celebrated Alexan- der 1 king of Macedon. The lands, excepting those dedicated to religious use, were flung among the sol- diers, and all the prisoners sold for slaves; by which 440 talents were brought into the king's treasury.

By this severity the rest of the Grecian states were so thoroughly humbled, that they thought no more of making any resistance, and Alexander had nothing further to hinder him from his favourite project of invading Asia. Very little preparation was necessary for the Macedonian monarch, who went out as to an as- ferred conquest, and reckoned upon being supplied only by the spoil of his enemies. Historians are not agreed as to the number of his army: Arrian says, that there were 30,000 foot and 5000 horse, Diodorus Sicu- lus tells us, that there were 23,000 Macedonian foot, 7000 of the confederate states, and 5000 mercenaries. These were under the command of Parmenio. Of the Odri- ans, Triballians, and Illyrians, there were 5000; and of the Agrians, who were armed only with darts, 1000. As for the horae, he tells us there were 18,000 com- mand ed by Philotas, and as many Thebassans under the command of Callas: out of the confederate states of Greece, were 600 commanded by Eurybius; and 900 Thracians and Phocianis, who led the van under Caffander. Plutarch tells us, that, according to a low computation, he had 90,000 foot and 5000 horse; and, according to the largest reckoning, he had 34,000 foot and 4000 horse. As to his fund for the pay- ment of the army, Aristoibius says it was but 70 ta- lent; and Oeniceritius, who was also in this expedition, not only takes away 70 talents, but affirms that the king was 200 in debt. As for provisions, there was just sufficient for a month and no more; and to prevent disturbances, Antipater was left in Macedon with 12,000 foot and 1500 horse.

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The army having assembled at Amphiopolis, he marched from thence to the mouth of the river Stry- mon; then crossing mount Pangeus, he took the road to Abdera. Crossing the river Euraus, he proceeded Macedo- through the country of Peris, and in 20 days reached Sehos; thence he came to Eleus, where he sacrificed on the tomb of Poseidnus, because he was the first among the Greeks who at the siege of Troy set foot on the Asiatic shore. He did this, that his landing might be more propitious than that of the hero to whom he sacrificed, who was slain soon after. The greatest part of the army, under the command of Par- menio, embarked at Sehos, on board a fleet of 165 galleys of three benches of oars, besides small craft. Alexander himself sailed from Eleus; and when he was in the middle of the Hellespont, offered a ball to Neptune and the Nereids, pouring forth at the same time a libation from a golden cup. When he drew near the shore, he landed a javelin, which struck in the earth; then in complete armour, he leaped upon the strand; and having erected altars to Jupiter, Minerva, and Hercules, he proceeded to Ilium. Here again he sacrificed to Minerva; and taking down some arms which had hung in the temple of that goddess since the time of the Trojan war, consecrated his own in their stead. He sacrificed also to the ghost of Priam, to avert his wrath on account of the deceit which he himself claimed from Achilles. In the mean time the Persians had assembled a great army in Phrygia; amongst whom was one Memnon, a Median, the chief officer in the service of Darius. Alex- ander, as soon as he had performed all the ceremonies which he judged necessary, marched directly towards the enemy. Memnon gave it as his opinion, that they should burn and destroy all the country round, that they might deprive the Greeks of the means of subsisting, and then transport a part of their army into Macedon. But the Persians, depending on their cavalry, rejected this helitorious advice: and posted themselves along the river Gr cabbage, in order to wait the arrival of Alexander. In the engagement which happened on the banks of that river, the Persians were defeated, and Alexander became master of all the neighboiring country; which he immediately began to take care of, as if it were his country, and as his dominions. The city of Sardis was immediately de- Consequence of his victory. Consequence of his victory. Consequence of his victory. Consequence of his victory. Consequence of his victory. Consequence of his victory. Consequence of his victory.

Almost all the cities between Miletus and Halicarnasus submitted as soon as they heard that the former was taken; but Halicarnasus, where Memnon com- manded with a very numerous garrison, made an obsti- nate defence. Nothing, however, was able to resist
the Macedonian army; Memnon was at last obliged to abandon the place; upon which Alexander took and razed the city of Tralles in Phrygia; received the submission of several princes tributary to the Persians, and having destroyed the Marmarians, a people of Lydia, who had fallen upon the rear of his army, put an end to the campaign; after which he went home all the new married-men, in obedience, it would seem, to a precept of the Mosaic law, and which endeared him more to his soldiers than any other action of his life.

As soon as the season would permit, Alexander quitted the province of Phælius; and having sent part of his army through the mountainous country of Perga, by a short but difficult road, took his route by a certain promontory, where the way is altogether impassable, except when the north winds blow. At the time of the king's march the south wind had held for a long time; but of a sudden it changed, and blew from the north so violently, that, as he and his followers declared, they obtained a safe and easy passage through the mountainous country. By his march was held to be miraculous, and compared to that of the children of Israel through the Red Sea; while, on the other hand, it is the opinion of others, that there was nothing at all extraordinary in it. He continued his march towards Gordium, a city of Phrygia; the enemy having abandoned the strong posts of Telmissus, through which it was necessary for him to march. When he arrived at Gordium, and found himself under a necessity of staying some time there till the several corps of his army could be united, he expressed a strong desire of seeing Gordius's chariot, and the famous knot in the harness, of which such strange stories had been published to the world. The cord in which this knot was tied, was made of the inner rind of the cornel-tree; and no eye could perceive where it had begun or ended. Alexander, when he could find no possible way of untying it, and yet was unwilling to leave it tied up, as it should cause some fears in the breasts of his soldiers, is said by some authors to have cut the cords with his sword, saying, "It matters not how it is undone." But Arifobulus affures us, that the king wrenched a wooden pin out of the beam of the waggon, which, being driven in across the beam, held it up; and so took the yoke from under it. Be this as it will, however, Arrian informs us, that a great tempest of thunder, lightening, and rain, happening the succeeding night, it was held declarative of the true solution of this knot, and that Alexander should become lord of Asia.

The king having left Gordium, marched towards Cilicia; where he was attended with his usual good fortune, the Persians abandoning all the strong posts as he advanced. As soon as he entered the province, he received advice that Arfakes, whom Darius had made governor of Tarfus, was about to abandon it, and that the inhabitants were very apprehensive that he intended to plunder them before he withdrew. To prevent this, the king marched incognito, and arrived just in time to save the city. But his leaving it had the effect of driving the inhabitants from the city, and the excessive fatigue of marching, as some say, or, according to others, by his plunging when very hot into the river Cydnus, which, as it runs through thick shades, has its waters excessively cold, he fell into such a different temper as threatened his immediate dissolution. His army lost their spirits immediately; the generals knew not what to do; and his physicians were so much affrighted, that the terror of his death hindered them from using the necessary methods for preserving his life. Philip the Macedonian alone preferred temper enough to examine the nature of the king's disease; the word symptom of which was a continual whining, and which he took off by means of a potion, and in a short time the king recovered his usual health.

Soon after Alexander's recovery, he received the agreeable news that Ptolemy and Alexander had defeated the Perian generals, and made great conquests on the Hellespont; little after that, he met the Perian army at Issus, commanded by Darius himself. A bloody engagement ensued, in which the Persians were defeated with great slaughter, as related under the article Issus. The consequences of this victory were very advantageous to the Macedonians. Many governors of provinces and pety princes submitted themselves to the conqueror; and the Macedonians were received by a newly-conquered people, as his old hereditary subjects; being neither bothered with soldiers nor oppressed with tribute. Among the number of those places which, within a short space after the battle of Issus, sent deputies to submit to the conqueror, was the city of Tyre. The king, whose name was Azemimus, was absent in the Persian fleet; but his son was among the deputies, and was very favourably received by Alexander. The king probably intended to confer particular honours on the city of Tyre; for he acquainted the inhabitants that he would come and sacrifice to the Tyrian Hercules, the patron of their city, to whom they had erected a most magnificent temple. But these people, like most other trading nations, were too suspicious to think of admitting such an enterprising prince with his troops within their walls. They sent therefore the deputies again to him, to inform him, that they were ready to do whatever he should command them; but, as to his coming and sacrificing in their city, they could not consent to that, but were positively determined not to admit a single Macedonian within their gates. Alexander immediately dismissed their deputies in great displeasure. He then assembled a council of war, wherein he inflicted strongly on the disobedient state of Greece, (for most of the Grecian states had sent ambassadors to Darius, to enter into league with him against the Macedonians), the power of the Persians by sea, and the folly of carrying on the war in distant provinces, while Tyre was left unreduced behind them; he also remarked, that if once the city was subdued, the sovereignty of the sea would be transferred to them, because it would fix their possession of the coast; and as the Persian fleet was composed chiefly of tributary squadrons, those tributaries would fight the battles, not of their late but of their present masters. For these reasons the siege of Tyre was resolved on. The town was not taken, however, without great difficulty; which provoked Alexander to such a degree of revenge, that he treated the inhabitants with the greatest cruelty.
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Macedon. an expedition into Syria; and in his way thither proposed to chastise the Jews, who had highly offended him during the siege of Tyre: for when he sent to them to demand provisions for his soldiers, they answered, That they were the subjects of Darius, and bound by an oath not to supply his enemies. The king, however, was pacified by their submissian; and not only pardoned them, but conferred many privileges upon them, as related under the article Jews.

Egypt submits. From Jerusalem, Alexander marched directly to Gaza, the only place in that part of the country which still held out for Darius. This was a very large and strong city, situated on an high hill, about five miles from the sea shore. One Battis, or Betis, an encun, had the government of the place; and had made every preparation necessary for sustaining a long and obstinate siege. The governor defended the place with great valor, and several times repulsed his enemies: but at last it was taken by storm, and all the garrison slain to a man: and this secured to Alexander an entrance into Egypt, which having before been very impatient of the Persian yoke, admitted the Macedonians peaceably.

Alexander visits the temple of Jupiter Ammon. Here the king laid the foundations of the city of Alexandria, which in many years after continued to be the capital of the country. While he remained here, he also formed the extraordinary design of visiting the temple of Jupiter Ammon. As to the motives by which he was induced to take this extraordinary journey, authors are not agreed; but certain it is, that he hazardad himself and his troops in the highest degree, there being two dangers in this march, which, with the example of Cambyses, who loft the greatest part of his army in it, might have terrified any body but Alexander. The first was the want of water, which, in the sandy deserts surrounding the temple, is no where to be found; the other, the uncertainty of the road from the fluctuation of the sands; which changing their situation every moment, leave the traveller neither a road to walk in nor mark to march by. These difficulties, however, Alexander got over, though not without a miraculous interposition, as is pretended by all his historians.

Alexander having consulted the oracle, and received a favourable answer, returned to pursue his conquests. Having settled the government of Egypt, he appointed the general rendezvous of his forces at Tyre. Here he met with ambassadors from Athens, requesting him to pardon such of their countrymen as he found serving the enemy. The king, being devious to oblige such a famous state, granted their request; and sent also a fleet to the coast of Greece, to prevent the effects of some commotions which had lately happened in Pelo-

ponnesus. He then directed his march to Thapsacus; and having passed the Euphrates and Tigris met with Darius near Arbela, where the Persians were again overthrown with prodigious slaughter, and Alexander in effect became master of the Persian empire.

After this important victory, Alexander marched directly to Babylon, which was immediately delivered up; the inhabitants being greatly disaffected to the Persian interest. After 30 days stay in this country, the king marched to Susa, which had already surrendered to Philoxenus; and here he received the treasures of the Persian monarch, amounting, according to the most generally received account, to 50,000 talents. Having received also at this time a supply of 6000 foot and 500 horse from Macedon, he set about reducing the nations of Media, among whom Darius was retired. He first reduced the Oaxians: and having forced a passage to Persepolis the capital of the empire, he like a barbarian destroyed the fateful palace there, a pile of building not to be equalled in any part of the world; after having given up the city to be plundered by his followers. In the palace he found 120,000 talents, which he appropriated to his own use, and caused to be carried away upon mules and camels; for he had such an extreme aversion to the inhabitants of Persepolis, that he determined to leave nothing valuable in the city.

During the time that Alexander remained at Persepolis, he received intelligence that Darius remained at Ecbatana the capital of Media, upon which he purposed him with the greatest expedition, marching at the rate of near 40 miles a-day. In 15 days he Darius. reached Ecbatana, where he was informed that Darius had retired from thence five days before, with an intent to pass into the remotest provinces of his empire. This put some frow to the rapid progress of the Macedonian army; and the king perceiving that there was no necessity for hurrying himself and his soldiers in such a manner, began to give the orders requisite in the present situation of his affairs. The Thessalian horse, who had deserved exceedingly well of him in all his battles, he dismissed according to his agreement; gave them their whole pay, and ordered 2000 talents over and above to be distributed among them. He then declared that he would force no man; but if any were willing to serve him longer for pay, he desired they would enter their names in a book, which a great many of them did; the rest sold their horses, and prepared for their departure. The king appointed Epocillus to conduct them to the sea, and assigned him a body of horse as an escort: he likewise sent Menetes with them, to take care of their embarkation, and that they were safely landed in Euboea without any expense to themselves.

On receiving fresh information concerning the state of Darius's affairs, the king fell out again in pursuit of him, advancing as far as Rhages, a city one day's journey from the Caspian frontiers: there he understood that Darius had passed those frontiers some time before; which information leaving him again without hopes, he halted for five days. Oxodontis, a Persian, whom Darius had left prisoner at Susa, was made governor of Media, while the king departed on an expedition into Parthia. The Caspian frontiers he passed immediately without opposition; and then gave directions to his officers to collect a quantity of provisions sufficient to serve his army on a long march through a wasted country. But before his officers could accomplish Who is these commands, the king received intelligence that Darius had been murdered by Bessus, one of his own subjects, and governor of Bactria, as is related at length under the article Bactria.

As soon as Alexander had collected his forces to Alexander gether, and settled the government of Parthia, he reduces Babylon, Susa, and Persepolis. entered Hyrcania; and having, according to his usual custom, committed the greatest part of his army to the care of Craterus, he, at the head of a choice body of troops, passed through certain raggy roads, and
and before the arrival of Craterus, who took an open
and easy path, struck the whole province with such
terror, that all the principal places were immediately
put into his hands, and soon after the province of Aria
also submitted, and the king continued Satibarzanes
the governor in his employment. — The reduction
of this province finished the conquest of Peria; but the
ambition of Alexander to become master of every
nation of which he had the least intelligence, induced
him to enter the country of the Mardis, merely be-
causé its rocks and barrenness had hitherto hindered
any body from conquering, or indeed from attempting
to conquer it. This conquest, however, he easily ac-
complished, and obliged the whole nation to submit
to his pleasure. But in the mean time disturbances
began to arise in Alexander’s new empire, and among
his troops, which all his activity could not thoroughly
suppress. He had fearlessly left the province of Aria,
when he received intelligence, that the traitor Bélus
had caused himself to be proclaimed king of Aria by
the name of Artaxes; and that Satibarzanes had
joined him, after having massacred all the Macedoni-
ans who had been left in the province. Alexander
appointed one Artagnes, and marched thence with his army against
the Zaunages, who under the command of Barzantes,
one of those who had conspired against Darius, had
taken up arms, and threatened to make an obiltine
defence. But their numbers daily falling off, Bar-
zaantes being afraid they would purchase their own
safety at the expense of his, privately withdrew from his
camp, and, crossing the river Indus, sought shelter
among the nations beyond it. But they, either dread-
ing the power of Alexander, or detesting the trea-
chery of this Persian towards his former master, feized
and delivered him up to Alexander, who caused him
immediately to be put to death.

The immense treasure which the Macedonians
had acquired in the conquest of Peria began now to cor-
rupt them. The king himself was of a most generous
disposition, and liberally bestowed his gifts on those
around him; but they made a bad use of his bounty,
and foolishly indulged in those vices by which the for-
term poiffivors of that wealth had lost it. The king
did all in his power to discourage the lazy and inac
tive pride which now began to flow itself among his offi-
cers; but neither his discourses nor his example had
any considerable effect. The manners of his courtiers
from bad became worse, in spite of all he could say
or do to prevent it; and at last they proceeded to
confume his conduct, and to express themselves with
some bitterness on the subject of his long continuance
of the war, and his leading them constantly from one
labour to another. This came to such an height, that
the king was at last obliged to use some severity in order
to keep his army within the limits of their duty. —
From this time forward, however, Alexander himself
began to alter his conduct; and by giving a little into
the customs of the Orientals, endeavored to fe-
cure that obedience from his new subjects which he
found difficult to be preserved among his old ones.
He likewise endeavored, by various methods to blend
the customs of the Asiaques and the Greeks. The
form of his civil government resembled that of the
ancient Persian kings; in the military affairs, how-
ever, he preferred the Macedonian discipline; but
then he made choice of 30,000 boys out the pro-
vinces, whom he caused to be instructed in the Greek
language, and directed to be brought up in such a
manner as that from time to time he might with them
draw the phalanx. The Macedonians law with
great care these extraordinary measures, which
failed very ill with their gross understandings; for
they thought, after all the victories they had gained,
to be absolute lords of Asia, and to possess the
riches of its inhabitants, but to rule the inhabi-
tants themselves: whereas they now saw, that Alex-
ander meant no such thing; but that, on the con-
trary, he conferred governments, offices at court,
and all other marks of confidence and favour, indif-
criminately both on Greeks and Persians. — From this
time also the king seems to have given instances of a
cruelty he had never before. Philotas his most
intimate friend was feized, tortured, and put to death
for a conspiracy of which it could never be proved
that he was guilty; and soon after Parmenio and
some others were executed without any crime at
all real or alleged. These things very much disturbed
the manners of his courtiers, as they had requested of him.
Some of them wrote home of the king’s fulbions of his friends, and his di-
position to hunt out enemies at the very extremities of
the world. Alexander having intercepted some of
these letters, and procured the best information he
could concerning their authors, picked out these
dissatisfied people, and having disposed them into one
corps, gave it the title of the turbulent battalion; hop-
ing by this means to prevent the spirit of disaf-
faction from pervading the whole army.

As a farther precaution against any future conspira-
cy, Alexander thought fit to appoint Hephestion and
Clytus, generals of the auxiliary horse; being appro-
nomotive, that if this authority was lodged in the hands
of a single person, it might prompt him to dangerous
undertakings, and at the same time furnish him with
the means of carrying them into execution. To keep
his forces in action, he suddenly marched into the
country of the Euectae, i.e. Benefactors; and
found them full of that kind and hospitable
disposition for which that name had been bestowed on their
ancestors; he therefore treated them with great re-
spect; and at his departure added some lands to their
dominions, which lay contiguous, and which for that
reason they had requested of him.

Turning then to the east, he entered Aracholus, the
inhabitants of which submitted without giving him any
trouble. While he passed the winter in these parts,
the king received advice, that the Arians, whom he
had so lately subdued, were again up in arms, Sati-
barzanes being returned into that country with two
thousand horse assigned him by Bélus. Alexander
instantly dispatched Artabazus the Persian, with Erigyus
and Caranus, two of his commanders, with a con-
derable body of horse and foot; he likewise ordered
Phraapatheeres, to whom he had given the govern-
ment of Parthia, to accompany him. A general
engagement ensued, wherein the Arians behaved
very well, as long as their commander Satibarzanes
d reman ed alive; but he engaging Erigyus, the Macedonian
fruck killed.

him first into the throat, and then drawing forth
his spear again, through the mouth; so that he im-
mediately
the chief commanders under Bellus, signifying, that, if he would send a small party to receive Bellus, they would deliver him into his hands; which they did accordingly, and the traitor expired, and with him the courage of his soldiers, who instantly began to fly; whereupon Alexander's commanders made an easy conquest of the rest of the country, and killed it effectually under his own eyes.

The king, notwithstanding the inclemency of the season, advanced into the country of Paropamisus, so called from the mountain Paropamisus, which the soldiers of Alexander called Caucasia. Having crossed the country in 16 days, he came at length to an opening leading into Media; which finding of a sufficient breadth, he directed a city to be built there, which he called Alexandria, as also several other towns about a day's journey distant from thence; and in these places he left 7000 persons, part of them such as had hitherto followed his camp, and part of the mercenary soldiers, who, weary of continual fatigue, were content to dwell there. Having thus settled things in this province, sacrificed solemnly to the gods, and appointed Proxes the Persian, president thereof, with a small body of troops under the command of Niloxenus to afflict him, he resumed his former design of penetrating into Bactria.

Bellus, who had assumed the title of Artaxerxes, when he was affurred that Alexander was marching towards him, immediately began to wafe all the country between Paropamisus and the river Oxus; which river he passed with his forces, and then burnt all the vessels he had made use of for transporting them, retiring to Nautaca, a city of Sogdia, fully persuaded, that by the precautions he had taken, Alexander would be compelled to give up his pursuit. This conduct of his, however, disheartened his troops, and gave the lie to all his pretentions; for he had affected to confirme Darius's conduct, and had charged him with cowardice, in not defending the rivers Ephrates and Tigris, whereas he now quitted the banks of the most defensible river perhaps in the whole world. As to his hopes, tho' it cannot be said they were ill founded, yet they proved absolutely vain; for Alexander, continuing his march, notwithstanding all the hardships his soldiers sustained, reduced all Bactria under obedienee, particularly the capital Bactria, and the strong castle Aornts; in the latter he placed a garrison under the command of Archelaus; but the government of the province he committed to Arachabuz. He then continued his march to the river Oxus; on the banks of which when he arrived, he found it three quarters of a mile over, its depth more than proportionable to its breadth, its bottom sandy, its stream so rapid as to render it almost un navigable, and neither boat nor tree in its neighbourhood; so that the ablest commanders in the Macedonian army were of opinion that they should be obliged to march back. The king, however, having first sent away, under a proper escort, all his infirm and worn-out soldiers, that they might be conducted safe to the sea-ports, and from thence to Greece, devised a method of passing this river without either boat or bridge, by causing the hides which covered the soldiers tents and carriages to be stuffed with straw, and then tied together, and thrown into the river. Having crossed the Oxus, he marched directly towards the camp of Bellus, where when he arrived, he found it abandoned; but received at the same time letters from Spitamenes and Dataphernes, who were

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A supply of horses being now arrived, the Macedonian cavalry were remounted. Alexander continued his march to Maracanda, the capital of Sogdia, from whence he advanced to the river Ixartes. Here he performed great exploits against the Scythians; from whom, however, though he overcame them, his army suffered much; and the revolted Sogdians being head ed by Spitamenes, gave him a great deal of trouble. Here he married Roxana the daughter of Oxartes, a prince of the country whom he had subdued. But during these expeditions, the king greatly disfigusted his army by the murder of his friend Cytus in a drunken quarrel at a banquet, and by his extravagant vanity in claiming divine honours.

At last he arrived at the river Indus, where Hephaestion and Perdiccas had already provided a bridge of boats for the passage of the army. The king refreshed his troops for 30 days in the countries on the other side of the river, which were those of his friend and ally Taxiles, who gave him 30 elephants, and joined his army now with 700 Indian horse, to which, when they were to enter upon action, he afterwards added 5000 foot. The true reason of this seems to have been his country to Porus, a famous Indian prince, whose territories lay on the other side of the river Hydaspes. During this recess, the king sacrificed with great solemnity; receiving also ambasholders from Ambilicus, a very potent prince, and from Doxarcas, who was likewise a king in those parts, with tenders of their duty, and considerable presents. The ceremonies over, Alexander appointed Philip governor of Taxila, and put a Macedonian garrison into the place, because he intended to erect an hospital there for the cure of his sick and wounded soldiers. He then ordered the vessels, of which his bridge had been composed when he passed the Indus, to be taken to pieces, that they might be brought to the Hydaspes, where he was informed that Porus with a great army lay encamped to hinder his passage. When he approached the banks of this river with his army and the auxiliaries under the command of Taxiles, he found that the people he had to do with were not so easily to be subdu'd as the Persians and other Asians. The Indians were not only a very tall and robust, but also a very hardy and well-disciplined people, and their king Porus was a prince of high spirit, invincible courage, and great conduct.

It was about the summer solstice when Alexander reached the Hydaspes, and consequently its waters were broader, deeper, and more rapid, than at any other time; for in India the rivers swell as the sun's increasing heat melts the snow, and subside again as winter approaches. Alexander therefore had every difficulty to struggle with. Porus had made his dispositions so judiciously, that Alexander found it impossible to arrive upon him as he had done upon others, and to pass the river in his view; wherefore he was constrained to divide his army into small parties, and to perform other arts, in order to get the better of so vigilant a prince. To this end he caused a great quantity of corn and other provisions to be brought into
Alexander pushed the river by the following contrivance. There was, at the distance of 150 ftaðia from his camp, a rocky promontory projecting into the river, thick covered with wood; and over against this promontory there lay a pretty large uninhabited island almost overgrown with trees. The king therefore conceived within him self a project of conveying a body of troops from this promontory into that island; and upon this scheme he built his hopes of surprising Porus, vigilant as he was. To this end he kept him and his army constantly alarmed for many nights together, till he perceived that Porus apprehended it was only done to harass his troops, and therefore no longer drew out of his camp, but trusted to his ordinary guards; then Alexander resolved to put his design in execution. A considerable body of horse, the Macedonian phalanx, with some corps of light armed foot, he left in his camp under the command of Craterus, as also the auxiliary Indians; giving these orders to be observed in his absence, that if Porus marched against him with part of his army, and left another part with the elephants behind in his camp, Craterus and his forces should remain where they were; but if it happened that Porus withdrew his elephants, then Craterus was to pass the river, because his cavalry might then do it safely. Alexander having marched half the way, or about nine of our miles, ordered the mercenary troops under the command of Astapus and other generals to remain there; and directed them, as soon as he knew he was engaged with the Indians on the other side, they should pass in vessels provided for that purpose, in order to assist him. Then marching a long way about, that the enemy might not perceive his design of reaching the rock, he advanced as diligently as he could towards that point. It happened very fortunately for him, that a great storm of thunder, lightning, and hail, rove in the night, whereby his march was perfectly concealed, his vessels of 30 oars put together, and his tents stuffed and flatted, so that they pulled from the rock into the island, without being perceived, a little before break of day; the storm ceasing just as he and his soldiers were ready for their passage. When they had traversed the island, they boldly set forward to gain the opposite shore in flight of Porus’s out-guards, who instantly pulled away to give their master an account of the attempt. Alexander landed first himself, and was followed as expeditiously as possible by his forces, whom he took care to draw up as fast as they arrived. When they began their march again, they found that their good fortune was not to last; for they were compelled to wade up to the breast. When they were on the other side, the king drew them up again carefully, ordering the foot to march slowly, they being in number about 6000, while himself with 5000 horse advanced before. As soon as Porus received intelligence that Alexander was actually passing the river, he sent his son with 2000 horse, and 120 armed chariots, to oppose him. But they came too late; Alexander was already got on shore, and even on his march.

When the Macedonian scouts perceived them advance, they informed the king, who sent a detachment to attack them, remaining still at the head of his cavalry in expectation of Porus. But when he found that this party was unsupported, he instantly attacked with all his horse, and defeated them with the slaughter of many, and the loss of all their armed chariots, the son of Porus being slain in the fight. The remainder of the horse returning to the camp with this disatisfactory account, Porus was in some confusion; however, he took very quickly the belt and wildest resolutions his circumstances would allow; which were, to leave a part of his army, with some of his elephants, to oppose Craterus, who was now about to pass the river also; and, with the rest, to march against Alexander and his forces, who were already passed. This resolution once taken, he marched immediately out of his camp, at the head of 4000 horse, 30,000 foot, 300 chariots, and 200 elephants. He advanced as expeditiously as he could, till he came into a plain which was firm and sandy, where his chariots and elephants might act to advantage; there he halted, that he might put his army in order, knowing well that he need not go in quest of his enemy, Alexander soon came up with his horse, but he did not charge Porus; on the contrary, he halted, and put his troops in order, that they might be able to defend themselves if they were attacked. When he had waited some time, his foot arrived; whom he immediately surrounded with his horse, that, after so fatiguing a march, they might have time to cool and breathe themselves, before they were led to engage. Porus permitted all this, because it was not his interest to fight, and because he depended chiefly upon his order of battle, the elephants covering his foot, so that the Macedonians could not charge them.

When Alexander had disposed his foot in proper order, he placed his horse on the wings: and, observing that he was much superior in them to the enemy, and that the cavalry of Porus were easy to be charged, he resolved to let the foot have as little share as possible in the battle. To this end, having given the necessary directions to Cœnas who commanded them, he went himself to the right, and with great fury fell upon the left wing of Porus. The dispute, though short, was very bloody: the cavalry of Porus, though they fought gallantly, were quickly broken; and the foot being by this means uncovered, the Macedonians charged them. But the Indian horses rallying, came up to their relief, yet were again defeated. By this time the archers had wounded Porus to the heart.
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Macedon. wounded many of the elephants, and killed most of their riders, so that they did not prove less troublesome and dangerous to their own side than to the Macedonians; whence a great confusion ensued: and Coenus, taking this opportunity, fell in with the troops under his command, and entirely defeated the Indian army. Porus himself behaved with the greatest intrepidity, and with the most excellent conduct: he gave his orders, and directed every thing, as long as his troops retained their form; and when they were broken, he retired from party to party as they made standes, and continued fighting till every corps of Indians was put to the rout. In the mean time Craesus had sailed with the rest of the Macedonian army; and these, falling upon the flying Indians, increased the slaughter of the day excessively, insomuch that 20,000 foot 3000 horse were killed, all the chariots were hacked to pieces, and the elephants not killed were taken; two of Porus's sons fell here, as also most of his officers of all ranks.

As for Porus, Alexander gave strict directions that no injury might be done to his person: he even sent Taxiles to persuade him to surrender himself; and to affure him that he should be treated with all the kindness and respect imaginable; but Porus, disdaining this advice from the mouth of an old enemy, threw a javelin at him, and had killed him but for the quick turn of his horse. Meroe the Indian, who was also in the service of Alexander, succeeded better: he had been the old acquaintance of Porus; and therefore when he intreated that prince to spare his person, and to submit himself to fortune and a general victor, Porus followed his advice; and we may truly say, that the condition of this Indian king suffered nothing by the loss of the battle. Alexander immediately gave him his liberty, restored him shortly after to his kingdom, to which he annexed provinces almost equal to it in value. Neither was Alexander a loser by his munificence; for Porus remained his true friend and constant ally.

To perpetuate the memory of this victory, Alexander ordered two cities to be erected; one on the field of battle, which he named Nicea; the other on this side the river, which he called Bucephala, in honour of his horse Bucephalus, who died here, as Arrian says, of mere old age, being on the verge of 30. All the folders, who fell in battle, he buried with great honours; offered solemn sacrifices to the gods, and exhibited pompous shows on the banks of the Hydaspes, where he had forced his passage. He then entered the territories of the Gauces, in which were 37 good cities, and a multitude of populous villages. All these were delivered up to him without resisting; and as soon as he received them, he presented them to Porus; and having reconciled him to Taxiles, befent the latter home to his own dominions. About this time ambassadors arrived from some Indian princes with their submissions; and Alexander having conquered the dominions of another Porus, which lay on the Hydaspes a branch of the Indus, added them to those of Porus his ally.

In the midst of all this success, however, news arrived that the Cnatis, the Oxoduces, and the Molls, the most warlike nations of India, were confederated against the Macedonians, and had drawn together a great army. The king immediately marched to give them battle; and in a few days reached a city called Sangala, seated on the top of a hill, and having a fine lake behind it. Before this city the confederate Indians lay encamped, having three circular lines of tents carried locked together, and their tents pitched in the centre. Notwithstanding the apparent difficulty of forcing these entrenchments, Alexander resolved immediately to attack them. The Indians made a noble defence; but at last the first line of their carriages was broken, and the Macedonians entered. The second was stronger by far; yet Alexander attacked that too, and after a desperate resistance forced it. The Indians without trusting to the third, retired into the city; which Alexander would have invested: but the foot he had with him not being sufficient for that purpose, he caufed his works to be carried on both sides as far as the lake; and, on the other side of that, ordered several brigades of horse to take post; ordering also battering engines to be brought up, and in some places employing miners. The second night he received intelligence that the besieged, knowing the lake to be fordable, intended to make their escape through it. Upon this the king ordered all the carriages which had been taken in forcing their camp to be placed up and down the roads, in hopes of hindering their flight; giving directions to Ptolemy, who commanded the horse on the other side of the lake, to be extremely vigilant, and to cause all his trumpets to sound, that the forces might repair to that post where the Indians made their greatest effort. These precautions had all the effect that could be desired: for of the few Indians who got through the lake, and passed the Macedonian horse, the greater part were killed on the roads; but the greatest part of their army was constrained to retire again through the water into the city. Two days after the place was taken by storm. Seventeen thousand Indians were killed, 70,000 taken prisoners; with 300 chariots, and 500 horse. The Macedonians are said to have lost only 100 men in this siege; but they had 1200 wounded, and among these several persons of great distinction.

The city was no sooner taken, than Alexander dispatched Eumenes his secretary, with a party of horse, to acquaint the inhabitants of the cities adjacent with what had befallen the Sangalans; promising also, that they should be kindly treated if they would submit. But they were so much affrighted at what had happened to their neighbours, that, abandoning all their cities, they fled into the mountains, choosing rather to expose themselves to wild beasts, than to these invaders, who had treated their countrymen so cruelly. When the king was informed of this, he sent detachments of horse and foot to scour the roads; and these, finding aged, infirm, and wounded people, to the number of about 300, put them to the sword without mercy. Perceiving that it was impossible to And rased. persuade the inhabitants to return, he caufed the city of Sangala to be razed, and gave the territories to the few Indians who had submitted to him. Alexander, still united with conquest, now prepared to pass the Hyphasis. The chief reason which induced him to think of this expedition was the information he had received of the state of the countries beyond 3 2 3 3 beyond 93 97
Macedon. beyond that river. He was told that they were in themselves rich and fruitful; that their inhabitants were not only a very martial people, but very civilized, that they were governed by the nobility, who were the sole judges subject to the laws; and that as they lived in happiness and freedom, it was likely they would fight obstinately in defence of those blessings. He was farther told, that among these nations there were the largest, strongest, and most useful elephants bred and tamed; and was therefore fired with an earnest desire to reduce such a bold and brave people under his rule, and of attaining to the possession of many valuable things that were said to be amongst them.

As exorbitant, however, as his personal ambition was, he found it impossible to induce any part of it into the minds of his soldiers, who were so far from willing to triumph over new and remote countries, that they were highly desirous of leaving those that they had already conquered. When therefore they were informed of the king's intentions, they privately consulted together in the camp about the situation of their own affairs. At this consultation, the gravest and best of the soldiers lamented that they were made use of by his king, not as lions, who fall fiercely upon those who have injured them; but as maffiats, who fly upon and tear those who are pointed out to them as enemies. The rest were not so modest; but expressed themselves roundly against the king's humour for leading them from battle to battle, from river to river, and from river to river,．protesting that they would follow him no farther, nor lavish away their lives any longer, to purchase fame for him.

Alexander was a man of too much penetration not to be early in perceiving that his troops were very uneasy. He therefore harangued them from his tribunal; but though his eloquence was great, and the love his army had for him was yet very strong, they did not relent. For some time the soldiers remained full and silent; and at last turned their eyes on Coenus, an old and experienced general, whom Alexander loved, and in whom the army put much confidence.

He had the generosity to undertake their cause; and told Alexander frankly, "that men endured toil in hopes of repose; that the Macedonians were already much reduced in their numbers; that of those who remained, the greater part were invalids; and that they expected, in consideration of their former services, that he would now lead them back to their native country: an act, which of all others, would most contribute to his own great designs; since it would encourage the youth of Macedon, and even of all Greece, to follow him in whatever new expedition he pleased to undertake." The king was far from being pleased with this speech of Coenus, and much less with the disposition of his army, which continued in a deep silence. He therefore dismissed the assembly; but next day he called another, wherein he told the soldiers plainly, that he would not be driven from his purpose; that he would proceed in his conquests with such as would follow him voluntarily: as for the rest, he would not detain them, but would leave them at liberty to go home to Macedon, where they might publish, "that they had left their king in the midst of his enemies." Even this expedient had no success; his army was so thoroughly tired with long marches and desperate battles, that they were determined to go no farther, either for fair speeches or force. Upon this Alexander retired to his tent, where he consulted with his friends, and put on the same gloomy temper that reigned among his troops. For three days things remained in this situation. At last the king suddenly appeared; and, as if he had been fully determined to pursue his first design, he gave orders for sacrificing for the good success of his new undertaking. Aristander the augur reported, that the omens were altogether auspicious; upon which the king said, that since his proceeding farther was neither pleasing to the gods nor grateful to his army, he would return. When this was rumoured among the army, they assembled in great numbers about the royal tent, flattering the king with loud acclamations, wishing him success in all his future designs; giving him at the same time hearty thanks, for that "he who was invincible had suffered himself to be overcome by their prayers."

A stop being thus put to the conquests of Alexander, he determined to make the Hyphasis the boundary of his dominions; and having erected twelve altars of an extraordinary magnitude, he sacrificed on them: after which, he exhibited shows in the Grecian manner; and, having added all the conquered country in these parts to the dominions of Porus, he began to return. Having arrived at the Hydaspes, he made the necessary preparations for forcing down the Indus into the ocean. For this purpose he ordered vast quantities of timber to be felled in the neighbourhood of the Hydaspes, through which he was to fall into the Indus; he caused the vessels with which he had passed other rivers to be brought thither, and assembled a vast number of artificers capable of repairing and equipping his fleet; which, when finished, consisted of 80 vessels of three banks of oars, and 2000 lefivs' ships and transports. Those who were to manage this fleet were collected out from the Phocicians, Cyprians, Carians, and Egyptians following his army, and who were reckoned perfectly well skilled in the naval art. When all things were in readiness, the army embarked about break of day: the king, in the mean time, sacrificing to the gods according to the ceremonies used in his own country, and likewise according to those of the country where he now was. Then he himself went on board, and causing the signal to be given by sound of trumpet, the fleet fell sail.

Craterus and Hephaestion had marched some days before with another division of the army; and in three days the fleet reached that part of the river which was opposite to their camps. Here he had information, that the Oxydraco and Malli were raising forces to oppose him: upon which he immediately determined to reduce them; for, during his voyage, he made it a rule to compel the inhabitants on both sides of the river to yield him obedience. But before he arrived on the coasts of the people abovementioned, he himself sustained no small danger; for, coming to the confluence of the Acesines with the Hydaspes, from whence both rivers roll together into the Indus, there eddies, whirlpools, and rapid currents, rushing with tremendous noise from the respective channels of those rivers into the great one formed by them both, at once terrified those who navigated his vessels, and actually
Macedonian soldiers destroyed many of the long vessels, with all who were aboard them; the king himself being in some danger, and Nearchus the admiral not a little at a loss. As soon as this danger was over, Alexander went on shore; and having ordered his elephants with some troops of horse and archers to be carried across, and put under the command of Craterus, he then divided his army on the left hand bank into three bodies; the first commanded by himself, the second by Hyphasis, and the third by Ptolemy. Hyphasis had orders to move silently through the heart of the country, five days march before the king; that if, on Alexander’s approach, any of the barbarians should attempt to shelter themselves by retiring into the country, they might fall into the hands of Hyphasis. Ptolemy Lagus was ordered to march three days journey behind the king, that if any escaped his army, they might fall into Ptolemy’s hands; and the fleet had orders to stop at the confluence of this river with the Hydrametes till such time as these several corps should arrive.

Alexander himself, at the head of a body of horse and light armed foot, marched through a desart country against the Malli; and, fearing perhaps any retreat to his soldiers, arrived in three days at a city into which the barbarians had put their wives and children, with a good garrision for their defence. The country people, having no notion that Alexander would march through such a desert and barren region, were all unarmed, and in the utmost confusion. Many of them therefore were slain in the field; the rest fled into the city, and shut the gates. But this only protracted their fate for a short time; for the king, having ordered the city to be invested by his cavalry, took it, as well as the castle, by storm, and put all he found there to the sword. He sent at the same time Perdiccas with a considerable detachment, to invest another city of the Malli at a considerable distance; but when he came there, he found it abandoned. However, he pursued the inhabitants who had but lately left it, and killed great numbers of them on the road. After this the king took several other cities, but not without considerable resistance; for the Indians sometimes chose to burn themselves in their houses rather than surrender. At last he marched to their capital city; and finding that abandoned, he proceeded to the river Hydrametes, where he found 50,000 men encamped on the opposite bank, in order to dispute his passage. He did not hesitate, however, to enter the river with a considerable party of horse: and so much were the Indians terrified at his presence, that their whole army retired before him. In a short time they returned and attacked him, being ashamed to fly before such an inconsiderable number; but in the mean time the reft of the Macedonian forces came up, and the Indians were obliged to retire to a city which lay behind them, and which Alexander invested that very night. The next day he formed the city with such violence, that the inhabitants were compelled to abandon it, and to retire to the castle, which they prepared for an obstinate defence. The king instantly gave orders for scaling the walls, and the soldiers prepared to execute these orders as fast as they could; but the king being impatient caught hold of a ladder and mounted it first himself, being followed by Leonatas, Peucefias, and Abreas, the latter a man of great valour, and who on that account had double pay allowed him. The king having gained the top of the battlements, cleared them quickly of the defenders, killing some of them with his sword; and pushing others over the walls; but after this was done, he was in more danger than ever; for the king was galloped in him with their arrows from the adjacent towers, though they durst not come near enough to engage him. His own battalion of targeteers mounting in haste to second him, broke the ladders; which, as soon as Alexander perceived, he threw himself down into the castle, as did also Peucefias, Leonatas, and Abreas. As soon as the king was on the ground, the Indian general rushed forward to attack him; but Alexander instantly dispatched him, as well as several others who followed him. Upon this the retreat retired, and contented themselves with throwing darts and stones at him at a distance. Abreas was struck into the head with an arrow, and died on the spot; and, shortly after, another piercing through the king’s breast-plate into his body. As long as he had spurs, he defended himself valiantly; but through a vast effusion of blood, losing his senses, he fell upon his shield. Peucefias then covered him with the sacred shield of Pallas on one side, as did Leonatas with his own shield on the other, though they themselves were dreadfully wounded. In the mean time, however, the soldiers on the outside, eager to save their king, further filled their want of ladders by driving large iron pins into the walls. By the help of these many of them ved by his accend, and came to the assistance of Alexander and his companions. The Indians were now slaughtered without mercy; but Alexander continued for some time in a very dangerous way; however, he at last recovered his strength, and showed himself again to his army, which filled them with the greatest joy.

The Malli, being now convinced that nothing but submission could save the remainder of them, sent deputies to Alexander, offering the dominion of their country; as did also the Oxysdraca: and the king having settled every thing in these countries agreeable to his mind, proceeded on his voyage down the river Indus. In this voyage he received the submission of some other Indian princes; and perceiving, that at the point of the island Pattala, the river divided itself into two vast branches, he ordered a haven and convenient docks to be made there for his ships; and when he had carreéed his fleet, he sailed down the right-hand branch towards the ocean. In his passage he sustained great difficulties by reason of his want of pilots, and at the mouth of the river very narrowly missed being cast away: yet all this did not hinder him from pursuing his first design, though it does not appear that he had any other motive thereto than the vain desire of boating that he had entered the ocean beyond the Indus: for, having consecrated certain bulls to Neptune, and thrown them into the sea, performed certain libations of golden cups, and thrown the cups also into the sea, he came back again; having only surveyed two little islands, one at the mouth of the Indus, and one a little farther in the ocean.

On the king’s return to Pattala, he resolved to sail down the other branch of the Indus, that he might
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Macedon. Alexander, therefore, setting out for Babylon, had no intelligence of his march; for indeed scarce any ever joined the forces of his army. In order to march back to Babylon.

Before the king's departure, many of his friends advised him against the route which he intended to take. They told him, that nothing could be more rash or dangerous than this resolution. They acquainted him, that the country through which he was to travel was a wild uncultivated desert; that Semiramis, when she led her soldiers this way out of India, brought home but 20 of them; and that Cyrus, attempting to do the same, returned with only seven. But all this was far from deterring Alexander, that it more than ever determined him to pursue no other road. As soon, therefore, as he had put things in order, he marched in the head of a sufficient body of troops to reduce the Orta, who had never vouchsafed either to make their submission or to court his friendship. Their territories lay on the other side of a river called Arbat, which Alexander crossed so speedily, that they had no intelligence of his march; whereupon most of them quitted their country, and fled into the deserts. Their capital he found so well situated, that he resolved to take it out of their hands, and to cause a new and noble city to be founded there, the care of which he committed to Hephæstion. Then he received the deputies of the Orta and Gedroia, and having assented to them, that if the people returned to their villages, they should be kindly treated, and having appointed Apollonides president of the Orta, and left a considerable body of troops under Leonatus to secure their obedience, he began his march through Gedroia. In this march his troops suffered incredible hardships. The road was very uncertain and troublesome, on account of its lying through deep and loose sands, rising in many places into hillocks, which forced the soldiers to climb, at the same time that it sunk under their feet; there were no towns, villages, nor places of refreshment to be met with; so that, after several marches, they were forced to encamp among fields and woods, where he is said to have given his soldiers the greatest quantities of victuals, they hardly met with any during their whole march. The soldiers were therefore obliged to kill their beasts of carriage: and such as were sent to bring some corn from the sea-side, were so grievously distressed, that, though it was fed with the king's pigeons, they could not eat it.
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He is said to have received several warnings of his approaching fate, and to have been advised to avoid that city; which advice he either despised or could not follow. He died of a fever after eight days illnes, without naming any successor; having only given his ring to Perdicas, and left the kingdom, as he said, to the most worthy.

The character of this great prince has been variously represented; but most historians seem to have looked upon him rather as an illustrious madman than one upon whom the epithet of Great could be properly bestowed. From a careful observation of his conduct, however, it must appear, that he possessed not only a capacity to plan, but likewise to execute, the greatest enterprises that ever entered into the mind of any of the human race. From whatever cause the notion originated, it is plain that he imagined himself a divine person, and born to subdue the whole world: and extravagant and impracticable as this scheme may appear at present, it cannot at all be looked upon in the same light in the time of Alexander. The Greeks were in his time the most powerful people in the world in respect to their skill in the military art, and the Persians were the most powerful with respect to wealth and numbers. The only other powerful people in the world were the Carthaginians, Gauls, and Italian nations. From a long series of wars which the Carthaginians carried on in Sicily, it appeared that they were by no means capable of contending with the Greeks even when they had an immense superiority of numbers; much less then could they have sustained an attack from the whole power of Greece and Asia united. The Gauls and Italians were indeed very brave, and of a martial disposition; but they were barbarous and could not have reformed armies well disciplined and under the command of such a skilful leader as Alexander. Even long after his time, it appeared that the Romans themselves could not have refuscited the Greeks; since Regulus, after having defeated the Carthaginians and reduced them to the utmost distress, was totally unable to refuscit a Carthaginian army commanded by a Greek general, and guided by Greek discipline.

Thus it appears, that the scheme of Alexander cannot by any means be accounted that of a madman, or of one who projects great things without judgment or means to execute them. If we consider from his actions the end which most probably he had in view, could his scheme been accomplished, we shall find it not only the greatest but the best that can possibly be imagined. He did not conquer to destroy, enslave, or oppress, but to civilize, and unite the whole world as one nation. No conqueror was a province conquered than he took care of it as if it had been part of his paternal inheritance. He allowed not his soldiers to oppress and plunder the Persians, which they were very much inclined to do; on the contrary, by giving into the oriental customs himself, he proved to extinguishe that inveterate hatred which had for long subsisted between the two nations. In the Scythian countries which he subdued, he pursued the same excellent plan. His courage and military skill, in which he never was excelled, were displayed, not with a view to stupre, or defolatory conquest, but to civilize and induce the barbarous inhabitants to employ themselves in more proper pursuits.
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Their way of Life. "Amidst the hardships of a military life (says Dr Gillies), obtinate lies, blood, battles, and dear bought victories, he still respected the rights of mankind, and practised the mild virtues of humanity. The conquered nations enjoyed their ancient laws and privileges; the rigours of despotism softened; arts and industry encouraged; and the profligate Macedonian governors compelled, by the authority and example of Alexander, to observe the rules of justice towards their meanest subjects. To bridge the fierce inhabitants of the Scythian plains, he founded cities and established colonies on the banks of the Iaxartes and Oxus; and those destructive campaigns usually ascribed to his restless activity and ambition, appeared to the discernment of this extraordinary man singular and meritorious. In general, he undertook, and which he performed with singular boldness and unexampled success in another place the same author gives his character in the following words."

"He was of a low stature, and somewhat deformed; but the activity and elevation of his mind animated and ennobled his fame. By a life of continual labour, and by an early and habitual practice of the gymnastic exercises, he hardened his body against the impressions of cold and heat, hunger and thirst, and prepared his robust constitution for bearing such exertions of strength and activity, as have appeared incredible to the undisciplined fancics of modern times. In generosity and in probity, he rivalled the greatest heroes of antiquity; and in the race of glory, having finally outstripped all competitors, became ambitious to surpass himself. His superior skill in war gave uninterrupted success to his arms; and his natural humanity, enlightened by the philosophy of Greece, taught him to improve his conquests to the best interests of mankind. In his extensive dominions, he built or founded not less than 70 cities; the situation of which being chosen with consummate wisdom, tended to facilitate communication, to promote commerce, and to extend the civility through the greatest nations of the earth. It may be suspected, indeed, that he mitigated the full extent of human power, when in the course of one reign he undertook to change the face of the world; and that he misjudged the stubbornness of ignorance and the force of habit, when he attempted to enlighten barbarism to soften servitude, and to transplant the improvements of Greece into an African and Asiatic soil, where they have never been known to flourish. Yet let not the designs of Alexander be too hastily accused of extravagance. Whoever seriously considers what he actually performed before his 33d year, will be cautious of determining what he might have accomplished had he reached the ordinary term of human life. His resources were peculiar to himself; and such views as well as actions became him as would have become none beside. In the language of a philosophical historian, 'he seems to have been given to the world by a peculiar dispensation of Providence, being a man like to none other of the human kind.'"

"From the part which his father Philip and himself acted in the affairs of Greece, his history has been transmitted through the impure channels of exagge-
We shall conclude this character of Alexander with observing, that he had in view, and undoubtedly must have accomplished, the sovereignty of the ocean as well as of the land. The violent resistance made by the Tyrians had shown him the strength of a commercial nation; and it was undoubtedly with a view to enrich his dominions by commerce, that he equipped the fleet on the Indies, and wished to keep up a communication with India by land as well as by sea. "It was chiefly with a view to the latter of these objects (says Dr. Robertson), that he examined the navigation of the Indies with so much attention. With the same view, on his return to Sups, he in person surveyed the course of the Euphrates and Tigris, and gave directions to remove the cataracts or dams with which the ancient monarchs of Persia, induced by a peculiar precept of their religion, which enjoined them to guard with the utmost care against defiling any of the elements, had constructed near the mouths of the rivers, in order to shut out their waters from any access to the ocean. By opening the navigation in this manner, he proposed, that the valuable commodities of India should be conveyed from the Persian Gulf into the interior parts of his Asiatic dominions, while by the Arabian Gulf they should be carried to Alexandria, and distributed to the rest of the world.

"Grand and extensive as these schemes were, the precautions employed, and the arrangements made for carrying them into execution, were various and so proper, that Alexander had good reason to entertain sanguine hopes of their proving successful. At the time when the mutinous spirit of his officers obliged him to relinquish his operations in India, he was not 30 years of age complete. At this enterprising period of life, a prince of a spirit so active, persevering, and indefatigable, must have found means to resume a favourite measure on which he had been long intent. If he had invaded India a second time, he would not, as formerly, have been obliged to force his way through hostile and unexplored regions, opposed at every step by nations and tribes of barbarians whose names had never reached the ears of any ancient Greek. All that he had to do, from the shores of the Indian sea to the banks of the Hyphasis, would then have been subject to his dominion; and through that immense stretch of country he had established such a chain of cities or fortified stations, that his armies might have continued their march with safety, and have found a regular succession of magazines provided for their subsistence. Nor would it have been difficult for him to bring into the field forces sufficient to have achieved the conquest of a country so populous and extensive as India. Having armed and disciplined his subjects in the East like Europeans, they would have been ambitious to imitate and to equal their instructors; and Alexander might have drawn recruits, not from his bounty in Macedonia and Greece, but from the vast regions of Asia, which in every age has covered the earth, and astonished mankind with its numerous armies. When at the head of such a formidable power he had reached the confines of India, he might have entered it under circumstances very different from those in his first expedition. He had secured a firm footing there, partly by means of the garrisons which he left in the three cities which he had built and fortified, and partly by his alliance with Taxiles and Porsus. These two Indian Princes, Macedon...

"But this and all his other splendid schemes were terminated at once by his untimely death. In consequence of that, however, events took place which illustrate and confirm the justice of the preceding speculations and conjectures by evidence the most striking and satisfactory. When that great empire, which the superior genius of Alexander had kept united and in subjection, no longer felt his superintending control, it broke into pieces, and its various provinces were seized by his principal officers, and parcelled out among them. From ambition, emulation, and personal animosity, they soon turned their arms against one another; as and as several of the leaders were equally eminent for political abilities and for military skill, the contest was maintained long, and carried on with frequent vicissitudes of fortune. Amidst the various convulsions and revolutions which then occurred, it was found that the measures of Alexander for the preservation of his conquests had been concerted with such sagacity, that upon the final reformation of tranquillity, the Macedonian dominion continued to be established in every part of Asia, and not one province had shaken off the yoke. Even India, the most remote of Alexander's conquests, quietly submitted to Pytho the son of Agenor, and afterwards to Seleucus, who successively obtained dominion over that part of Asia. Porsus and Taxiles, notwithstanding the death of their benefactor, neither declined submission to the authority of the Macedonians nor made any attempt to recover independence.

"With the death of Alexander fell also the glory of the Macedonians; who very soon relapsed into a situation as bad, or worse, than that in which they had been before the reign of Philip. This was occasioned principally by his not having distinctly named a successor, and having no child of his own come to the years of discretion to whom the kingdom might seem naturally to belong. The ambition and jealousy of his mother Olympias, his queen Roxana, and especially of the great commanders of his army, not only prevented a successor from being ever named, but occasioned the death of every person, whether male or female, who was in the least related to Alexander. To have a just notion of the origin of these disturbances, it is necessary in the first place to understand the situation of the Macedonian affairs at the time of Alexander's death.

When Alexander set out for Asia, he left Antipater, as we formerly observed, in Macedon, to prevent any disturbances that might arise either there or in Greece. The Greeks, even during the lifetime of Alexander, bore the superiority which he exercised over them with great impatience; and, though nothing could be more gentle
gentle than the government of Antipater, yet he was exceedingly hated, because he obliged them to be quiet. One of the last actions of Alexander’s life was the death of a man named Perdiccas, the brother of Alexander, who had always accompanied the king, and been wont to sacrifice with him. Should he accompany the sovereign—This Perdiccas was a man of very flesher parts and judgment, yet not naturally but by the wicked practices of Olympias, who had given him poisonous draughts in his infancy, left him to stand in the way of her son Alexander or any of his family: and, for this, or some other reason, Perdiccas, Polymenus, and Philotas, the horse-officers, repeated his promise to such a degree, that they quitted the city, and even the army. However, Meleager, at the head of the phalanx, vigorously supported their first resolution, and threatened loudly to shed the blood of those who opposed them, and to assume a kingdom which no way belonged to them. Perdiccas was accordingly arrayed in royal robes, had the arms of Alexander put upon him, and was saluted by the name of Philip, to render him more popular. Thus were two parties formed at the head of whom were Meleager and Perdiccas: both of them pretended vast concern for the public good, yet, at bottom, desiring nothing more than the ascendancy. Perdiccas was a man of high birth, had had a supreme command in the army, was much in favour with Alexander, and one in whom the nobility had put great confidence. Meleager was become formidable by having the phalanx on his side, and he had become a king entirely in his power: for Perdiccas, or Philip, was obliged to comply with whatever he thought proper and publically declared, that whatever he did was by the advice of Meleager; so that he made his minister unaccountable for his own schemes, and no way endangered himself. The Macedonians also, besides, their regard for the deceased king, soon began to entertain a personal love for Philip on account of his moderation.

It is remarkable, however, that notwithstanding all the favours which Alexander had conferred upon his officers, and the fidelity with which they had served him during his life, only two of them were attached to the interests of his family after his death. These were Antipater and Eumenes the Cardian, whom he had appointed his secretary. Antipater, as we have already seen, was embroiled with the Greeks, and could not affix the royal family who were in Asia; and Eumenes had not as yet sufficient interest to form a party in their favour. In a short time, however, Perdiccas prevailed against Meleager, and got him murdered; by which means the supreme power for a time fell into his hands. His first step, in consequence of this empire, was to distribute the provinces of the empire among the commanders in the following manner, in order to prevent competitors, and to satisfy the ambition of the principal commanders of the army. Arid, the son of Roxana, born after the death of his father, were to enjoy the regal authority. Antipater had the government of the European provinces. Craterus had the title of protector. Perdiccas was general of the household troops in the room of Hephaestion. Polymenus the son of Lagus had Egypt, Libya, and that part of Arabia which borders upon Egypt. Cleomenes, a man of infamous character, whom Alexander had made receiver-general in Egypt, was made Polymenus’s deputy. Lysias had Syria; Philotas, Cilicia; Pithon, Media; Eumenes, Cappadocia, Phœnicia, and all the country bordering on the Euxine Sea, as far as Træpezus; but these were not yet conquered, so that he was a governor without a province. Antigonus had Pamphylia, Lycia, and Phrygia Major; Callander, Caria; Menander; Lydia; Leonatus, Phrygia on the Hellepont.

In the mean time, not only Alexander’s will, but Alexander himself, was so much neglected, that his body was allowed to remain seven days before any notice was taken of it, or any orders given for its being embalmed. The only will he left was a short memorandum of six things he would have done—1. The building of a fleet of 1000 sail galleys, to be made use of against the Carthaginians and other nations who should oppose the reduction of the coasts of Africa and Spain, with all the adjacent islands as far as Sicily. 2. A large and regular highway was to be made along the coast of Africa, as far as Cænus and Tangier. 3. Six temples of extraordinary magnificence were to be erected at the expense of 1500 talents each. 4. Castles, arsenals, havens, and military yards for building ships, to be settled in proper places throughout his empire. 5. Several new cities were to be built in Europe and Asia; those in Asia to be inhabited by colonies from Europe, and those in Europe to be filled with Ailaxians; that, by blending their people and their manners, that hereditary antipathy might be eradicated which had hitherto subsisted between the inhabitants of the different continents. 6. Lastly, he had projected the building of a pyramid, equal in bulk and beauty to the Biggest in Egypt in honour of his father Philip. All these designs, under pretence of their being expensive, were referred to a council of Macedonians, to be held nobody knew when or where.

The government, being now in the hands of Perdiccas and Roxana, grew quickly very cruel and trifling. Alexander was scarce dead when the queen sent for Staïra and Drypetis, the two daughters of Theodasses, one of whom had been married to Alexander and the other to Hephaestion; but as soon as they arrived at Babylon, caulked them both to be murdered, Roxana, that no son of Alexander by any other woman, or of Hephaestion, might give any trouble to her or her son Alexander.
Alexander. Sygambis, the mother of Darius, no sooner heard that Alexander the Great was dead, than the laid violent hands on herself, being apprehensive of the calamities which were about to ensue.

War was first declared in Greece against Antipater in the year 321 B.C. Through the treachery of the Thessalians, that general was defeated, with the army he had under his own command. Leonatus was therefore sent from Aisa, with a very considerable army, to his assistance; but both were overthrown with great loss by the confederates, and Leonatus himself was killed. In a short time, however, Craterus arrived in Greece with a great army, the command of which he assigned to Antipater. The army of the confederates amounted to 25,000 foot and 3000 horse; but Antipater commanded no fewer than 40,000 foot, 3000 archers, and 5000 horse. In such an unequal contest, therefore, the Greeks were defeated, and forced to flee for peace, which they did not obtain but on condition of their receiving Macedonian garrisons into several of their cities. At Athens also the democratic government was abrogated; and such a dreadful punishment did this seem to the Athenians, that 22,000 of them left their country, and retired into Macedonia.

While these things were doing in Greece, disturbances began also to arise in Aisa and in Thrace. The Greek mercenaries, who were dispersed through the inland provinces of Aisa, despairing of ever being allowed to return home by fair means, determined to attempt it by force. For this purpose, they assembled to the number of 20,000 foot and 3000 horse; but were all cut off by a man by the Macedonians. In Thrace, Lyfinachus was attacked by one Seuthes, a prince of that country, who claimed the dominions of his ancestors, and had raised an army of 20,000 foot and 8000 horse. But though the Macedonian commander was forced to engage this army with no more than 4000 foot and 2000 horse, yet he kept the field of battle, and could not be driven out of the country. Perdiccas, in the mean time, by pretending friendship to the royal family, had gained over Eumenes entirely to his interest; and at last put him in possession of the province of Cappadocia by the defeat of Ariarathes king of that country, whom he afterwards cruelly caufed to be crucified. His ambition, however, now began to lead him into difficulties. At the first division of the provinces, Perdiccas, to strengthen his own authority, had proposed to marry Nicaea the daughter of Antipater; and so well was this proposal relished, that her brethren Jollas and Archias conducted her to him, in order to be present at the celebration of the nuptials. But Perdiccas now had other things in view. He had been solicited by Olympias to marry her daughter Cleopatra, the widow of Alexander king of Epirus, and who then reigned at Sardis in Lydia. Eumenes promoted this match to the utmost of his power, because he thought it would be for the interest of the royal family, and his intrigues had such an effect on Perdiccas, that he was sent to Sardis to compliment Cleopatra, and to carry presents to her in name of her new lover. In the absence of Eumenes, however, Alcetas, the brother of Perdiccas, persuaded him to marry Nicaea; but, in order to gratify his ambition, he resolved to divorce her immediately after marriage, and marry Cleopatra. By this Macedonian marriage, he hoped to have pretexts for altering the government of Macedon; and, as a necessary measure preparatory to the same, he entered into contrivances for destroying Antipater. Unfortunately for himself, however, he ruined all his schemes by his own jealousy and precipitate cruelty. Cyane, the daughter of Philip by his second wife, had brought her daughter named Adox, and who was afterwards named Eurydice, to court, in hopes that king Ardaeus might marry her. Against Cyane, Perdiccas, on some political motives, conceived such a grudge, that he caused her to be murdered. This raised a commotion in the army; which frightened Perdiccas to such a degree that he now proposed the match between Arдаeus and Eurydice, to prevent which, he had murdered the mother of the young princes. But, in the mean time, Antipater, knowing the designs of Perdiccas against himself, fled with his son Demetrius to Greece there to take shelter under the protection of Antipater and Craterus, whom he informed of the ambition and cruelty of the regiment.

A civil war was now kindled. Antipater, Craterus, Neoptolemus, and Antipater, were combined against Perdiccas; and it was the misfortune of the empire in general, that Eumenes, the most able general, as well as the most virtuous of all the commanders, was on the side of Perdiccas, because he believed him to be in the interest of Alexander's family. Ptolemy, in the mean time, remained in quiet possession of Egypt; but without the least intention of owning any pretension for his superiority; however, he also acceded to the league formed against Perdiccas; and thus the only person in the whole empire who consulted the interest of the royal family was Eumenes.

It was now thought proper to bury the body of Alexander, which had been kept for two years, during which time preparations had been making for it. Ardaeus, to whose care it was committed, set out from Babylon for Damacus, in order to carry the king's body to Egypt. This was fore against the will of Perdiccas; for it seems there was a superfluous report, that wherever the body of Alexander was laid, that country should flourish most. Perdiccas, therefore, out of regard to his native soil, would have it conveyed to the royal sepulchres in Macedon; but Ardaeus, pleading the late king's express direction, was determined to carry it into Egypt, from thence to be conveyed to the temple of Jupiter Ammon. The funeral was accordingly conducted with all imaginable magnificence. Ptolemy came to meet the body as far as Syria; but, instead of burying it in the temple of Jupiter Ammon, erected a flat stone temple for it in the city of Alexandria; and, by the respect he showed for his dead master, induced many of the Macedonian veterans to join him, and who were afterwards of the greatest service to him. No sooner was the funeral over, than both the Perdiccan parties abovementioned fell to blows. Perdiccas was killed by marched against Ptolemy; but was slain by his own men, who, after the death of their general, submitted to his antagonist; and thus Eumenes was left alone to contend against all the other generals who had served under Alexander. In this contest, however, he would by no means have been overmatched, had his soldiers...
A new division of the empire.

Matters now seemed to wear a better aspect than they had yet done; and, had Eumenes believed that his enemies really confided in the interest of Alexander's family, there is not the least doubt that the war would have been immediately terminated. He saw, however, that the design of Antigonus was only to set up for himself, and therefore he refused to submit. From this time, therefore, the Macedonian empire ceased in Asia; and an account of the transactions of this part of the world fail to be recorded under the article Syria. The Macedonian affairs are now entirely confined to the kingdom of Macedon itself, and to Greece.

A new division of the empire.

Antipater had not long been returned to Macedon, when he died; and the last act of his life completed the ruin of Alexander's family. Out of a view to the public good, he had appointed Polyperchon, the eldest of Alexander's captives at hand, to be pretector and governor of Macedon. This failed not to displease his son Caffander; who thought he had a natural right to these offices, and of course kindled a civil war in Macedon. This was indeed highly promoted by his first actions as a governor. He began with attempting to remove all the governors appointed in Greece by Antipater, and to restore democracy wherever it had been abolished. The immediate consequence of this was, that the people refused to obey their magistrates; the governors refused to reign their places, and applied for assistance to Caffander. Polyperchon Macedon also had the imprudence to recall Olympias from Epirus, and allow her a share in the administration; which Antipater, and even Alexander himself, had always refused her. The consequence of all this was, that Caffander invaded Greece, where he prevailed against Polyperchon; Olympias returned to Macedon, where the cruelly murdered Aridæus and his wife Eurydice; she herself was put to death by Caffander, who afterwards caused Roxana and her son to be murdered, and Polyperchon being driven into Eotia, first raised to the crown Hercules the son of Alexander by the daughter of Darius, and then by the instigation of Caffander murdered him, by which means the line of Alexander the Great became totally extinct.

Cassander having thus destroyed all the royal family, various suggestions were made as to how the title of king of Macedonia should be determined. Various suggestions were made as to how the title of king of Macedonia should be determined. Various suggestions were made as to how the title of king of Macedonia should be determined. Various suggestions were made as to how the title of king of Macedonia should be determined.

It was now certain that the empire of Alexander the Great was at an end, and that the Greeks were to be at the mercy of the next conqueror. The Macedonians were with reason alarmed at the approach of the new empire, and expected the worst. The Athenians were in the same situation, and were equally alarmed. The Lacedaemonians were in a still more critical situation. They had been long in the habit of ruling over the Greeks, and had been accustomed to think of themselves as the masters of the world. They were now to be placed in the position of the ruled, and were therefore in a state of great extraordinary distress. The Romans were in a still more critical situation. They had been long in the habit of ruling over the Greeks, and had been accustomed to think of themselves as the masters of the world. They were now to be placed in the position of the ruled, and were therefore in a state of great extraordinary distress.
MACEDONIA [389]

MACEDONIA

War with the Romans.

The latter; but involved the whole country in so many calamities, that these transactions could not redound much to the reputation either of his arms or his honour. About 243 B.C. he died, leaving the kingdom to his son, Demetrius II.

Neither Demetrius, nor his successor Antigonus Doson, performed any thing remarkable. In 221 B.C. the kingdom fell to Philip, the last but one of the Macedonian monarchs. To him Hannibal applied for assistance after the battle of Canna, which he refused, and the same imprudence which made him refuse this assistance prompted him to embroil himself with the Romans; and at last to conclude a treaty with them, by which he in effect became their subject, being tied up from making peace or war but according to their pleasure. In 170 B.C. he was succeeded by his eldest son Perseus, under whom the war with the Romans was renewed. Even yet the Macedonians were terrible in war; and their phalanx, when properly conducted, seems to have been absolutely invincible by any method of making war known at that time. It consisted of 16,000 men, of whom 1000 marched abroad, and thus was 16 men deep, each of whom carried a kind of pike 23 feet long. The soldiers stood close; that the pikes of the fifth rank reached their points beyond the front of the battle. The hindermost ranks leaned their pikes on the shoulders of those who went before them, and, locking them fast, pressed briskly against them when they made the charge; so that the first five ranks had the impetus of the whole phalanx, which was the reason why the shock was generally irresistible. The Romans had never encountered such a terrible enemy; and in the first battle, which happened 171 B.C. they were defeated with the loss of 2200 men, while the Macedonians lost no more than 60. The generals of Perseus now pleaded him to form the enemy's camp; but he being naturally of a cowardly disposition refused to comply, and thus the best opportunity he ever had was lost. Still, however, the Romans gained little or no advantage, till the year 165 B.C. when Paulus Aemilius, a most experienced commander, was sent into Macedonia. Perseus now put all upon the issue of a general engagement; and Aemilius, with all his courage and military experience, would have been defeated, had the Macedonians been commanded by a general of the smallest courage or conduct. The light armed Macedonians charged with such vigour, that after the battle some of their bodies were found within two furlongs of the Roman camp. When the phalanx came to charge, the points of their spears striking into the Romans shields, kept the heavy armed troops from making any motion; while, on the other hand Perseus's light armed men did terrible execution. On this occasion it is said that Aemilius tore his clothes, and gave up all hopes. However, perceiving that as the phalanx gained ground it lost its order in several places, he caused his own light-armed troops to charge in those places, whereby the Macedonians were soon put into confusion. If Perseus had not on the first appearance of this charged the Romans briskly, his infantry would have been able to recover themselves; but instead of this, he betook himself to flight, and the infantry at last did the same, but not till 20,000 of them had lost their lives.

This battle decided the fate of Macedonia, which immediately submitted to the conqueror. The cowardly king took refuge in the island of Samothrace; but was at last obliged to surrender to the Roman consul, by whom he was carried to Rome, led in triumph, and afterwards most barbarously used. Some pretenders to the throne appeared afterwards; but being unable to defend themselves against the Romans, the country was reduced to a Roman province in 149 B.C. To them it continued subject till the year 1357, when it was reduced by the Turkish sultan Bajazet, and hath remained in the hands of the Turks ever since.

MACEDONIANS, in ecclesiastical history, the followers of Macedonius, bishop of Constaninople, who, through the influence of the Eunomians, was deposed by the council of Constaninople in 360, and sent into exile. He considered the Holy Ghost as a divine energy diffused throughout the universe, and not as a person distinct from the Father and the Son. The fecl Macedonians was crushed before it had arrived at its full maturity, by the council assembled by Theodotius in 381, at Constaninople. See SEMIARIUS.

MACEDONIUS. See Macedonians.

MACER (Emilius), an ancient Latin poet, was born at Verona, and flourished under Augustus Caesar. Eusebius relates, that he died a few years after Virgil. Ovid speaks of a poem of his, on the nature and quality of birds, serpents, and herbs; which he says Macer being then very old had often read to him:

Baculus amarus legit nihil grandior auro,
Quaque most ferentes, quo vasto herbis, Macer.

De Ponto, lib. iv. eleg. 10.

There is extant a poem upon the nature and power of herbs under Macer's name; but it is spurious. He also wrote a supplement to Homer, as Quintus Calaber did afterwards in Greek:

To ancis armis quiesquid refii hat Homerus:
Ne curvant jamms Troia sola manu.

De Ponto, lib. ii. eleg. 70.

MACERATION, is an infusion of, or soaking ingredients in water or any other fluid, in order either to soften them or draw out their virtues.

MACERATA, a handsome and populous town of Italy, in the territory of the church, and in the Marche of Ancona, with a bishop's see, and an university. It is seated near the mountain Ciento, in E. Long. 13. 37. N. Lat. 43. 15.

MACHIAN, a celebrated physician among the ancients, son of Echolatus and brother to Pocalirius. He went to the Trojan war with the inhabitants of Triga, Ithome, and Echallus. According to some, he was king of Messenia. He was physician to the Greeks, and healed the wounds which they received during the Trojan war. Some suppose he was killed before Troy by Euryalus the son of Telephus. He received divine honours after death, and had a temple, in Messenia.

MACHÆRUS (anc. geogr.), a citadel on the other side Jordan, near the mountains of Moab, not far from and to the north of the Latus Abbasites. It was the fourth boundary of the Persæ: situated on a mountain encompassed round with deep and broad valleys; built by Alexander king of the Jews, destroyed by Gabinius in the war with Ariobabas, and rebuilt by Herod with a cistominal town round it. Here John the Baptist was beheaded (Josephus).
MACHIAN, one of the Molucca islands, in the East India Ocean, about 20 miles in circumference, and the most fertile of them all. It likewise produces the best cloves; and is in possession of the Dutch, who have three strong forts built on it.

MACHIAVEL (Nicholas), a famous political writer of the 16th century, was born of a distinguished family at Florence. He wrote in his native language with great elegance and politeness, though he understood very little of the Latin tongue; but he was in the service of Marcellus Virgilus, a learned man, who pointed out to him many of the beautiful passages in the ancients, which Machiavel had the art of placing properly in his works. He composed a comedy upon the ancient Greek model; in which he turned into ridicule many of the Florentine ladies, and which was so well received, that Pope Leo X. caused it to be acted at Rome. Machiavel was secretary, and afterwards historiographer, to the republic of Florence. The house of Medicis procured him this last office, together with a handsome salary, in order to pacify his resentment for having suffered the torture upon suspicion of being an accomplice in the conspiracy of the Soderini against that house, when Machiavel bore his sufferings without making any confession. The great encomiums he bestowed upon Brutus and Camillus, both in his conversations and writings, made him strongly suspected of being concerned in another conspiracy against cardinal Julian de Medicis, who was afterwards pope under the name of Clement VII. However, they carried on no proceedings against him; but from that time he turned everything into ridicule, and gave himself up to irreligion. He died in 1530, of a remedy which he had taken by way of prevention. - Of all his writings, that which has made the most noise, and has drawn upon him the most enemies, is a political treatise entitled the Prince; which has been translated into several languages, and wrote against by many authors. The world is not agreed as to the motives of this work; some thinking, it meant to recommend tyrannical maxims; others, that he only delineated them to excite abhorrence. Machiavel also wrote, Reflections on Titus Livius, which are extremely curious; The History of Florence, from the year 1205 to 1494; and a quarto volume of Poems and other pieces. Mr Harrington considers him as a superior genius, and as the most excellent writer on politics and government that ever appeared.

MACHINE, (Machinery), in the general, signifies anything that serves to augment or to regulate moving powers: Or it is any body defined to produce motion, so as to serve either time or force. The word comes from the Greek macheras, machine, invention, art; and hence, in strictness, a machine is something that confits more in art and invention, than in the strength and solidity of the materials; for which reason it is that the inventors of machines are called inventors or engineers.

Machines are either simple or compound. The simple ones are the seven mechanical powers, viz. lever, balance, pulley, axis and wheel, wedge, screw, and inclined plane. See MECHANICS.

From these the compound ones are formed by various combinations, and serve for different purposes. See MECHANICS and HYDROSTATICS; also the articles AGRICULTURE, CANNON, CENTRIFUGAL, FIRE, STEAM, FURNACE, BURROUGHS, RAMSDEN, &c. &c.

MACHINES in war amongst the Greeks, were principally these: 1. Papugoni, or scaling ladders. 2. The battering ram. 3. The helotis. 4. The cheiron or tortoise, called by the Romans the testudo. 5. The spina or agger, which was faced with stone, and raised higher than the wall; 6. Upon the spina were built the towers of wood; 7. Testudo, or other hurdles; 8. Catapulte, or extenterion, from which they threw arrows with amazing force; and 9. The scissur, or the poros, from which stones were cast with great velocity.

The principal warlike machines made use of by the Romans were, the ram, the lupus or wolf, the testudo or tortoise, the batteria, the catapultia, and the scorpion.

MACHINERY, in epic and dramatic poetry, is when the poet introduces the use of machines; or rings some supernatural being upon the stage, in order to solve some difficulty or to perform some exploit out of the reach of the human power.

The ancient dramatic poets never made use of machines, unless where there was an absolute necessity for it; whence the precept of Horace;

Non Deus intrexit, olep dignus vides pedes
Inciderit.

It is quite otherwise with epic poets, who introduce machines in every part of their poems; so that nothing is done without the intervention of the gods. In Milton's Paradise Lost, by far the greater part of the actors are supernatural personages: Homer and Virgil do nothing without them; and in Voltaire's Henriade, the poet has made use of St Louis.

As to the manner in which these machines should act, it is sometimes invisibly, by simple inspirations and suggestions; sometimes by actually appearing under some human form; and, lastly, by means of dreams and oracles, which partake of the other two. However, all these should be managed in such a manner as to keep within the bounds of probability.

MACHUL, an instrument of music among the Hebrews. Kircher apprehends that the name was given to two kinds of instruments, one of the stringed and the other of the pulsatile kind. That of the former had six chords: though there is great reason to doubt whether an instrument requiring the aid of the hair bow, and so much resembling the violin, be so ancient. The second kind was of a circular form, made of metal, and either hung round with little bells, or furnished with iron rings suspended on a rod or bar that passed across the circle. Kircher supposes that it was moved to and fro by a handle fixed to it, and thus emitted a kind of murmur.

MACHYNLETH, a town of Montgomeryshire in North Wales, 198 miles from London, and 32 from Montgomery. It is an ancient town; and has a market on Mondays, and fays on May 16, June 26, July 9, September 18, and November 25, for sheep, horned cattle, and horses. It is seated on the river Dove, over which there is a large stone bridge, which leads into Merionethshire. It was here that Owen Glyndwr exercised the first acts of his royalty in 1402.
MACKEY (John), an Englishman, employed by the government as a spy upon James II. after the revolution, was author of Memoirs of James's court at St Germaine, and of the court of England in the reigns of William III. and queen Anne; in which are many curious anecdotes not to be met with in any other work. He died in 1726.

MACLAURIN (Colin), a most eminent mathematician and philosopher, was the son of a clergyman, and born at Kilmoddan in Scotland in 1698. He was sent to the university of Glasgow in 1709; where he continued five years, and applied himself to study in a most intense manner. His great genius for mathematical learning discovered itself so early as at twelve years of age; when, having accidentally met with an Euclid in a friend's chamber, he became in a few days master of the first six books without any assistance: and it is certain, that in his 16th year he had invented many of the propositions which were afterwards published under the title of Geometria organica. In his 15th year he took the degree of master of arts; on which occasion he composed and publicly defended a thesis On the power of Gravity, with great applause. After this he quitted the university, and retired to a country-seat of his uncle, who had the care of his education; for his parents had been dead some time. Here he spent two or three years in pursuing his favourite studies; but, in 1717, he offered himself a candidate for the professorship of mathematics in the Marischal college of Aberdeen, and obtained it after a ten days trial with a very able competitor. In 1719, he went to London, where he became acquainted with Dr Hoadly then bishop of Bangor, Dr Clarke, Sir Isaac Newton, and other eminent men; at which time also he was admitted a member of the Royal Society: and in another journey in 1721, he contracted an intimacy with Martin Folkes, Esq. the president of it, which lasted to his death.

In 1722, lord Bolingbroke, plenipotentiary of the king of Great-Britain at the congress of Cambrai, engaged him to go as a tutor and companion to his eldest son, who was then to set out on his travels. After a short stay at Paris, and visiting other towns in France, they fixed in Lorraine; where Maclaurin wrote his piece On the Persecution of Bodies, which gained the prize of the royal academy of sciences for the year 1724. But his pupil dying soon after at Montpellier, he returned immediately to his profession at Aberdeen. He was hardly settled here, when he received an invitation to Edinburgh; the curators of that university being desirous that he should supply the place of Mr James Gregory, whose great age and infirmities had rendered him incapable of teaching. He had some difficulties to encounter, arising from competitors, who had good interest with; but the university, and also from the want of an additional fund for the new professor; which however at length were all surmounted, principally by the means of Sir Isaac Newton. In Nov. 1725, he was introduced into the university; as was at the same time his learned colleague and intimate friend, Dr Alexander Monro, professor of anatomy. After this, the mathematical classes soon became very numerous, there being generally upwards of 100 young gentlemen attending his lectures every year; who being of different standings and proficiency, he

MACKENZIE, (Sir George), an able lawyer, a polite scholar, and a celebrated wit, was born at Dundee in the county of Angus in Scotland in 1656, and studied at the universities of Aberdeen and St Andrew's; after which he applied himself to the civil law, travelled into France, and professed his study in that faculty for about three years. At his return to his native country, he became an advocate in the city of Edinburgh; and soon gained the character of an eminent pleader. He did not however, suffer his abilities to be confined entirely to that province. He had a good taste for polite literature; and he gave the public, from time to time, incontrovertible proofs of an uncommon proficiency therein. He had practised but a few years, when he was promoted to the office of a judge in the criminal court; and, in 1674, was made king's advocate, and one of the lords of the privy council in Scotland. He was also knighted by his majesty. In these stations he met with a great deal of trouble, on account of the rebellions which happened in his time; and his office of advocate requiring him to act with severity, he did not escape being cenfured, as if in the deaths of some particular persons who were executed he had stretched the laws too far. But there does not seem to have been any just foundation for this clamour against him; and it is generally agreed, that he acquitted himself like an able and upright magistrate. Upon the abrogation of the penal laws by king James II. our advocate, though he had always been remarkable for his loyalty, and even cenfured for his zeal against traitors and fanatics, thought himself obliged to resign his post; being convinced, that he could not discharge the duties of it in that point with a good conscience. But he was soon after restored, and held his offices till the revolution; an event which, it seems, he could not bring himself to approve. He had hoped that the prince of Orange would have returned to his own country, whom the matters were adjusted between the king and his subjects; and upon his leaving otherwise, he quitted all his employments in Scotland, and retired into England, resolving to spend the remainder of his days in the university of Oxford. He arrived there in September 1689, and professed his studies in the Bodleian library, being admitted a student there by a grace passed in the congregation, June 2. 1690. In the spring following, he went to London; where he fell into a disorder, of which he died in May 1691. His corpse was conveyed by land to Scotland, and interred there with great pomp and solemnity. "The University of his learning and the frugality of his life, were (says the reverend Mr Granger) conspicuous in all his pleadings, and those in his ordinary conversation." Mr Dryden acknowledged, that he was unacquainted with what he calls the beautiful turn of words and thoughts in poetry, till they were explained and exemplified to him in a conversation with that noble wit of Scotland Sir George Mackenzie. - He wrote several pieces of history and antiquities; institutions of the laws of Scotland; Essays on various subjects, &c. His works were printed together at Edinburgh in 1716, in 2 vols folio.
Macaulin was obliged to divide them into four or five classes, in each of which he employed a full hour every day, from the first of November to the first of June.

He lived a bachelor to the year 1733; but being not less formed for society than for contemplation, he then married Anne, the daughter of Mr. Walter Stewart, solicitor-general to his late majesty for Scotland.

By this lady he had seven children, of whom two sons and three daughters, together with his wife, survived him. In 1734, Berkeley, bishop of Cloyne, published a piece called "The Analyst," in which he took occasion, from some disputes that had arisen concerning the grounds of the fluxional method, to explode the method itself, and also to charge mathematicians in general with infidelity in religion. Macaulin thought himself included in this charge, and began an answer to Berkeley's book: but, as he proceeded, so many discoveries, so many new theories and problems occurred to him, that instead of a vindicatory pamphlet, his work came out, a complete system of Fluxions, with their application to the most considerable problems in geometry and natural philosophy. This work was published at Edinburgh in 1742, 2 vols 4to; and as it cost him infinite pains, so it is the most considerable of all his works, and will do him immortal honour. In the mean time, he was continually obliging the public with some performance or observation of his own; many of which were published in the fifth and sixth volumes of the "Medical Essays" at Edinburgh. Some of them were likewise published in the Philosophical Transactions; as the following: 1. Of the construction and measure of curves, No. 336. 2. A new method of describing all kinds of curves, No. 359. 3. A letter to Martin Folkes, Esq.; on equations with impossible roots, May 1726, No. 394. 4. Continuation of the same, March 1729, No. 408. 5. December the 21st, 1732, on the description of curves; with an account of farther improvements, and a paper dated at Nancy, Nov. 27, 1732, No. 439. 6. An account of the treatise of fluxions, Jan. 27, 1742, No. 457. 7. The same continued, March 16, 1742, No. 459. 8. A rule for finding the meridional parts of a sphereoid with the same exactness as of a sphere, August 1741, No. 461. 9. Of the basis of the cells wherein the bees depose their honey; Nov. 3, 1734, No. 471.

In the midst of these studies, he was always ready to lend his assistance in contriving and promoting any scheme which might contribute to the service of his country. When the earl of Morton fret out in 1739 for Orkney and Shetland, to visit his estates there, he desired Mr. Macaulin to assist him in settling the geography of those countries, which is very erroneous in all the maps; to examine their natural history, to survey the coasts, and to take the measure of a degree of the meridian. Macaulin's family affairs, and other connections, would not permit him to do this; he drew, however, a memorial of what he thought necessary to be observed, furnished the proper instruments, and recommended Mr. Short, the famous optician, as a fit operator for the management of them. He had still another scheme for the improvement of geometry and navigation, of a more extensive nature; which was the opening a passage from Greenland to the South Sea by the north pole. That such a passage might be found, he was so fully persuaded, that Macaulin, he has been heard to say, if his situation could admit of such adventures, he would undertake the voyage, even at his own charge. But when schemes for finding it were laid before the parliament in 1744, and himself consulted by several persons of high rank concerning them, before he could finish the memorials he proposed to send, the premium was limited to the discovery of a North-west passage; and he used to regret, that the word West was inferred, because he thought that passage, if at all to be found, must lie not far from the pole.

In 1745, having been very active in fortifying the city of Edinburgh against the rebel army, he was obliged to fly from thence to the north of England; where he was invited by Herring, then archbishop of York, to reside with him during his stay in that country. In this expedition, however, being exposed to cold and hardships, and naturally of a weak and tender constitution, he laid the foundation of an illness which put an end to his life, in June 1746, at the age of 48.

Mr. Macaulin was a very good man as well as a very great man, and worthy of love as well as admiration. His peculiar merit as a philosopher was, that all his studies were accommodated to general utility; and we find, in many places of his works, an application even of the most abstruse theories, to the perfecting of mechanical arts. He had resolved, for the same purpose, to compose a course of practical mathematics, and to rescue several useful branches of the science from the bad treatment they often met with in leisuré hands. But all this his death prevented; unless we should reckon, as a part of his intended work, the translation of Dr. David Gregory's "Practical Geometry," which he revised, and published with additions, 1745.

In his lifetime, however, he had frequent opportunities of serving his friends and his country by his great skill. Whatever difficulty occurred concerning the constructing or perfecting of machines, the working of mines, the improving of manufactures, the conveying of water, or the execution of any other public work, he was at hand to resolve it. He was likewise employed to terminate some disputes of consequence that had arisen at Glasgow concerning the gauging of vessels; and for that purpose preferred to the commissioners of excise two elaborate memorials, with their demonstrations, containing rules by which the officers now act. He made also calculations relating to the provision, now established by law, for the children and widows of the Scots clergy, and of the professors in the universities, intituting them to certain annuities and sums, upon the voluntary annual payment of a certain sum by the incumbent. In contriving and adjusting this wise and useful scheme, he bestowed a great deal of labour, and contributed not a little towards bringing it to perfection. It may be said of such a man, that "he lived to some purpose," which can hardly be said of those, who uncommonly forever their abilities and attainments, who spend their whole time in abstract speculations, and produce nothing to the real use and service of their fellow creatures.

Of his works we have mentioned his Geometria Organica, in which he treats of the description of curve lines by continued motion. We need not repeat what has
MACRIN (Salmon), one of the best Latin poets of the 16th century, was born at London. His true name was John Salmon; but he took that of Macrin, from his being frequently so called in ridicule by Francis I. on account of his extraordinary leanings. He was preceptor to Cladius of Savoy, count of Tenda; and to Honorius the count’s brother; and wrote several pieces of poetry in Latin, which were so admired, that he was called the Horace of his time. He died of old age, at London, in 1555. Charles Macren, his son, was not inferior to him as a poet, and surpassed him in his knowledge of the Greek tongue. He was preceptor to Catharine of Navarre, the sister of Henry the Great; and perished in the massacre on St Bartholomew’s day in 1572.

MACROBI, a people of Ethiopia, celebrated for their justice, and the innocence of their manners, also a people in the island Moro. The Hyperboreans were also called Macrobi: They generally lived to their 120th year; and from their longevity they obtained their name (mareus signum longae suae. vel Sig.)
MACROBIUS (Ambrosius Aurelius Theodosius), an ancient Latin writer, who flourished towards the latter part of the fourth century.

Of what country he was, is not clear: Erasmus, in his Ciceronianus, opines that he was a Greek; and he himself tells us, in the preface to his Saturnalia, that he was not a Roman, but laboured under the inconveniences of writing in a language which was not natural to him. Of what religion he was, Christian or Pagan, is uncertain. Bartholin ranks him among the Christians; but Spanheim and Fabricius suppose him to have been a heathen. This, however, is certain, that he was a man of confiderable dignity, and one of the chamberslains or ministers of the wardrobe to Theodosius; as appears from a refcript directed from Florentius, concerning those who were to obtain that free audience. Theodofius, as appears from a refcript directed by Firmian, concerning those who were to obtain that free audience from the Emperor, is uncertain. Barihius ranks him among the Christians; as appears from a refcript directed by Firmian, concerning those who were to obtain that free audience from the Emperor. For my view in this present work is, not to give proofs or universal truths, but to be useful to be known. I shall therefore here imitate the barony of Muskerry, county of Cork, and instance the bees, who suck the best honey from all sorts of flowers, and afterwards work them up into various forms. Later editions, a piece intituled, "De Differentiis et Societatis Libri," has been added, in the later editions, a piece intituled, De Differentiis et Societatis Libri. 

MACROCEPHALUS, or Macroccephalus, (from the Greek, "great," and "head," denotes a person with a head larger or longer than the common size. Macroccephaloi, or Long-heads, is a name given to a certain people, who, according to the accounts of authors, were famous for the uncommon length of their heads: they customarily bore them thus, that instead of looking on it as a deformity, they esteemed it a beauty, and, as soon as the child was born, moulded and fashioned its head in their hands to give it a length as possible, and afterward used all such rollers and bandages as might seem most likely to determine its growth long. The greater part of the illadgers in the Archipelago, some of the people of Asia, and even some of those of Europe, still prefer their children heads out lengthwise. We may observe also, that the Epirots, many people of America, &c. are all born with some singularity in the conformation of their heads, either a flattens on the top, two extraordinary protruberances behind, or one on each side; singularities which we can only regard as an effect of an ancient and strange mode, which at length is become hereditary in the nation. According to the report of many travellers, the operation of compressing the head of a child lengthwise, while it is yet fat, is with a view intemibly to enlarge the interval between the two eyes, so that the visual rays turning more to the right and left, the fight would embrace a much larger portion of the horizon; the advantage of which they are well acquainted with, either in the constant use of hunting, or on a thousand other occasions. Ever since the 16th century, the missionaries established in the countries inhabited by the savages of America, have endeavoured to destroy this custom; and we find in the leflions of the third council of Lima, held in 1585, a canon which expressly prohibits it. But if it has been repressed one way, the free negroes and Maroons, although Africans, have adopted it, since they have been established among the Caribs, boldly with the view of distinguishing their children, which are born free, from those who are born in slavery. The Omaquas, a people of South America, according to F. Veigh, prefers the heads of their children so violently between two planks that they become quite sharp at the top, and flat before and behind. They say they do this to give their heads a greater resemblance to the moon.

MACROERCI, a name given to that class of animals which have tails longer than their bodies.

MACROCOLUM, or Macrocolum (formed of macrose, "large," and column, "I join," among the Romans, the largest kind of paper then in use. It measured sixteen inches, and frequently two feet.

MACROCOSM, a word denoting the great world or universe. It is compounded of the Greek words macro, "great," and cosmos, "world.

MACROMPYRENIUM. MACROMPYRENIUM, or Macrompyreum, a town of Ireland, in the barony of Mulberry, county of Cork, and province of Munster, 142 miles from Dublin; it is situated amongst hills, in a dry gravelly limestone soil. This place is said to take its name from an old crooked oak, so called in Irish, which formerly grew here. The castle was first built in King John's time, soon after the English conquest, (according to Sir Richard Cox) by the Carew family, but others attribute it to the Daltons. It was repaired and beautified by Tegue Macarry, who died in the year 1565, and was father to the celebrated Sir Cormac MacTegue mentioned by Camden and other writers as an active person in Queen Elizabeth's time. Sir George Macarry, the last owner of Glanmore, altered this castle into a more modern structure, it being burnt down in the wars of 1641. Opposite to the bridge, is the parochial church, dedicated to St Colman of Clone. Here is a barrack for a foot company, a market house, and handsome Roman Catholic chapel. A considerable number of persons have been employed in this town in combing wool and spinning yarn, and some flax works have been erected here. At half a mile's distance is a spa, that rises on the very brink of a bog; its waters are a mild chalybeate, and are accounted serviceable in hypochondriacal cases, and in cutaneous eruptions. The fairs are four in the year.

MACROPYRENIUM, in natural history, a genus of fossils consisting of crusted septarian, with a long nucleus standing out at each end of the mafs.

MACROTELOSTYLA, in natural history, the name of a genus of crystals, which are composed of two pyramids joined to the end of a column; both the pyramids, as also the column, being hexagonal, and...
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MADAGASCAR, the largest of the African islands, is situated between 23° and 51° of E. Long., and between 12° and 26° of S. Lat.; extending in length near 3000 miles from north-north-east to south-south-west, and about 300 in breadth where broadest. It was discovered in 1506 by Laurence Almeida; but the Peruvians and the Arabs were acquainted with it from time immemorial under the name of Serandi.

Alphonso Almeida ordered Ray Peres da Continato to visit the interior parts, and that general instructed Tristan d’Acunha with the survey. The Portuguese called it the island of St. Lawrence; the French, who visited it in the reign of Henry IV. named it île Dauphine; its proper name is Madagascar. It is now, however, by common consent called Madagascar.

This large island, according to many learned geographers is the Céme of Pliny, and the Menuthutau of Ptolemy. It is every where watered by large rivers, streams, and rivulets, which have their source at the foot of that long chain of mountains which runs through the whole extent of the island from east to west. The two highest promontories are called Vida-gara and Béchime.

These mountains, according to the Abbe Rochon, incline within their bosoms a variety of precious minerals and useful fossils. The traveller (who for the first time rambles over savage and mountainous countries, intersected with valleys and with hills, where nature left herself brings forth the most singular and the most varied productions) is involuntarily surprised and terrified at the sight of precipices, the summits of which are crowned with monstrous trees, that seem coeval with the world. His astonishment is redoubled at the noise of those grand cascades, the approach to which is generally inaccessible. But to those views so sublimely picturesque, rural scenes soon succeed; he little hills, gently rising grounds, and plains, the vegetation of which is never repelled by the intemperance or the vicissitudes of the season. The eye contemplates with pleasure those vast savannas which nourish numberless herds of bullocks and of sheeps. You behold a flourishing agriculture, produced almost solely by the fertilizing womb of nature. The fortunate inhabitants of Madagascar do not bedew the earth with their sweat; they fearce stir the ground with a rake, and even that slightest preparation is sufficient. They scrape little holes at a small distance from each other, into which they scatter a few grains of rice, and cover them with their feet; and so great is the fertility of the soil, that the lands found in this careless manner produce an hundred fold.

The forests present a prodigious variety of them useful and the most beautiful trees; ebony, wood dyed, bamboos of an enormous thicknes, and palm trees of every kind. The timber employed in ship-building is no less common than those kinds so much prized by the cabinet-maker. We are told by the French governor Flacourt, in his history of this island, that in the year 1650 he sent to France 52,000, weight of aloes of an excellent quality. All of these various trees and shrubs are surrounded by an infinite number of parasitical plants: mushrooms of an infinite diversities of kinds and colours are to be met with everywhere in the woods; and the inhabitants know well how to distinguish those which are prejudicial to the health. They collect large quantities of useful gums and resins; and out of the milky sap of a tree, denominated by them singuere, the inhabitants by means of coagulation, make that singular substance known to naturalists by the name of gum elasie. (See Caoutchouc and Jatropha.)

Besides the aromatic and medicinal herbs which abound in the forests, the island produces flax and hemp of a length and strength which surpass any in Europe. Sugar canes, wax, honey of different kinds, tobacco, indigo, white pepper, gum lac, ambergris, silk, and cotton, would long since have been objects of commerce, which Madagascar would have yielded in profusion, if the Europeans, in visiting the island, had furnished the inhabitants with the necessary information for preparing and improving these several productions.

The sugar canes (as we are informed by another traveller) are much larger and finer than any in the West Indies; being as thick as a man’s wrist, and so full of juice, that a foot of them will weigh two pounds. When the natives travel, they carry a sugar cane along with them, which will support them for two or three days. Here are also plenty of tamarinds; and such quantities of limes and oranges, that very large casks may be filled with their juices at a trifling expense, as they may be purchased for iron-ports, muskets, powder, ball, &c. During the short time that Admiral Watson’s squadron stayed here in 1754, Mr Ives preferred about half a hoghead full of those juices, which proved afterwards of the greatest service to the ships crews. It must be observed, however, that no good water is to be had at St Augufine in the south-west part of the island, where ships usally touch, unless boats are sent for it four or five miles up the river; and instead of filling their casks at low water (as is the case in most other rivers), they must begin to fill at

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about a quarter's flood: The reason assigned for this is, that the river has a communication with the sea at other places besides this of St Augustine's bay; and it has been found by experience, that the sea-water brought into the river by the flood-tide is not discharged till a quarter's flood of the next tide in St Augustine's bay, and for three miles up the river, the water is always very brackish, if not quite salt.

The abundance and variety of provisions of every kind, which a fine climate and fertile soil can produce, are on no part of the globe, according to M. Rochon, superior to those of Madagascar: game, wild-fowl, poultry, fish, cattle, and fruits, are alike plentiful. The oxen, Mr Ives also informs us, are large and fat, and have each a protuberance of fat between the shoulders, weighing about 20 pounds. Their flesh is greatly esteemed by all the European nations trading to India, and ships are sent to Madagascar on purpose to kill and salt them on the island. The protuberance of fat aforesaid is particularly esteemed after it has lain some time in salt; but our author says, that he could not join in the encomiums either on this piece or the beef in general; as the herbage on which the creatures feed gives their flesh a particular taste, which to him was disagreeable. The sheep differ little from the goats; being equally hairy, only that their heads are somewhat larger: their necks resemble that of a calf, and their tails weigh at least ten pounds. Vast quantities of locusts rise here from the low lands in thick clouds, extending sometimes to an incredible length and breadth. The natives eat these insects, and even prefer them to their finest fish. Their method of dressing them is to strip off their legs and wings, and fry them in oil.

The inhabitants (termed Melagaches or Malagaces), M. Rochon informs us, are in person above the middle size of Europeans. The colour of the skin is different in different tribes: among some it is of a deep black, among others tawny; some of the natives are of a copper colour, but the complexion of the greatest number is white. All those who are black have hair like the negroes of the coast of Africa: those, on the other hand, who resemble Indians or Mulattoes, have hair equally straight with that of the Europeans; the nose is not broad and flat; the forehead is large and open; in short, all the features are regular and agreeable. Their physiognomy displays the appearance of frankness and of satisfaction; they are devious only of learning such things as may minister to their necessaries; that species of knowledge which demands reflection is indifferent to them: sober, agile, active, they spend the greatest part of their time either in sleep or in amusement. In fine, according to the abbe, the natives of Madagascar, so far as we can judge in general, possess a character equally devoid of vice and virtue; the gratifications of the present moment solely occupy his reflections; he possesses no kind of foresight whatever; and he cannot conceive the idea that there are men in the world who trouble themselves about the evils of futurity.

The population of the island has been estimated at four millions; but this calculation is thought exaggerated by our author, and indeed it appears incredible to us. Every tribe or society inhabits its own canton, and is governed by its own customs. Each of these acknowledges a chief: this chief is sometimes elective, but more usually hereditary. The lands are not divided and portioned out, but belong to those who are at the trouble of cultivating them. These islanders make use of neither locks nor beards; the principal part of their food consists in rice, fish, and flesh; their rice is moistened with a soup which is seasoned with pimento, ginger, faffron, and aromatic herbs. They display wonderful cunning in catching a variety of birds, many of which are unknown in Europe: they have, the pheasant, the partridge, the quail, the pintado, the wild duck, seal of five or six different kinds; the blue hen, the black parroquet, and the turtle-dove, in great plenty; and also a bat of a monstrous size, which is much prized on account of its exquisite flavour. These last are so hideous in their appearance, that they at first terrify the European sailors; but after they have vanquished their repugnance to them, they prize their flesh infinitely before that of the pullet of their own country. The Melagaches also catch an immense quantity of sea-fish; such as the dorado, the sole, the herring, the mackerel, the turtle, &c. with oysters, crabs, &c. The rivers afford excellent eels, and mullets of an exquisite flavour.

The inhabitants near St Augustine's bay, Mr Ives informs us, speak as much broken English as enables them to exchange their provisions for European articles. These, on the part of the Melagaches, are cattle, poultry, milk, fruit, rice, salt, porcelain, potatoes, yams, fish, tallow, and felts. From the Europeans they receive muskets, powder, bullets, fillets, clouties (including handkerchiefs, and linen of all kinds), beads, iron pots, &c. Silver, which they call Monia, is in great esteem with them, and is made by them into bracelets for their wives.

That part of the island at which the English squadron touched, is the dominions of the king of Babas, who, by the account of Mr Ives, seemed greatly to affect to be an Englishman. They had no sooner touched at the islands, than they were waited on by one called Robin Hood, and another person, both of whom bore the office of puferi. Along with these were Philibey the general; John Anderson and Frederic Martin, captains. Nor did the king himself and his family disdain to pay them a visit; who in like manner, were distinguished by English names; the king's eldest son being called the prince of Wales, and the court not being without a duke of Cumberland, a prince Augufus, princes, &c. as in England. All these grandees came on board naked, excepting only a flight covering above their loins and on their shoulders, made of a kind of graft growing on the island; which they had adorned with small glass beads by way of border or fringe. Their hair resembled that of the Indians in being long and black, rather than the woolly heads of the African negroes. The wives of the Melagaches (according to our author) take great pains with their husbands' hair; sometimes putting it in large and regular curls; at other times braiding it in great order, and making it shine with a particular oil which the island produces. The men always carry in their hands a wooden hatchet headed with iron, which is commonly made very neat; and they are such excellent marksmen, that they will strike with it a very small
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small object at 30 or 40 yards distance. They have also commonly a musket, which they get from Europeans in exchange for cattle, and are always sure to keep it in excellent order. I am sorry to say (continues Mr Ives) that the English are frequently guilty of great impositions in this kind of traffic, by disposing of cheap and ill tempered barrels among the poor inhabitants, who sometimes lose their lives by the bursting of these pieces. Such iniquitous practices as these must in the end prove injurious to the nation; and has indeed already made the name of more than one half of these traders truly infamous among the delayed but hitherto friendly Madagascarians.

"They are a civil and good-natured people, but easily provoked, and apt to show their resentment on the least provocation, especially when they think themselves injured or ill-treated. Another characteristic of them is, the very high notions of dignity they entertain of their kings, which is carried to such a height, that they are never more sensibly struck by the elevation of others, than when they imagine he is treated with incivility or disrespect. This mighty monarch resides in a town built with mud, about 12 miles up the country from St Augustine's Bay. On the east side of the bay, as you enter, there reigned one Prince William, a relation and tributary to the king; but who in most cafes acted as an independent prince, and always used his utmost endeavours with the officers to cause them buy their provisions from him, and not from the king or his subjects. In this prince's territories, not far from the sea, are the remains of a fort built by Averey the Pirate.

"All the women of Madagascars, excepting the very poorest, wear a covering over their breasts and shoulders, ornamented with glass beads, and none go without a cloth about their loins. They commonly walk with a long slender rod or stick. The men are allowed to marry as many women as they can support.

"During our stay at this island (says Mr Ives), I observed, with great concern, several miserable objects in the last stage of the venereal disease. They had not been able to find any cure, and as far as I could learn, their doctors are totally ignorant of medicine. The only method they use for curing all distempers, as well external as internal, is the wearing on the arm or neck a particular charm or amulet; or befemearing the part affected with earth moistened with the juice of some plant or tree, and made up into a soft paste.

"I took some pains to learn their religious tenets; and find that they worship one Universal Father; whom, when they speak in English, they call God; and in whom they conceive all kinds of perfection to reside. The fun they look upon as a glorious body; and, I believe, as a spiritual being, but created and dependent. They frequently look up to it with wonder, if not with praise and adoration. They make their supplications to the One Almighty, and offer sacrifices to him in their ditties. I had the curiosity to attend a sacrifice, at the height of John Andreou, whose father had for a long time been afflicted with sickness. About sun-set an ox was brought into the yard; and the fon, who officiated as priest, slew it. An altar was rear'd nigh, and the post of it was sprinkled with the blood of the victim. The head, after its being severed from the body, was placed, Madagascarn with the horns on, at the head of the altar; the cauldron was burned on the fire, and most of the live and entrails boiled in a pot. The sick man, who was brought to the door, and placed on the ground so as to face the sacrifice, prayed often, and seemingly with great fervency. His eyes were fixed attentively towards the heavens, and his hands held up in a suppliant posture. The ceremony ended with the son's cutting up the ox into small pieces, the great part of which he distributed among the poor slaves belonging to his father and himself; referring, however, some of the best pieces for his own use. Upon the whole, I saw to many circumstances in the Madagascarian sacrifice, so exactly resembling those described in the Old Testament as offered up by the Jews, that I could not turn my thoughts back to the original, without being sensibly struck by the exactness of the copy."

"When the squadron first arrived at Madagascar, the king of Bâba, a man of about 60 years of age, was ill of the gout. Having demanded of admiral Watson some presents, the latter complimented him, among other things, with some brandy. The monarch then asked him if he had any doctor with him, and if he was a great doctor, and a king's doctor? To which being answered in the affirmative, he desired him to bring some Mahometes (medicines) for his sick knee. With this requisition Mr Ives designed to comply; but having waited until some officers should be ready to accompany him, his majesty, in the mean time, took such a dose of brandy as quickly sent the gout into his head, and occasioned his death. Mr Ives observes, that it happened very luckily for him that the monarch's disease happened without his having taken any of the medicines intended for him, as it would have been impossible to avoid the imputation of having poisoned him, which would certainly have been resented by his loyal subjects.

The king's death occasioned great confusion; the grandees being detinous that it should be concealed for some time. This, however, was found impossible; on which they set off for the Mad Town about 11 o'clock the same evening. All the inhabitants of the village followed their example; leaving only the dogs, who set up the most horrid howling. Captain Frederic Martin, coming to take leave of the English, begged with great earnestness for a fresh supply of gunpowder; whispering that the king was dead, and that they should in all probability go to war about making another. They had been formerly told, that one who had the title of duke of Bâba would certainly succeed to the throne; but they afterwards learned, that Philippey the general having espoused the cause of Kaphami the late king's son, and taken him under his tutelage and protection, this youth, who was only about 16 years of age, succeeded his father as king of Bâba.

The following is a description of the southern division of the island, from the Abbe Rochon.

"That part of Madagascar in which fort Dauphin is situated is very populous. Almost all the villages are placed on eminences, and surrounded with two rows of strong palisadoes, somewhat in the manner of such of our fences as are composed of hurdles and turf. Within, is a parapet of solid earth about four feet in height;"
MADAGASCAR

The Madagascars are a people with a rich history and culture. They have a unique language and customs that have evolved over centuries. The Madagascan language is a mix of African and Malagasy influences.

As to their kings and form of government, the Madagascars have always acknowledged the line of Ramini, or Ampanfacabe, as their sovereign. They have considered this line as the legitimate one since the death of Ramini, which occurred 66 years ago, and who was buried on a mountain, out of which the river Manangourou springs; but having acknowledged the son of this line, and the son of the female side, they re-established this title in the year 1779. The Ampanfacabe confides in nominating the Rohandrians to assist in the cabars, at which all those who are cited are bound to appear, and the judgment of the Ampanfacabe in his cabar is decisive.

Another prerogative of the Ampanfacabe is, that each Rohandrian is obliged to leave him by will a certain proportion of his property, which the successors usually purchase by a light tribute or fine. Thirdly, the Ampanfacabe has a right to exact from each Rohandrian one tenth of the produce of his land, and a number of horned cattle and slaves, in proportion to the riches of the country possessed by each Rohandrian.

In the second volume of Count Benyowsky's Memoirs and travels, we have the following account of the religion, government, &c. of the people of this island.

"The Madagascars believe in a Supreme Being, whom they call Zanahare, which denotes creator of all things. They honour and revere this Being, but have dedicated no temple to him, and much less have they substituted idols. They make sacrifices, by killing oxen and sheep, and these are of the following kind: for the piece of the sacrificed beast which is thrown into the fire is not intended in honour of the devil, as is usually pretended. This custom is very ancient, and no one can tell the true reason of it. With regard to the immortality of the soul, the Madagascars are convinced, that after their death, their spirit will return again to the region in which the Zanahare dwells, but by no means admit that the spirit of man, after his death, can suffer any evil. As to the distinction of evil or good, they are persuaded that the good and upright man shall be recompensed, in this life, by a good state of health, the confidence of his friends, the increase of his fortunes, the obedience of his children, and the happiness of beholding the prosperity of his family; and they believe that the wicked man's fate shall be the contrary to this. The Madagascars, upon this conviction, when they make oaths, add benedictions in favour of those who keep them, and curses against those who break them.

In this manner it is that they appeal to the judgment of Zanahare, in making agreements; and it has never been known, or heard of, that a native of Madagascar has broken his oath, provided it was made in the usual manner, which they say was prescribed by their forefathers.
MAD

Madagascar is composed of several villages. The fourth order consists of the Loehavohits, or chiefs of villages. The fifth order, Osdzazi, who are freemen, and compose the attendants or followers of the Rohandrians, Voadziri, or Loehavohits. The sixth order consists of Ombiasses, or learned men; and this order forms the warriors, workmen, physicians, and diviners: these last possess no charge. The seventh order consists of Ampurias or slaves.

Having made inquiries from Bobetoki passing to the northward, and as far as qapere, the report proved that there are 38 Rohandrians actually reigning, and 287 Voadziri. With respect to the Loehavohits, Osdzazi, and Ombiasses, it was not possible to obtain any accurate determination of their number. These orders prefer a regular gradation, respecting which it would be very difficult to give a detailed account. They live in the manner we read of concerning the ancient patriarchs. Every father of a family is priest and judge in his own house, though he depends upon the Loehavohits, who superintend his conduct. This last is answerable to his Voadziri, and the Voadziri to the Rohandrian.

The Madagascar people having no communication with the main land of Ethiopia, have not altered their primitive laws; and the language throughout the whole extent of the island is the same. It would be a rash attempt to determine the origin of this nation: it is certain that it consists of three distinct races, who have for ages past formed intermixtures which vary to infinity. The first race is that of Zafe, whose names such as Isaac, Reuben, and Jacob, &c. This race is of a brown colour. The second race is that of Zafarminis: with respect to this, some books which are extant among the Madagascar nation are contented with such as are necessary to make their moveables, tools, utensils, and arms for defence; to construct their dwellings, and the boats which are necessary for their navigation; and lastly, to fabricate cloths and stuffs for their clothing. They are deformed only by possessing the necessary supplies of immediate utility and convenience. The principal and most respected business is that of manufacture iron and steel. The artists in this way call themselves ampanas a vrbbe. They are expert in forging the ore, and forging utensils, such as hatchets, hammers, anvils, knives, spades, saws, razors, pinners, &c. They are very expert in this business, and make use of the rule, the plane, the compasses, &c. The sixth are the ompanavoviov, or rope-makers. They make their ropes of different kinds of bark of trees, and like wise of hemp.

The seventh, ampanalambo, or weavers. This business is performed by women only, and it would be reckoned disgraceful in a man to execute it. The embiere are the literary men and physicians, who give advice only. The heborovizi, are comedians and dancers.

The Madagascar people always live in society; that is to say, in towns and villages. The houses are surrounded by a ditch and palisades (as already mentioned), at the extremities of which a guard from 12 to 20 armed men is kept. The houses of private people consist of a convenient cottage, surrounded by several small ones: the master of the house dwells in the largest, and his women or slaves lodge in the smaller. These houses are built of wood, covered with leaves of the palm-tree or straw.

The houfes of the great men of the country are very spacious; each house is composed of two walls and four apartments: round about the principal house other smaller habitations are built for the accommodation of the women, and the whole family of the chief; but the slaves can stand in the light within them. Most of the houses inhabited by the Rohandrians are built with taste and admirable symmetry.

The French attempted to conquer and take possession of the whole island, by order, and for the use of their most Christian Majesties, Louis XIII. and XIV., and they maintained a footing on it from the year 1642 to 1657. During this period, by the most cruel treachery, they taught the native princes the barbarous traffic in slaves, by villainously telling the Dutch governor of Mauritius a number of innocent people, who had been afflicting them, in forming a settlement at Fort Dauphin.

The Abbe Rochon tells us, that the infallibility of the air in Madagascar determined his countrymen in 1664, to quit that method on finding, in order to establish themselves at so inconsiderable a place as the isle of Bourbon, which is scarcely perceptible in a map of the globe: but it is apparent, from the account of the French affairs on the island of Madagascar in 1661, when Placourt's narrative was published, that their ill treatment of the natives had raised such a general and formidable opposition to their residence in the country, that the French were obliged to abandon their possessions for other reasons than the unhealthy qualities of the climate. We have not room here for a detail of all the oppressive measures of the French, which the Abbe himself candidly censures in the strongest terms; but shall extract the following narrative, both because it is interesting in itself, and exhibits the causes and the means of their expulsion.

La Caze, one of the French officers employed by the governor of Fort Dauphin against the natives, was so successful in all his enterprises, that they called him Deaun Fou. The name of a chief who had formerly conquered the whole island. The French governor, jealous of his renown, treated him harshly, and refused to allow him the rank or honours due to his valour. The sovereign of the province of Angouleme, called Deaun Rajetat, taking advantage of his discontent, prevailed on him to become his general. Five Frenchmen followed him. Deaun Nong, the daun-
In order to free himself from the persecution of this priest, he removed with his family 70 or 80 miles up into the country, but he was soon followed by Father Stephen and another missionary, with their attendants. The chief, Manang, till received them civilly; but he intreated them no longer to insist on the conversion of him and his people, as it was impossible to oblige them to quit the customs and manners of their ancestors. The only reply which Father Stephen made to this intreaty, was by tearing off the veil, and the amulets and charms which the chief wore as sacred badges of his own religion; and, throwing them into the fire, he declared war against him and his nation.

This violence instantly cost him and his followers their lives: they were all massacred by order of Manang, who vowed the destruction of all the French in the island; in which intention they proceeded in a manner that has been related by an eye-witness, who was afterwards provincial commissary of Madageascar, in a narrative published at Lyons in 1722, intitled l'voyage de Madageascar. "Our yoke (says the abbe Rochon) was become odious and intupportable. Historians, for the honour of civilized nations, should bury in oblivion the afflicting narratives of the atrocities exercised on these people, whom we are pleased to call barbarous, treacherous, and deceitful, because they have revoluted against European adventurers, whose least crime is that of violating the sacred rights of hospitality."

It was about the year 1672 that the French were totally driven from the island of Madageascar; and no considerable attempts were made to form fresh establishments there till within these few years, by M. de Madavve, and by Count Renown, neither of which was attended with success, for reasons given by the Abbe, but which we have not room to detail.

MADDER. See RUBIA.

M. Maceror observes, that the Hollanders are obliged to the refugees from Flanders for the knowledge of manufacturing the root of madder; and that they generally cultivate it in fresh lands which have not been ploughed. The commodity, when manufactured, is distinguished into different kinds, as grape madder, bunch-madder, &c. The grape-madder is the heart of the root; the other, besides the heart, consists also of the bark and small fibres proceeding from the principal root: For that kind called grape-madder, the finest roots are picked out, the bark is separated at the mill, and the inside root kept moist in caiks for three or four years, which makes it more fit for dyeing than otherwise it would be. Unlefs madder be kept close in this manner, it is apt to spoil, and loses its bright colour in a great measure. It is yellow at first, but grows red and darker with age. It should be chosen of a fine saffron colour, in very hard lumps, and of a strong though not disagreeable smell.

The madder used for dyeing cottons in the East-Indies, is in some respects different from that of Europe.
The cultivated Madder.

Madder. rope. On the coast of Coromandel it has the name Madeiras, or chat, and grows wild on the coast of Malabar. The cultivated kind is imported from Vaoor and Tucorin, but the most esteemed is the Persian chat called also dunan. Another plant, called roge de chape, or colour-root, is also gathered on the coast of Coromandel; but this, though supposed to be a species of madder, is a kind of galium flore also, which however, gives a tolerable good colour to cotton. Another species of madder, called chine-buya, and chine-hazala, is cultivated at Kunder in the neighbourhood of Smyrna, and some other countries of Turkey in Asia. It is more esteemed than the best Zealand madder imported into these parts by the Dutch; and experiments have shown that it is superior to any other kind as a dyeing ingredient. The modern Greeks call this kind of madder lazar, and the Arabs favas. The fine colour of these madders, however, are by our author attributed to their being dried in the air, and not in floves. Another kind of madder is produced in Canada, where it is called tyffa-voyana; its qualities are nearly the same with the European kind.

The root of madder impregnates water with a dull red colour, and spirit of wine with a deep bright red. This root, when eaten by animals along with their food, tinges their urine, and their molt follic bones, of a deep red. Wool previously boiled in a solution of alum and tartar, receives from a hot decoction of madder and tartar a very durable but not a very beautiful red colour. Mr Margraaf (Berlin Mem. 1771), shows how a very durable lake of a fine red colour, fit for the purposes of painting, may be obtained from madder. This process is as follows: Take two ounces of the purest Roman alum, and dissolve it in three French quarts of distilled water that has boiled, and in a clean glazed pot. Set the pot on the fire; and when the water begins to boil, withdraw it, and add two ounces of the best Dutch madder. Boil the mixture once or twice; then remove it from the fire, and filter it through a double filter of paper not coloured. Let the liquor thus filtered stand a night to settle, and pour off the clear liquor into the glazed pot previously well cleaned. Make the liquor hot, and add to it gradually a clear solution of salt of tartar in water, till all the madder is precipitated. Filterate the mixture; and upon the red precipitate which remains upon the filter pour boiling distilled water, till the water no longer acquires a saline taste. The red lake is then to be gently dried. No other water, neither rain or river water, produces so good a colour as that which has been distilled, and the quantity required of this is considerable. The colour of the above precipitate is deep; but if two parts of madder be used to one part of alum, the colour will be still deeper: one part of madder and four parts of alum produces a beautiful rose colour.

MADEIRAS, a cluster of isles situated in the Atlantic ocean in W. Long. 16°, and between 32° and 33° N. Lat.—The largest of them, called Madeira, from which the rest take their name, is about 55 English miles long, and 10 miles broad; and was first discovered on the 22 of July, in the year 1419, by Joao Gonçalves Zarco, there being no historical foundation for the fabulous report of its discovery by one Machin an Englishman. It is divided into two capitanias, named Funchal and Masico, from the towns Madeiras, of those names. The former contains two judicatures, viz. Funchal and Calheta; the latter being a town with the title of a county, belonging to the family of Castello Mejhor. The second judicature likewise comprehends two judicatures, viz. Mexico (read Mazico) and San Vicente.

Funchal is the only citade or city in this island, which has also seven villas or towns; of which there are four, Calheta, Camara de Lobos, Ribeira Barba, and Ponta de Sol in the judicature of Funchal, which is divided into 26 parishes. The other three are in the judicature of Mexico, which consists of 17 parishes; these towns are called Mexico, San Vicente, and Santa Cruz.

The governor is at the head of all the civil and military departments of this island, of Porto-Santo, the Salvages, and the Ilhas Desartas; which last only contain the temporary huts of some fishermen, who resort thither in pursuit of their business.

The law-department is under the corregidor, who is appointed by the king of Portugal, commonly sent from Lisbon, and holds his place during the king’s pleasure. All causes come to him from inferior courts by appeal. Each judicature has a senate; and a juiz or judge, whom they choose, presides over them. At Funchal he is called Juiz do Pó; and in the absence, or after the death of the corregidor, acts as his deputy. The foreign merchants elect their own judges, called the Provisor, who is at the same time collector of the king’s customs and revenues, which amount in all to about 12,000l. Sterling. Far the greatest part of this sum is applied towards the salaries of civil and military officers, the pay of troops and the maintenance of public buildings. This revenue arises, first from the tenth of all the produce of this island belonging to the king, by virtue of his office as grand master of the order of Christ; secondly, from ten per cent. duties laid on all imports, provisions excepted; and lastly, from the eleven per cent. charged on all exports.

The island has but one company of regular soldiers of 100 men: the rest of the military force is a militia consisting of 3000 men, divided into companies, each commanded by a captain, who has one lieutenant under him and one ensign. There is no pay given to either the private men or the officers of this militia: and yet their places are much sought after, on account of the rank they which communicate. These troops are embarked once a year, and exercised once a month. All the military are commanded by the Sergeant Major. The governor has two Capitãos de Sal about him, who do duty as aids-de-camp.

The secular priests on the island are about 1200, many of whom are employed as private tutors. Since the expulsion of the Jesuits, no regular public school is to be found here; unless we except a seminary, where a priest, appointed for that purpose, instructs and educates ten students at the king’s expense. These wear a red cloak over the usual black gowns worn by ordinary students. All those who intend to go into orders, are obliged to qualify themselves by studying in the university of Coimbra, lately re-established by Portugal. There is also a dean and chapter at Madeira, with a bishop at their head, who...
MAD

MAD

**Madeira.** The income is considerably greater than the governor's; it consists of 110 pipes of wine, and of 40 muids of wheat, each containing 24 bushels; which amounts in common years to 3000l. Sterling. Here are likewise 60 or 70 Francian friars, in four monasteries, one of which is at Funchal. About 300 nuns live on the island, in four convents, of the order of Mercy, Sta. Clara, Incarnacao, and Dom Jefus. Those of the last mentioned institution may marry whenever they choose, and leave their monasticity.

In the year 1768, the inhabitants living in the 43 parishes of Madeira, amounted to 63,915, of whom there were 31,341 males and 32,572 females. But in that year 5243 persons died, and no more than 2199 children were born; so that the number of the dead exceeded that of the born by 3045. It is highly probable that some epidemic distemper carried off so disproportionate a number in that year, as the island would shortly be entirely depopulated if the mortality were always equal to this. Another circumstance concurs to strengthen this supposition namely, the excellence of the climate. The weather is in general mild and temperate; in summer, the heat is very moderate on the higher parts of the island, whether the better part of people retire for that reason; and in the winter the snow remains there for several days, whilst it is never known to continue above a day or two in the lower parts.

The common people of this island are of a tawny colour and well shaped though they have large feet, owing perhaps to the efforts they are obliged to make in climbing the craggy slopes of this mountainous country. Their faces are oblong, their eyes dark; their black hair naturally falls in ringlets, and begins to crisp in some individuals, which may perhaps be owing to intermarriages with negroes; in general, they are hard-featured, but not disagreeable. Their women are too frequently ill-favoured; and want the florid complexion, which, when united to a pleasingsemblage of regular features, gives our northern fair ones the superiority over all their sex. They are small, have prominent cheek-bones, large feet, an ungraceful gait, and the colour of the darkest brunette. They have no just proportion of the body, the fine form of their hands, and their large, lively eyes, seem in some measure to compensate for those defects. The labouring men, in summer, wear linen trowsers, a coarse shirt, a large hat, and boots; some have a short jacket made of cloth, and a long cloak, which they sometimes carry over their arm. The women wear a petticot, and a short corselet or jacket, closely fitting their shapes, which is a simple, and often not an elegant dress. They have also a short, but wide cloak; and those that are unmarried tie their hair on the crown of their head, on which they wear no covering.

The country people are exceedingly sober and frugal their diet in general consisting of bread and onions or other roots, and little animal-food. However, they avoid eating tripe, or any offals, because it is proverbially said of a very poor man, "He is reduced to eat tripe." Their common drink is water, or an infusion of the remaining rind or skin of the grape (after it has passed through the wine-preits), which when fermented acquires some tartness and acidity, but cannot be kept very long. The wine for which the Madeira island is so famous, and which their own hands prepare, is sold at a price.

Their principal occupation is the planting and raising of vines; but as that branch of agriculture requires little attendance during the greatest part of the year, they naturally incline to idleness. The warmth of the climate, which renders great provision against the inclemencies of weather unnecessary, and the ease with which the cravings of appetite are satisfied, must tend to idleness, wherever the regulations of the legislature do not counteract it, by endeavouring, with the prospect of increasing happiness, to infuse the spirit of industry. It seems the Portuguese government does not pursue the proper methods against this dangerous lethargy of the state. They have lately ordered the plantation of olive trees here, on such spots as are too dry and barren to bear vines; but they have not thought of giving temporary assistance to the labourers, and have offered a premium by which these might be induced to conquer their reluctance to innovations and aversion to labour.

The vineyards are held only on an annual tenure, and the farmer reaps but four-tenths of the produce, since four other tenths are paid in kind to the owner of the land, one tenth to the king, and one to the clergy. Such small profits, joined to the thoughts of toiling merely for the advantage of others, if improvements were attempted, entirely preclude the hopes of a future increase. Oppressed as they are, they have however preserved a high degree of cheerfulness and contentment; their labours are commonly alleviated with songs, and in the evening they assemble from different cottages to dance to the drowsy music of a guitar.

The inhabitants of the towns are more ill-favoured than the country-people, and often pale and lean. The men wear French clothes, commonly black, which do not seem to fit them, and have been in fashion in the polite world about half a century ago. Their ladies are delicate, and have agreeable features: but the seamen and common people are of a kind which the Madeira soil of the whole island is large: branches rise every-where from the sea towards the summit of the island, converging to the summit, in the midst of which is a depression or excavation, called the vale by the inhabitants, always covered with a fresh and delicate herbage. The flowers on the island seem to have been in the fire, are full of holes, and of a blackish colour; in short the greater part of them are lava. A few of them are of the kind which the Derbyshire miners call dunstone. The soil of the whole island is a tarras mixed with some particles of clay, lime, and sand, and has much the same appearance as some earths on the isle of Ascension. From this circumstance, and from the excavation of the summit on the mountain, it is probable that in some remote period
A volcano has produced the lava and the obsidional particles, and that the Val was formerly its crater.

Many brooks and small rivulets descend from the summits in deep channels or gullies, which separate the various parts of the island. The beds of the brooks are in some places covered with stones of all sizes, carried down from the higher parts by the violence of winter-floods or floods of melted snow. The water is conducted by ways and channels in the vineyards, where each proprietor has the use of it for a certain time; some being allowed to keep a constant supply of it, some to use it thrice, others twice, and others only once a-week. As the heat of the climate renders this supply of water to the vineyards absolutely necessary, it is not without great expense that a new vineyard can be planted; for the maintenance of which, the owners must purchase water at a high price, from those who are constantly supplied, and are thus enabled to spare some of it.

Wherever a level piece of ground can be contrived in the higher hills, the natives make plantations of eddoes, enclosed by a kind of dike to cause a stagnation, as that plant succeeds best in swampy ground. Its leaves serve as food for hogs, and the country-people use the roots for their own nourishment.

The sweet potato is planted for the fame purpose, and makes a principal article of diet; together with chestnuts, which grow in extensive woods, on the higher parts of the island, where the vine will not thrive. Wheat and barley are likewise found at Madeira; and their quadrupeds encroache, with great advantage; but supposing husbandry to be carried on with as much facility as in their garden; they had therefore placed a brass-kettle in the ground to catch them, as they are constantly running about in quest of food. In this manner they daily caught hundreds, which could not get out on account of the smooth sides of the kettle, but were forced to perish.

The animals of the feathered tribe, which live wild here, are more numerous than the wild quadrupeds; there being only the common hare, the smooth hares, and the hare of the kettle, but in the town they use a sort of drays or sledges, formed of two pieces of plank joined by crofs pieces, which make an acute angle before; these are drawn by oxen, and are used to transport casks of wine, and other heavy goods, to and from the warehouses.

The animals of the feathered tribe, which live wild here, are more numerous than the wild quadrupeds; there being only the common grey rabbit here, a representative of the last-mentioned class. Some birds, such as turkeys, geese, ducks, and hens, are very rare, which is perhaps owing to the scarcity of corn.

There are no snakes whatsoever in Madeira; but all the housetops, vineyards, and gardens, swarm with lizards. The friars of one of the convents complained to Mr. Forster, that these vermin destroyed the fruit in their garden; they had therefore placed a brass-kettle in the ground to catch them, as they are constantly running about in quest of food. In this manner they daily caught hundreds, which could not get out on account of the smooth sides of the kettle, but were forced to perish.

The shores of Madeira, and of the neighbouring Salvages and Defertas, are not without fish; but as they are not in plenty enough for the rigid observance of
of Lent, pickled herrings are brought from Gottenburg in English bottoms, and salted cod from New York and other American ports, to supply the deficiency. MADIAN, (anc. geog.) a town of Arabia Petraea, near the Arman; so called from one of the sons of Abraham by Ketura, in ruins in Jerome’s time. Jerome mentions another MADIAN, or MIDIAN, beyond Arabia, in the desert, to the south of the Red Sea: and hence Madianites; and Madianites, the people; and Madianae Rige, the country.

MADNESS, a most dreadful kind of delirium, without fever. See (the Index subjoined to) Medicine.

MADOX (Dr Isaac), an ingenious and worthy prelate, born of obscure parents about the year 1696, who placed him apprentice to a pastry-cook; but not relishing this employment, and having an inclination to learning, he was put to school by some friends, and completed his studies at Aberdeen. He entered into orders; and having the good fortune to be made chaplain to Dr Bradford bishop of Chichester, he married his niece, a very sensible and worthy lady. From this time his preferment may be dated; he was made king’s chaplain, clerk of the closet to queen Caroline, and about the year 1736 bishop of St Asaph; from whence, in 1743, he was translated to Worcester. He was an excellent preacher, and a great promoter of public charities; particularly the Worcester infirmary, and the hospital for inoculating the small-pox at London: his sermon in favour of this latter institution, preached in 1755, was much admired, and contributed greatly to extend the practice of inoculation. He published some other fingle sermons, and a Defence of the Doctrine and Discipline of the Church of England, in answer to Mr. Neale’s History of the Puritans.—Dr Madox died in 1759.

MADRAS. See St George.

MADRE DE DIOS, a town and convent of South America, in Terra Firma, seated on the river Grande. It is almost as much referred to by pilgrims of America as Loreto is in Europe; and the image of the Virgin Mary is said to have done many miracles in favour of the faa-faring people. W. Lon. 76° o. N. Lat. 11° o.

MADREPOR, in natural history, the name of a genus of submersion substances; the characters of which are, That they are almost of a stony hardness, resembling the corals, and are usually divided into branches, and pervious by many holes or cavities, which are frequently of a stellar figure.

In the Linnean system, this is a genus of lithophyta: The animal that inhabits it is the Medula; it comprehends 39 species. According to Donati, the madrepore is like the coral as to its hardnes, which is equal to bone or marble; the colour is white when polished; its surface is lightly wrinkled, and the wrinkles run lengthwise of the branches; in the centre there is a sort of cylinder, which is often pierced thro’ its whole length by two or three holes. From this cylinder are detached about 17 laminae, which run to the circumference in straight lines; and are transversely intersected by other laminae, forming many irregular cavities; the cells, which are composed of these laminae ranged into a circle, are the habitations of little polypes, which are extremely tender animals, generally transparent, and variegated with beautiful colours. M. de Peyssonel observes, that those writers who only considered the figures of submersion substances, denominated that class of them, which seemed pierced with holes, por; and thofe, the holes of which were large, they called madrepore. He defines them to be all those marine bodies which are of a stony subinance, without either bark or crust, and which have but one apparent opening at each extremity, furnished with rays that proceed from the centre to the circumference. He observes that the body of the animal of the madrepore, whose flesh is so soft that it divides upon the gentlest touch, fills the centre; the head is placed in the middle and surrounded by several feet or claws, which fill the intervals of the partitions observed in this substance, and are at pleasure brought to its head, and are furnished with yellow papillae. He discovered that its head or centre was lifted up occasionally above the surface, and often contracted and dilated itself like the pupil of the eye: he saw all its claws moved, as well as its head or centre. When the animals of the madrepore are destroyed, its extremities become white. In the madrepore, he says, the animal occupies the extremity; and the substance is of a stony but more loose texture than the coral. This is formed, like other substances of the same nature, of a liquor which the animal discharges; and he further adds, that there are some species of the polyple of the madrepore which are produced singly, and others in clusters.

MADRID, a town of New Castile in Spain, and capital of the whole kingdom, though it never had the title of a city, is situated in W. Long. 3° 5. N. Lat. 40° 25. It stands in the centre of a large plain, surrounded with mountains, and in the very heart of Spain, on the banks of the little river Manzanares, which is always very low and shallow, except when it is swelled by the melting of the snow on the mountains. The city is in general well laid out; the streets are very handsome; and the houses are fair and lofty, but built of brick, with lattice-windows, excepting those of the rich, who have glafs in their windows; only, during the summer-heats, they ufe gauze, or some such thin stuff, instead of it, to let in the fresh air. There are two flatly bridges here over the Manzanares, a great many magnificent churches, convents, hospitils, and palaces. The royal palace, which stands on the west side of the town, on an eminence, is magnificent, and magnificent, consisting of three courts, and commanding a fine prospect. At the east end of the town is the prado, or pardo; which is a delightful plain, planted with regular rows of poplar trees, and watered with a great many fountains; where the nobility and gentry take the air on horfeback, or in their coaches, and the common people on foot, or divert themselves with a variety of sports and exercifes. Almost all the streets of Madrid are straight, wide, clean, and well paved. The largest and most frequented are the street of Alcala, that of Atocha, that of Toledo, and the Calle grande or great street. Madrid has also several figures, which in general are not very regular. The principal are those of San Joachim, Sol, Lafiganitas, San Domingo, La Feveda, and the Plaza Mayor. The latter especially deserves notice for its spaciousness and regularity, and the elegant and lofty houses it contains. It is fifteen hundred and thirty-six feet in circuit.
burning coals, with the motto "limpias, fea, y da esplicador; "it purifies, fixes, and gives loofe." Its first object was the compilation of a dictionary of the Spanish language, which was published in four volumes in 1508, and of which a new edition, with great additions, has been lately put to the press. The fame academy is also employed on a superlative edition of Don Quixote, adorned with elegant engravings far superior to the last, and collated with all the former editions. The second is the academy of history; which owes its origin to a society of individuals, the object of whose meetings was to preserve and illustrate the historical monuments of the kingdom of Spain. Their labours met the approbation of Philip V. who in 1738 confirmed their statutes by a royal cedula. This academy consists of 24 members, including the president, secretary, and censor. Its device is a river at its source; and the motto, In patriam popularumque fuet. The two academies are the academy of the fine arts, painting, sculpture, and architecture; and the academy of medicine. The latter is held in no great estimation.

The environs of Madrid contain several royal seats; among which are El Buen Retiro, Casa del Campo, Florida, Le Pardo, Sarchuela, and St Ildefonso; but the most magnificent not only in this country but perhaps in the whole world is the Escurial, which takes its name from a small village near which it stands, about 22 miles north-west from Madrid; and of which a description is given under the article ESCURIAL. Another royal palace greatly admired particularly for its delicious gardens and forpling water-works, is Aranjuez, which is situated on the Tagus, about 50 miles south of Madrid. See ARANJUEZ.

MADRIGAL, a short amorous poem, composed of a number of free and unequal versicles, neither confined to the regularity of a sonnet, nor to the point of an epigram; but only consisting of some tender and delicate thought, expressed with a beautiful, noble, and elegant simplicity.

Menage deserves the word from madrigal, which in Latin and Greek signifies "a sheath-fold;" imagining it to have been originally a kind of pastoral or shepherd's song; whence the Italians formed their madrigale, and we madrigal. Others rather choose to derive it from the word madrugar, which in the Spanish language signifies "to rise in the morning;" the madrigale being formerly sung early in the morning by those who had a mind to fernade their mistresses.

MADURA, a province of of Afa, in the peninsula on this side the Ganges; bounded on the east by Tanjour and Marava, on the south-east by the sea, on the west by the Balagale mountains, which separate it from Malabar, and on the north by Vifapour and Carnate. The inhabitants are Gentoos, and of a thievish disposition. The commodities are rice, elephants teeth, and cotton-cloth; of which last a great deal is made here, and very fine. The Dutch have a pearl-factory, which brings them in a large sum annually.

MEANDER (aus. geog.), a celebrated river of Afa Minor, rising near Celiae. It flows through Caria and Ionia into the Egean sea between Miletus and Priene, after it has been increased by the waters of the Marthes, Lycaus, Lethaeus, &c. It is celes-
celebrated among the poets for its windings, which amount to not less than 600, and from which all obliquities have received the name of meanders. It forms in its course, according to the observation of some travellers, the Greek letters ε and Ε; and from its windings Dædalus is said to have had the first idea of his famous labyrinth.

MÆTÆE, anciently a people of Britain, near Severus's wall, inhabiting the district now called Leaderdale, in Scotland.

MÆCENAS (Caio Cilnius), the great friend and counsellor of Augustus Cæsar, was himself a very polite scholar, but is chiefly memorable for having been the patron and protector of men of letters. He was defended from a most ancient and illustrious origin, even from the kings of Hetruria, as Horace often tells us; but his immediate forefathers were only of the equestrian order. He is supposed to have been born at Rome, because his family lived there; but in what year, antiquity does not tell us. It says as little about his education; but we know it must have been of the most liberal kind, and perfectly agreeable to the dignity and splendor of his birth, since he excelled in everything that related to arms, politics, and letters. How Mæcenas spent his younger years is also unknown to us, any farther than by effects; there being no mention made of him by any writer before the death of Julius Cæsar, which happened in the year of Rome 709. Then Octavius Cæsar, who was afterwards called Augustus, went to Rome, to take possession of his uncle's inheritance; and then Mæcenas became first publicly known, though he appears to have been Augustus's intimate friend, and as it should seem guardian, from his childhood. From that time he accompanied him through all his fortunes, and was his counsellor and adviser upon all occasions; so that Peto Abinomus justly called him Cæfaris dextram, "Cæsar's right-hand."

In A. R. 716, the year that Cicero was killed and Ovid born, Mæcenas distinguished himself by his courage and military skill at the battle of Modena, where the confuls Hortius and Panfa were slain in fighting against Antony; as he did afterwards at Philippi. After this last battle began the memorable friendship between Mæcenas and Horace. Horace, as Suetonius relates, was a tribune in the army of Brutus and Cæfianus, and upon the defeat of those generals made a prisoner of war. Mæcenas, finding him an accomplished man, became immediately his friend and protector; and afterwards recommended him to Augustus, who restored to him his estate with no small additions. In the mean time, though Mæcenas behaved himself well as a soldier in those and other battles, yet his principal province was that of a minister and counsellor. He was the minister, the manager, the negotiator, in every thing that related to civil affairs. When the league was made at Brundusium between Antony and Augustus, Mæcenas was sent to act on the part of Augustus. This we learn from Horace in his journey to Brundusium:

Hunc venturus erat Mæcenas optimus, atque
Goccinis, múllis magnis de rebus uterque
Legati, ovesque suis commeorare amicos. Sat. 1. 1.

And afterwards, when this league was near breaking, through the suspicions of each party, Mæcenas was sent to Antony to ratify it anew.

In the year 717, when Augustus and Agrippa went to Sicily to fight Sextus Pompeius by sea, Mæcenas went with them, but soon after returned, to appease some commotions which were riling at Rome; for though he usually attended Augustus in all his military expeditions, yet, whenever there was any thing to be done at Rome either with the senate or people, he was always dispatched thereto for that purpose.

Upon the total defeat of Antony at Actium, Mæcenas returned to Rome, to take the government into his hands, till Augustus could settle some necessary affairs in Greece and Asia. Agrippa soon followed Mæcenas; and when Augustus arrived he placed these two great men and faithful adherents, the one over his civil and the other over his military concerns. While Augustus was extinguishing the remains of the civil war in Asia and Egypt, young Lepidus, the son of the triumvir, was forming a scheme to assassinate him at his return to Rome. This conspiracy was discovered at once, by the extraordinary vigilance of Mæcenas; who, as Velleius Paterculus says, "obseruing the rash counsels of the headstrong youth with the same tranquillity and calmness as if nothing at all had been doing, instantly put him to death, without the least noise and tumult; and by that means extingushed another civil war in its beginning."

The civil wars being now at an end, Augustus returned to Rome; and from this time Mæcenas indulged himself at vacant hours in literary amusements, and the conversation of men of letters. In the year 734 Virgil died, and left Augustus and Mæcenas heirs to what he had. Mæcenas was excessively fond of this poet, who, of all the wisds of the Augutian age, flound highest in his esteem; and if the Georgics and the Æneid be owing to the good taste and encouragement of this patron, as there is some reason to think, popularity cannot commemorate him with too much gratitude. Horace may be ranked next to Virgil in Mæcenas's good graces; we have already mentioned how and at what time their friendship commenced. Propertius also acknowledges Mæcenas for his favourer and protector, lib. ii. eleg. 7. Nor must Varius be forgot, though we have nothing of his remaining; since we find him highly praised by both Virgil and Horace. He was a writer of tragedies; and Quintilian thinks he may be compared with any of the ancients. In a word, Mæcenas's house was a place of refuge and welcome to all the learned of his time; not only to Virgil, Horace, Propertius, and Varius, but to Fundarius, whom Horace extols as an admirable writer of comedies; to Fufcius Aritius, a noble grammarian and Horace's intimate friend; to Plotius Mæcenas, who affiliated Varius in correcting the Æneid after the death of Virgil; to Valgius, a poet and very learned man, who, as Pliny tells us, dedicated a book to Augustus, De usu Herbarum; to Afinius Pollio, an excellent tragic writer; and to several others, whom it would be too tedious to mention. All these dedicated their works, or some part of them, to Mæcenas, and celebrated his praises in them over and over; and we may observe farther, what Plinarch tells us, that even Augustus himself inscribed his Commentaries to him and to Agrippa.
Mæcænas continued in Augustus's favour to the end of his life, but not uninteruptedly. Augustus had an intrigue with Mæcænas's wife: and though the minister bore his liberty of his master very patiently, yet there was a coldness on the part of Augustus, which, however, soon went off. Mæcænas died in the year 74; but at what age we cannot precisely determine, though we know he must have been old. He must have been older than Augustus, because he was a kind of tutor to him in his youth: and we then find him which, however, soon went off.

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Horsate Flaccet, ut mut, lorem efo, &c." Horace, however, did not probably survive him long, as there is no elegy of his upon Mæcænas extant, nor any account of one having ever been written, which there certainly would have been had Horace havy any time. Nay, Father Sanadon, the French editor of Horace, will have it, that the poet died before his patron; and that these last words were found only in Mæcænas's will, which had not been altered.

Mæcænas is said never to have enjoyed a good state of health in any part of his life: and many singularities are related of his bodily constitution. Thus Pliny tells us, that he was always in a fever; and that, for three years before his death, he had not a moment's sleep. Though he was certainly an extraordinary man, and professed many admirable virtues and qualities, yet it is agreed on all hands, that he was very luxurious and effeminate. "Mæcænas (says Vellius Parterculus) was of the equitrian order, but sprung from a most illustrious origin. He was a man, who, when business required, was able to undergo any fatigue and watching; who consulted properly upon all occasions, and knew as well how to execute what he had consulted: yet a man who in feasons of leisure was luxurious, soft, and effeminate, almost beyond a woman. He was no less dear to Caesar than Agrippa, but distingished by him with fewer honours; for he always continued of the equestrian rank, in which he was born: not that he could not have been advanced upon the least intimation, but he never solicited it." But let moralists and politicians determine of Mæcænas as they please, the men of letters are under high obligations to celebrate his praisies and revere his memory: for he counonenced, protected, and supported, as far as they wanted his support, all the wits and learned men of his time; and that too, out of a pure and disinterested love of letters, when he had no little views of policy to serve by their means: whence it is no wonder, that all the protectors and patrons of learning, ever since, have usally been called Mæcænas'.

MAELSTROM, a very dangerous whirlpool on the coast of Norway, in the 68th degree of latitude, in the province of Norseland, and the district of Lofoden, and near the island of Mofko, from whence it also takes the name of Mofkø flux. Its violence and roarings exceed that of a cataract, being heard to a great distance, and without any interruption, except a quarter every six hour, that is, at the turn of high and low water, when its impetuosity seems at a stand, which short interval is the only time the fishermen can venture in: but this motion soon returns, and, however calm the sea may be, gradually increases with such a draught and vortex as to absorb whatever comes within Maelstrom's sphere of action, and keep it under water for some hours, when the fragments, shivered by the rocks, appear again. This circumstance, among others, makes strongly against Kircher and others, who imagine that there is here an abyss penetrating the globe, and issuing in some very remote parts, which Kircher is so particular to assign, for he names the gulph of Bothnia. But after the most exact researches which the circumstances will admit, this is but a conjecture without foundation; for this and three other vortices among the Ferroo islands, but smaller, have no other cause, than the collision of waves rising and falling, at the flux and reflux, against a ridge of rocks and shelves, which confine the water so that it precipitates itself like a cataract; and thus the higher the flood rises, the deeper must the fall be: and the natural result of this is a whirlpool or vortex, the prodigious force whereof is known by letters experiments. But what has been thus absorbed, remains no longer at the bottom than the ebb leaves; for the suction then ceases, and the flood removes all attraction, and permits whatever had been sunk to make its appearance again. Of the situation of this amazing Mofkøefstrom we have the following account from Mr Jonas Ramus, "The mountain of Hafelbron, in Lofoden, lies a league from the isle of Fer, and betwixt these two runs that large and dreadful stream called Mœlstrœm, from the isle Mofko, which is in the middle of it, together with several circumference islands, as Ambaren, half a quarter of a league northward, Hræfen, Hoeholm, Kieldhelm, Sauren, and Buchholm. Mofko lies about half a quarter of a mile south of the isle of Fer, and betwixt these small islands, Otterholm, Flimen, Sandhafen, Stockholm. Betwixt Lofoden and Mofko, the depth of the water is between 36 and 40 fathoms; but on the other side, towards Fer, the depth decreases so as not to afford a convenient passage for a vessel, without the diligence of splitting on the rocks, which happen to be in the calmest weather: when it is flood, the stream runs up the country between Lofoden and Mofko with a boisterous rapidity; but the roar of its impetuous ebb to the sea is scarce equalled by the loudest and most dreadful cataracts; the noise being heard several leagues off, and the vortices or pits are of such an extent and depth, that if a ship comes within its attraction, it is inevitably absorbed and carried down to the bottom, and there heat to pieces against the rocks; and when the water relaxes, the fragments thereof are thrown up again. But these periods of tranquility are only at the turn of the ebb and flood, and calm weather: but but a quarter of an hour, its violence gradually returning. When the stream is most boisterous, and its fury heightened by a storm, it is dangerous to come within a Norway mile of it; boats, ships, and yachts having been carried away, by not guarding against it before they were within its reach. It likewise happens frequently that whales come too near the stream, and are overpowerd by its violence; and then its impotence to describe their howlings and bellowings in their frightens, struggles to disengage themselves. A bear once attempting to swim from Lofoden to Mofko, with a design of preying upon the sheep at pasture in the island, afforded the like spectacle to the people; the stream caught him, and bore him down, while he
MÆ STRIGHT, an ancient large, and strong town of the Netherlands, ceded to the Dutch by the treaty of Münster. The town-house and the other public buildings are handsome, and the palace is about four miles in circumference, and strongly fortified. It is governed jointly by the Dutch and the bishop of Liege; however, it has a Dutch garrison. The inhabitants are noted for making excellent fire-arms, and some say that in the arsenal there are arms sufficient for a whole army. Both Papists and Protestants are allowed the free exercise of their religion, and the magistrates are composed of both. It is feated on the river Maas, which separates it from Wyck, and with which it communicates by a handsome bridge. Maestricht revolted from the Spaniards in 1570, but was reduced in 1579. Louis XIV. became master of it in 1677, but it was restored to the states by the treaty of Nimfeuwen in 1678. E. Long. 5. 50. N. Lat. 51° 5'.

MÆFFÆUS (Vegio), a Latin poet, born in Lombardy in 1407, was greatly admired in his time. He wrote epigrams, and a humorous supplement to Virgil, which he called The thirteenth book of the Enéid: this was as humorously translated into English a few years since by Mr. Ellis. Maffaeus wrote also some prose works. He was chancellor of Rome towards the end of the pontificate of Martin V.; and died in 1458.

MÆFFE (Scipio), a celebrated Italian poet, born of an illustrious and ancient family at Verona, in 1675. After having finished his studies, he took arms, and distinguished himself by his valor at the battle of Donawert; but he more particularly distinguished himself by his love of learning, which made him undertake several voyages into France, England, and Germany. He converted with the learned in all those countries, and obtained their friendship and esteem. He was a member of the academy of the Arcadia at Rome, an honorary foreign member of that of Inscriptions at Paris; and died in 1755. He wrote many works in verse and prose, which are esteemed; the most known of which are: 1. The tragedy of Merope, of which there are two French translations in prose. 2. Ceremonies, a comedy. 3. A translation, into Italian verse, of the first book of Homer's Iliad. 4. Many other pieces of poetry, in a collection intitled Rhyme and Prose, quarto. His principal works in prose are: 1. Verona illustrata, 2. Istoria diplomatica, 3. Scientia cavallesca, an excellent work, in which he attacks duelling. 4. An edition of Theatro Italiano. 5. An edition of Cassiodorus on the Epistles, Acts of the Apostles, and Apocalypse. 6. Gallic antiquitates quaedam secundae atque inplures epistolae distributae, and several other works.

MAGADA, in mythology, a title under which Venus was known and worshipped in Lower Saxony; where this goddess had a famous temple, which was treated with respect even by the Huns and Vandals when they ravaged the country. It is said to have been destroyed by Charlemagne.

MAGADOXO, the capital town of a kingdom of the same name, in Africa, and on the coast of Ajan. It is seated near the mouth of a river of the same name, defended by a citadel, and has a good harbour. The inhabitants are Mahometans. E. Long. 45° 15'. N. Lat. 3° 0'.

MAGAS,
MAGAZINE. In a siege, the magazine is Magazine, made about 25 or 30 yards behind the battery, towards the parallels, and at least three of them under the rampart; the powder, loaded shells, port fires, &c. Its sides and roof must be well secured with boards to prevent the earth from falling in: a door is made to it, and a double trench or palisade is sunk from the magazine to the battery, one to go in and the other to come out at, to prevent collision. Sometimes traverses are made in the palisades to prevent ricochet shot from plunging into them.

MAGAZINE, on ship-board, a close room or storehouse, built in the fore or afterpart of the hold, to contain the gun powder used in battle. This apartment is strongly secured against fire, and no person is allowed to enter it with a lamp or candle: it is therefore lighted, as occasion requires, by means of the candles or lamps in the light-room contiguous to it.

MAGAZINE Air-Gun. See Air Gun.

MAGAZINES (Literary); a well known species of periodical publications, of which the first that appeared in England was The Gentleman's, a sort of foot by the inventor Mr Edward Cave in the year 1731: (See the article CAVE). This, as Dr Kippis observes, 'may be, Jug. Brt. considered as something of an epocha in the literary vol. iii. art. history of this country. The periodical performances Cave, before that time were almost wholly confined to political transactions, and to foreign and domestic occurrences; but the monthly magazines have opened a way for every kind of literature. This improvement and discussion contained in them are very extensive and various; and they have been the means of diffusing a general habit of reading through the nation, which in a certain degree hath enlarged the public understanding. Many young authors, who have afterwards risen to considerable eminence in the literary world, have here made their first attempts in composition. Here too are preferred a multitude of curious and useful hints, observations, and facts, which otherwise might have never appeared; or if they had appeared in a more evanescent form, would have incurred the danger of being lost. If it were not an invincible task, the history of them would be no incurious or entertaining subject. The magazines that unite utility with entertainment, are undoubtedly preferable to those (if there have been any such) which have only a view to idle and frivolous amusements. It may be observed, that two of them, The Gentleman's and The London, which last was begun the year after the former, have amid their numerous rivals preserved their reputation to the present day. They have both of them, in general, joined instruction with pleasure; and this likewise hath been the case with some others of a later origin.'—The original London Magazine, it is believed, has been discontinued for some years past. — The next oldest publication of this kind is that initiated The Scots Magazine; which was commenced at Edinburgh a few years posterior to the appearance of the Gentleman's at London; which, like it, has preserved many rivals; and which still submits, deferentially esteemed for the simplicity of its plan and the accuracy of its information.

MAGDALEN (Mary.) See MARY.

Religion of St Magdalen, a denomination given to diverse communities of nuns, confiding generally of pe-
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Magdalen or Magdeburg. The religious of Magdalen at Rome were established by Pope Leo X. Clement VIII, settled a revenue on them; and farther appointed, that the effects of all public profites, dying intestate, should fall to them; and that the testaments of the rest should be invalid unless they bequeathed a portion of their effects, which was to be at least a fifth, to them.

Magdalene's Cave, a cave of Germany, and in Carinthia, 10 miles east of Groitz. It appears like a chimney in a rock, and at the entrance torches are lighted to conduct travellers. It is divided into several apartments, or halls, with a vast number of pillars formed by nature, which give it a beautiful appearance; they being, as white as snow, and almost transparent. The bottom is of the same substance, in somuch that a person may fancy himself to be walking among the ruins of an enchanted castle, surrounded with magnificent pillars, some entire and others broken.

Magdeburg, a duchy of Germany, in the circle of Lower Saxony; bounded on the north by the duchy of Mecklenburgh, on the south and west by the principality of Anhalt and Halberstadt, on the east by Upper Saxony with part of Brandenburg, and on the west by the duchy of Wolfenbuttel. The Saale circle, and that of Luxenwalde, are separated from the rest, and surrounded on all sides by a part of Upper Saxony. This country is, for the most part, level; but sandy, marshy, or overgrown with woods. There are salt springs in it so rich, that they are sufficient to supply all Germany with that commodity. The Holz circle is the most fruitful part of it. In the Saale circle, where wood is scarce, there is pit-coal; and at Rothenburg is a copper-mine worked. The duchy is well-watered, for the Elbe passes through it; and the Saale, Havel, Ater, Oder, and Elster, either rise in, or wash some part of it in their course. The whole duchy, exclusive of that part of the county of Mansfelds which is connected with it, is said to contain 29 cities, 6 towns, about 390 villages, and 330,000 inhabitants. The states of the county consist of the dean, the nobility and deputies of the cities. Before it became subject to the electoral house of Brandenburg, frequent diets were held here; but at present no diets are held, nor have the states the direction of the finances as formerly. Before the Reformation, it was an archbishopsric, subject in spirituals to the Pope alone, and its prelate was primate of all Germany; but embracing the Reformation, it chose itself administrators, till the treaty of Munster in 1648, when it was given, together with the bishopric of Halberstadt, to the elector of Brandenburg, as an equivalent for the Hither Pomerania, granted by that treaty to the king of Sweden. Lutheranism is the predominant religion here; but Calvinists, Jews, and Roman Catholics, are tolerated. Of the fall there are five convents, who never embraced the Reformation. All the Lutheran parishes, amounting to 314, are subject to 16 inspectors, under one general superintendent; only the clergy of the old town of Magdeburg are under the direction of their lieuten. The Jews have a synagogue at Halte. The manufactures of the duchy are cloth, flax, flockings, linen, oil-flax, leather, and parchment; of which, and gratia of all sorts, large quantities are exported. The arms of it are, Parry, an eagle, ruby, and pearl. The king of Prussia, as duke of Magdeburg, sits and votes between the elector of Bavaria, as duke of Bavaria, and the elector Palatine, as Palgrave of Lantern. Of the states of the circle of Lower Saxony he is the first. His matricular assessment for the duchy is 43 horse and 196 foot, or 1300 florins monthly; and to the chamber of Witzlar 343 florins and 40 krutiters. For the civil government of the duchy there is a council of regency, with a war and domestic office; and for the ecclesiastical, a confistory, and general superintendent. The revenues of the duchy arising from the salt works, demesnes and taxes, some of which are very heavy and oppressive, are said to amount to 800,000 rixdollars annually. With respect to salt, every housekeeper in the Prussian dominions is obliged to buy a certain quantity for himself and wife; and also for every child and servant, horse, cow, calf, and sheep, that he possesses. The principal places are Magdeburg, Halle, and Glauche.
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Magdeburg, a pleasant city upon the banks of the Elbe, in the Province of Saxony, in Lower Germany. It has been a great sufferers by fires and sieges; but by none so much as that in 1631, when the emperor's general, Count Tilly, took it by storm, plundered and set it on fire, by which it was entirely reduced to ashes, except the cathedral, the convent of our Lady, and a few cottages belonging to fishermen; of 40,000 burghers, not above 400 escaping. The soldiers spared neither age nor sex; but ripped up women with child, murdered fighting infants in sight of their parents, and ravished young women in the streets; to prevent which violation, many of them flung themselves into the Elbe, and others into the fire. The city is now populous, large, and well built, particularly the broad street and cathedral-square. The principal buildings are the king's palace, the governor's house, the armoury, guild-hall, and cathedral. The last is a superb structure in the antique style, dedicated to St. Maurice, which has a fine organ, the matter-pipe of which is so big, that a man can scarce clasp it with both arms; it also contains the tombs of the emperor Otto and the empress Editha; a fine marble statue of St Maurice, a porphyry font, an altar in the choir of one font of divers colours, curiously wrought, and many other curiosities. They show here a bedstead and table which belonged to Martin Luther, when he was an Augustinian friar in a cloister of this city before the Reformation. Among the relics, they pretend to have the bason in which Pilate washed his hands after his condemnation of our Saviour; the lantern which Judas made use of when he apprehended him; and the ladder on which the cock crowed after St Peter denied him. The chapter consists of a provost, 16 major and seven minor canons; besides which, there are four other Lutheran collegiate foundations, and a Lutheran convent dedicated to our Lady, in which is a school or seminary. Here is also a gymnasion, with an academy, in which young gentlemen are instructed in the art of war. The canons of the chapter, which, except the change of religion, is upon the same footing as before the reformation, must make proof of their nobility. The prebends and dignities are all in the gift of the elector; and the revenue of the provost is computed at 12,000 crowns a-year. Here is a great trade, and a variety of manufactures. The chief are those of woollen cloths, and fluffs, silk, cotton, linens, stockings, hats, gloves, tobacco and snuff. The city was formerly one of the Hanfe and imperial towns. Editha, daughter to Otho I, on whom it was conferred as a dowry, among many other privileges and advantages, procured it the grant of a yearly fair. The burgomestre of this city was anciently an office of great power, having the civil and criminal jurisdiction, the office of hereditary cup-bearer being annexed to it; and was long held as a fief of the archbishopric, but afterwards became an imperial fief, which was again conferred on the archbishopric by the elector of Saxony, upon certain conditions.

MAGDALEN, or MAGDALENE, a town of Lower Egypt, twelve miles to the south of Pelusium (Herodotus, Antiquitates, whose doubled is the Migdol or Magdol of Jeremiah.—Another

MAGDALEM, or MAGGOL, denoting literally a tower or place of strength, near the Red Sea, (Moses) far to the south of the former.

MAGELLAN (Ferdinand), a celebrated Portuguese mariner in the 16th century. He being dissatisfied with the king of Portugal, went into the service of the emperor Charles V., and failed from Seville with five vessels in 1519, when he discovered and passed the strait to which he gave his own name, and failed through the South Sea to the Ladrone Islands, when according to some authors, he was poisoned in 1520; though others say that he was killed in a mutiny of his people in the island of Mutan, in account of his severity. His voyage round the world was written by one on board, and has been frequently printed in English. He suddenly converting to the Christian religion people whose language was unknown to him, as his was to them, is an absurdity that discredits this work.

Straits of MAGELLAN, a narrow passage between the island of Terra del Fuego and the southern extremity of the continent of America. This passage was first discovered by Ferdinand Magellan, who failed through it into the South Sea, and from thence to the East Indies. Other navigators have passed the same way; but as these straits are exceedingly difficult, and subject to storms, it has been common to fall by Cape Horn, rather than through the straits of Magellan. See Straits Le Maire, and Terra del Fuego.

MAGELLANIC-clouds, whith appearances like clouds, seen in the heaven towards the south pole, and having the same apparent motion as the stars. They are three in number, two of them near each other. The largest lies far from the south pole; but the other two are not many degrees more remote from it than the nearest conspicuous star, that is, about 11 degrees. Mr Boyle conjectures, that if these clouds were seen through a good telescope, they would appear to be multitudes of small stars, like the milky-way.

MAGGI (Jerome), in Latin Magius, one of the most learned men of the 16th century, was born at Anghiari in Tuscany. He applied himself to all the sciences, and even to the art of war: and distinguished himself so much in this last study, that the Venetians sent him into the island of Cyprus in quality of judge of the admirality. When the turks besieged Famagusta, he performed all the services that could be expected from the most excellent engineer; he invented mines and machines for throwing fire, by means of which he destroyed all the works of the besiegers, and in an instant overthrew what had cost the Turks infinite labour. But they had their revenge; for, taking the city in 1571, they plundered his library, carried him loaded with chains to Constantinople, and treated him in the most inhuman and barbarous manner. He nevertheless comforted himself from the example of Xerxes, Memiphus, Epictetus, and other learned men, and, after passing the whole day in the meanest doldrums, he spent the night in writing. He composed, by the help of his memory alone, treatises filled with quotations, which he dedicated to the Imperial and French ambassadors. These ministers, moved by compassion for this learned man, resolved to purchase
The great chief and siege of Magnum.

Maggi found means to make his escape, and to get to the imperial ambassador's house; when the Grand Vizir being enraged at his flight, and remembering the great mischief he had done the Turks during the siege of Famagusta, sent to have him seized, and caused him to be strangled in prison in 1572. His principal works are, 1. A treatise on the beds of the ancients. 2. On the division of the world by fire.

Commentaries on Aemilius Probus’s lives of illustrious men. 4. Commentaries on the inquisitions. These works are written in elegant Latin. He also wrote a treatise on fortification in Italian, and a book on the situation of ancient Tuscany.

He ought not to be confounded with his brother Bartolommeo Maggi, a physician at Bologna, who wrote a treatise on gun-shot wounds; nor with Vincent Maggi, a native of Brescia, and a celebrated professor of humanity at Ferrare in Padua, who was the author of several works.

MAGGOT, the common name of the fly-worm bred in flies, from the egg of the great blue fly-fly. Notwithstanding the difficulty for this animal, its figure and structure of parts are greatly worth attending to; and may serve as a general history of the casts of worms produced from the eggs of flies.

This animal is white and fishy; its body is composed of a number of rings, like the bodies of caterpillars and other similar insects; and is capable, at the pleasure of the animal, of assuming different figures; being at times more or less extended in length, and consequently more or less thick.

Notwithstanding that this animal has no legs, it is able to move itself very swiftly; and in its first attempt to move its body, is extended to its greatest length, and assumes something of the figure of a pointed cone. The pointed part of the cone is the head of the animal, and is not separated from the next ring by any deeper furrow than the rest of the rings are from one another. In some flies of the animal, one may see two short horns thrust out from the head; but more generally two scaly hooks are observable: these are, however, sometimes hid, and have each of them a cave or depth into which the animal can retract them at pleasure. These hooks are bent into an arch, the concavity of which is towards the plane on which the creature is placed; and they are thick at their insertion in the head, and thence diminish gradually, till they terminate in a fine sharp point.

These two hooks are placed in a parallel direction, and can never come together, and therefore cannot serve in the place of teeth for grinding the food; but merely to pull and sever it in pieces, that it may be of a proper size for the mouth of the creature. Besides these hooks the maggot has a kind of dart, which is about a third part of their length, and is placed at an equal distance between them. This also is brown and scaly like them; it is quite straight, and terminates in a fine point. The hooks have as it were two scaly thorns at their points; and this dart seems intended, by reiterated strokes, to divide and break the pieces of flesh these have separated from the rest into smaller parts. Immediately below the apertures for the egrets of the books, is placed the mouth of the animal; the creature does not flow this little opening unlesse pref-
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Agrippa divides magic into three kinds; natural, celestial, and ceremonial or superstitious.

Natural Magic is no more than the application of natural active causes to passive subjects; by means whereof many surprising, but yet natural effects are produced.

In this way many of our experiments in natural philosophy, especially those of electricity, optics, and magnetism, have a kind of magical appearance, and among the ignorant and credulous might easily pass for miracles. Such, without doubt, have been some of those miracles wrought by ancient magicians, whose knowledge of the various powers of nature, there is reason to believe, was much greater than modern vanity will sometimes allow.

Baptista Porta has a treatise on natural magic, or secrets for performing very extraordinary things by natural causes. The natural magic of the Chaldeans was nothing but the knowledge of the powers of simples and minerals. The magic which they called theurgia, consisted wholly in the knowledge of the ceremonies to be observed in the worship of the gods, in order to be acceptable. By virtue of these ceremonies they believed they could converse with spiritual beings, and cure diseases.

Celestial Magic, borders nearly on judicial astrology; it attributes to spirits a kind of rule or dominion over the planets, and to planets a dominion over men; and on these principles builds a ridiculous kind of system. See Astrology.

Superstitious or Geotic Magic, consists in the invocation of devils. Its effects are usually evil and wicked, though very strange, and seemingly surpassing the powers of nature; supposed to be produced by virtue of some compact, either tacit or express, with evil spirits: but the truth is, these have not all the power that is usually imagined, nor do they produce these effects ordinarily ascribed to them.

This species of magic, there is every reason to believe, had its origin in Egypt, the native country of paganism. The first magicians mentioned in history were Egyptians; and that people so famed for early wisdom believed not only in the existence of demons, the great agents in magic (see Demon), but also that different orders of those spirits presided over the elements of earth, air, fire, and water, as well as over the perils and affairs of men. Hence they ascribed every disease with which they were afflicted to the immediate agency of some evil daemon. When any person was seized with a fever, for instance, they did not think it necessary to search for any natural cause of the disease; it was immediately attributed to some daemon which had taken possession of the body of the patient, and which could not be ejected but by charms and incantations.

These superstitious notions, which had spread from Egypt over all the east, the Jews imbibed during their captivity in Babylon. Hence we find them in the writings of the new Testament attributing almost every disease to which they were subject to the immediate agency of devils (See Possession). Many of the same impious superstitions were brought from Egypt and Chaldea by Pythagoras, and transmitted by him and his followers to the Platonists in Greece. This
Pallor utraque

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Magic.

is apparent from the writers of the life of Pythagoras. Jamblicus, speaking of the followers of that philosopher, says expressly, that they cured certain diseases by incantations; and Porphyry adds, that they cured diseases both of the mind and of the body by songs and incantations. This was exactly the practice of the Egyptian priests, who were all supposed to keep up a constant intercourse with demons, and to have the power of controlling them by magic charms and sacred songs. Agreeably to this practice of his masters, we are told that Pythagoras directed certain diseases of the mind, doubting those which he attributed to the agency of demons, to be cured partly by incantations, partly by magical runes, and partly by music.

That there are different orders of created spirits,—whether called demons or angels,—whose powers intelleetual and active greatly surpass the powers of men, reason makes probable, and revelation certain. Now it was the universal belief of the ancient nations, says the learned Moheim, and especially of the orientals, that certain sounds and words, for the most part barbarous, were highly grateful, and that others were equally disagreeable, to these spirits. Hence, when they wished to render a demon propitious, and to employ him on any particular office, the magicians composed their sacred songs of words which were believed to be agreeable to him; and when it was their intention to drive him from themselves or others, they sung in a strain which they fancied a demon could not hear but with horror. From the same persuasion arose the custom of suspending from the neck of a sick person, whose disease was supposed to be inflicted by a demon, an amulet, sometimes made of gold and sometimes of parchment, on which was written one or more of those words which demons could not hear either to hear or to see: and in a didactic poem on the healing art full extant, we are taught by Serenus Sammonicus, that the word Askacacia is an infallible remedy for a febrile or ague; and to banish grief of heart, Marcellinus thinks nothing more effectual than the word Desmias. In more modern times, as we are informed by Agrippa, the words used by theos in compact with the devil, to invoke him, and to succeed in what they undertake, are, Dies, misis, jefquis, beneolet, douwima, enetensas. There are an hundred other formulæ of words composed at pleasure, or gathered from several different languages, or patched from the Hebrew, or formed in imitation of it. And among the primitive Christians there was a superstitious custom, of which we suspect some remains may yet be found among the illiterate vulgar in different countries, of futilening to the neck of a sick person, or to the bed on which he lay, some text from the New Testament, and especially the first two or three verses of the gospel of St John, as a charm undoubtedly efficacious to banish the disease.

That magicians who could thus cure the sick, were likewise believed to have the power of inflicting diseases, and of working miracles, by means of their sublimer demons, need not be doubted. Ancient writers of good credit are full of the wonders which they performed. We shall mention a few of those which are best attested, and inquire whether they might not have been effected by other means than the interposition of demons.

The first magicians of whom we read are those who in Egypt opposed Moses. And we are told, that when Aaron cast down his rod, and it became a serpent, they also did the like with their enchantments; "for they cast down every man his rod, and they became serpents." This was a phenomenon which, it must be confessed, had a very miraculous appearance; and yet there seems to have been nothing in it which might not have been effected by flight of hand. The Egyptians, and perhaps the inhabitants of every country where serpents abound, have the art of depriving them of their power to do mischief, that they may be handled without danger. It was easy for the magicians, who were favoured by the court, to pretend that they changed their rods into serpents, by dexterously substituting one of those animals in place of the rod. In like manner they might pretend to change water into blood, and to produce frogs; for if Moses gave in these instances, as we know he did in others, any previous information of the nature of the miracles which were to be wrought, the magicians might easily provide themselves in a quantity of blood and number of frogs sufficient to answer their purpose of deceiving the people. Beyond this, however, their power could not go. It elapsed where that of all workers in legerdemain must have failed—"the failure of proper materials to work with. Egypt abounds with serpents; blood could easily be procured; and without difficulty they might have frogs from the river: But when Moses produced lice from the dust of the ground, the magicians, who had it not in their power to collect a sufficient quantity of these animals, were compelled to own this to be an effect of divine agency.

The appearance of Samuel to Saul at Endor is the next miracle seemingly performed by the power of magic, which we shall consider. It was a common practice of magicians, that they could raise up ghosts from below, or make dead persons appear unto them to declare future events; and the manner of their incantation is thus described by Horace:

Pallor utraque

Sacerbor rendens apecte
Scalpere terram
Unguibus, et pullam divellere mordicus agnam
Cooperent: error in solem confusus, ut inde
Manes elicientur, animas responfa daturas.

"With yelling dire they fill'd the place,
And hideous pale was either's face.
Soon with their nails they scar'd the ground,
And fill'd a magic trench profound
With a black lamb's thick streaming gore,
Whose members with their teeth they tore;
That they might charm the frights to tell
Some curious anecdotes from hell."

Whether the witch of Endor made use of such informal charms as these, the sacred historian has not informed us; but Saul addressed her, as if he believed that by some form of incantation she could recall from the state of departed spirits the soul of the prophet who had been for some time dead. In the subsequent apparition, however, which was produced, some
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...some have thought there was nothing more than a trick, by which a cunning woman imposed upon Saul's credulity, making him believe that some confident of her own was the ghost of Samuel. But had that been the case, he would undoubtedly have made the pretended Samuel's answer as pleasing to the king as possible, both to save her own life, which appears from the context to have been in danger, and likewise to have procured the larger reward. She would never have told her sovereign, she durst not have told him, that he himself should be shortly slain, and his sons with him; and that the host of Israel should be delivered into the hands of the Philistines. For this reason many critics, both Jewish and Christian, have supposed that the apparition was really a demon or evil angel, by whose assistance the woman was accustomed to work wonders, and to foretell future events. But it is surely very incredible, that one of the apostate spirits of hell should have upbraided Saul for applying to a 

forecere, or should have accosted him in such words as these: "Why hast thou disquieted me, to bring me up? Wherefore dost thou ask of me, seeing the Lord is departed from thee, and is become thine enemy? For the Lord hath rent the kingdom out of thine hand, and given it to thy neighbour, even to David. Because thou obeyedst not the voice of the Lord, therefore the Lord hath done this thing to thee this day." It is to be observed farther, that what was here denounced against Saul was really prophetic, and that the event answered to the prophecy in every particular. Now, though we do not deny that there are created spirits of penetration vastly inferior to that of the most enlarged human understanding; yet we dare maintain, that no finite intelligence could by its own mere capacity have ever found out the precise point of the two armies engaging, the issue of the Philistines, the consequences of the victory, and the very names of the persons that were to fall in battle. Saul and his sons were indeed men of tried bravery, and therefore likely to expose themselves to the greatest danger; but after the menaces which he received from the apparition, he would have been impelled, one should think, by common prudence, either to chuse with the enemy, or to retire from the field without exposing himself, his sons, and the whole army, to certain and inevitable destruction; and his acting differently, with the consequences of his conduct, were events which no limited understanding could either foresee or certainly foretell. If to these circumstances we add the fuddenee of Samuel's appearance, with the effect which it had upon the forecere's herself, we shall find reason to believe, that the apparition was that of no evil demon. There is not, we believe, upon record, another instance of any person's pretending to raise a ghost from below, without previously using some magical rites or some form of incantation. As nothing of that kind is mentioned in the case before us, it is probable that Samuel appeared before he was called. It is likewise evident from the narrative, that the apparition was not what the woman expected; for we are told, that "when the king exhorted her not to be afraid, and asked what the law, 'the woman said, I see gods (elohim) ascending out of the earth.' Now, had she been accustomed to do such feats, and known that what the law was only her subjacent demon, it is not conceivable that she could have been frightened, or have mistaken her familiar for elohim in any sense in which that word can be taken. We are therefore strongly inclined to adopt the opinion of those who hold that it was Samuel himself who appeared and prophesied, not called up by the wretched woman or her demons, but, to her utter confusion, and the disgrace of her art, sent by God to rebuke Saul's madness in a most affecting and mortifying way, and to deter all others from ever applying to magicians or demons for assistance when refused comfort from heaven. For though this hypothesis may to a superficial thinker seem to transgress the rule of Horace—Nec Deus interfect, &c. Which is as applicable to the interpretation of Scripture, as to the introduction of supernatural agency in human compositions; yet he who has studied the theoretical constitution of Israel, the nature of the office which was there termed regal, and by what means the administration was in emergencies conducted, will have a different opinion, and at once perceive the dignus vindicet nodus.

The sudden and wonderful destruction of the army of Brennus the Gaul, has likewise been attributed to magic, or, what in this inquiry amounts to the same thing, to the interposition of evil spirits, whom the priests of Apollo invoked as gods. Those barbarians had made an inroad into Greece, and invested the temple of Apollo at Delphi, with a view to plunder it of the sacred treasure. Their numbers and courage overpowered all opposition; and they were just upon the point of making themselves masters of the place, when Justus informs us, that, to encourage the besieged, the priests and prophetesses "advocavit dum clamabant: cumque fie vidisset desilirem in templum per culminis apta fasglia. Dum omnes opem dei supplicata imlorter, juvenem supra humanummodum infignis pulcrissimae, comiteque eadem armatas virgines, ex propinquus duabus Dianae Minervaque sedibus occasisse, uel osculis tantum haec per peregrinam adietiam fridericum arcanum, in streptum armorum: proinde ne condarentur, dis antestigiam, honesta caedere et victoriae deorum faciis se adjungere;" similes obsercatiunibus motabant. Quibus vocibus incenti, omnes certamin praedum profiliunt. Praefeniam Deicti ipii statim fenere: nam et terre motu portio nuntius abrupta Gallorum flavit exercitum, et confertissimi cunei non fine vulneribus hostium diiissipati ruerant. Insecta deinde templibus ad locum grandine et frigore faecios ex vulneribus absumpti [a]."

This was unquestionably an extraordinary event; and

(a) Called aloud that the god had arrived. That they had been him leap into the temple through the aperture in the roof: That whilst they were all humbly imploiring his help, a youth of more than human beauty, accompanied by two virgins in armour, had run to their assistance from the neighbouring temples of Dian.
and it must be ascribed either to the immediate interposition of the supreme being, to natural means, or to the agency of demons; there is no other alternative. But it is altogether incredible that the supreme being should have miraculously interposed to defend the temple of a pagan divinity. It is very difficult to suppose that an earthquake, produced in the ordinary course of nature, should have been foretold by the priests, or that it could have happened so opportunely for the preservation of their treasure from the hands of fierce barbarians. Nothing, therefore, it has been said, remains, but either to suppose the earthquake to have been produced by evil spirits, or to deny the truth of the historian's relation. But the catalogue of Brennus's army is recorded in the same manner by so many ancient writers of good credit, that we cannot call in question their veracity; and therefore, being unwilling to admit the agency of demons into this affair, it will be incumbent on us to shew by what human contrivance it might have been effected: for its arrival at so critical a juncture will not easily suffer us to suppose it a mere natural event.

"The inclination of a Pagan priest (says Bishop Warburton) to asitle his god in extremity, will hardly be questioned; and the inclination of those at Delphi was not ill seconeled by their public management and address. On the first rumour of Brennus's march against them, they called the oracle, to all the region round, forbidding the country people to fear and bear away their wine and provisions. The effects of this order succeeded to their expectations. The half-starved barbarians finding, on their arrival in Greece, so great a plenty of all things, were dispersed from the country, and revelled in the abundance that was provided for them. This reprieve gave time to the friends and allies of the god to come to his assistance. Their advantages of situation likewise supported the measures which they had taken for a vigorous defence. The town and temple of Delphi were seated on a bare and cavernous rock, defended on all sides with precipices instead of walls. A large recess within assumed the form of a theatre; so that the thorns of soldiers and the sounds of military instruments, re-echoing from rock to rock, and from cavern to cavern, increased the clamour to an immense degree: which, as the historian observes, could not but have great effects on ignorant and barbarous minds. The playing of their punic terror was not indeed of itself sufficient to repulse and disperse a host of fierce and hungry invaders but it enabled the defenders to keep them at bay till a more solid entertainment was prepared for them in, the explosion and fall of that portion of the rock at the foot of which the greater part of the army lay encamped.

"Among the caverns in the sacred rock, there was one, from an intoxicating quality discovered in the steam which issued from it, was rendered very famous by being fitted to recipient of the priest's of Apollo (A). Now, if we only suppose this, or any other of the vapours emitted from the numerous fissures, to be endowed with that unctuous, or other wise inflammatory quality, which modern experience shews to be common in mines and subterraneous places, we can easily conceive how the priests of the temple might, without the agency of Demons, be able to work the wonders which history speaks of as effected in this transaction. For the throwing down a lighted torch or two into a cavern whence such a vapour issued, would set the whole into a flame; which, by suddenly rarifying and dilating the air, would, like fired gunpowder, blow up all before it. That the priests, the guardians of the rock, could be long ignorant of such a quality, or that they would divulge it when discovered, cannot be supposed. Strabo relates, that one Qnonarchus, with his companions, as they were attempting by night to dig their way through to rob the holy treasury, were frightened from their work by the violent shaking of the rock; and he adds, that the same phenomenon had defeated many other attempts of the like nature. Now, whether the tapers which Qnonarchus and his companions were obliged to use while they were at work, inflamed the vapour, or whether the priests of Apollo heard them at it, and set fire to a countermine, it is certain a quality of this kind would always stand them in stead. Such then (presumes the learned prelate) was the expedient (B) they employed to dislodge this nest of hornets, which had nestled at the foot of their sacred rock; for the form of thunder, lightening, and hail, which followed, was the natural effect of the violent convulsions given to the air by the explosion of the mine."

Two instances more of the power of ancient magic we shall just mention, not because there is any

and Minerva; and that they had not only beheld these things with their eyes, but had also heard the whizzing of his bow and the clanger of his arms. They therefore earnestly exhorted the besieged not to neglect the heavenly signal, but to fall out upon their enemies, and partake with the divinities of the glory of the victory. "With these words the soldiers being animated, eagerly rushed to battle: and were themselves quickly sensible of the presence of the god: for part of the rock being torn away by an earthquake, rolled down upon the Gauls; whose thickset battalions being thus thrown into confusion, fled, exposed to the weapons of their enemies. Soon afterwards a tempest arose, which by cold and fall of hailstones cut off the wounded."

(B) "In hoc rapis infracta, nec e ferre montis altitudine, plantiae exiguiores, in ea profundum terrae foramen, qui in occultate, ex quo frigidos spiritus, vici quidem velut vento in soltis expallunt, mentes vatam, in reverba veibt, implorantque deo responfa confluentibus dare cogit." Just. lib. 24. c. 10.

"By the learned author, by arguments too tedious to be here enumerated, confirms the reasoning which we have borrowed from him; and likewise from history, that the priests, before they came to extremities with the sacred rock, had entered into treaty with those barbarians, and paid them a large tribute to desert and quit the country. This add greatly to the probability of his account of the explosion; for nothing but the absolute impossibility of getting quit of their besiegers by any other means, could have induced the priests to hazard an experiment so big with danger to themselves as well as to their enemies.
thing particular or important in the facts, but because some credit seems to have been given to the narration by the discerning Cudworth. Philostratus, in his life of Apollonius Tyanaeus, informs us, that a laughing Daemon at Athens was cured by that magician, who ejected the evil spirit by threats and menaces; and the biographer adds, that the daemon, at his departure, is said to have overturned a statue which stood before the porch where the cure was performed. The other instance is of the same magician reigning the city of Ephesus from the plague by stoning to death an old ragged beggar whom Apollonius called the plague, and who appeared to be a daemon by his changing himself into the form of a shaggy dog.

That such tales as these should have been thought worthy of the sighted notice by the incomparable author of the Intellectual System, is indeed a wonderful phænomenon in the history of human nature. The whole story of Apollonius Tyanaeus, as is now well known, is nothing better than a collection of the most extravagant fables; but were the narrative such as credit would be given to the facts here related, there appears no necessity in either case for calling in the agency of evil spirits by the power of magic.

The Athenians of that age were a superstitious people. Apollonius was a thorough impostor, long practised in the art of deceiving the multitude. For such a man it was easy to persuade a friend and confident to act the part of the laughing daemon; and without much difficulty the fiction might be so understood as inevitably to tumble upon a violent concussion being given to the ground at the time of the departure of the pretended daemon. If so, this fear of magic dwindles down into a very trifling trick performed by means both simple and natural. The other case of the poor man at Ephesus, who was stoned to death, is exactly similar to that of those innocent women in our own country, whom the volgare in the last century were instigated to burn for the supposed crime of witchcraft. We have no reason to suppose that an Ephesian mob was less inflammable or credulous than any other mob, or that Apollonius played his part with less skill than a Christian demonologist; and as the priests of our witches, who were sacrificed to folly and fanaticism, were often supposed to migrate from their dead bodies into the bodies of hares or cats accidentally passing by, so might this impostor at Ephesus persuade his cruel and credulous instruments, that the spirit of their victim had taken possession of the body of the shaggy dog.

Still it may be said, that in magic and distination events have been produced out of the ordinary course of nature; and as we cannot suppose the Supreme Being to have countenanced such abominable practices by the interpretation of his power, we must necessarily attribute those effects to the agency of demons, or evil spirits. Thus, when Aeneas confuted the Sybil, or the agency of the insipring god changed her whole appearance:

\[\text{Poefera fata} \]

Tempus, ut it: "Dens, ecce, Dens." Cuttella fanti
Ante fores, subito non vultus, non color unus,
Non compure manuere come: fed peclus anhelum,
Et rable fera cordatum: miuorque videri,
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Nec mortale fontas: aflat et numine quando
Jam propiole Dei. 

\[\text{Aloud the cries,} \]
\[\text{This is the time, inquire your deflines.} \]
He comes, behold, a god! Thus while she said,
And shivering at the sacred entry flashed,
Her colour chang’d, her face was not the same,
And hollow groans from her deep spirit came:
Her hair stood up; convulsive rage poffeds’d
Her trembling limbs, and heav’d her lab’ring breath;
Greater than human kind the seem’d to look,
And with an accent more than mortal spoke.
Her staring eyes with sparkling fury roll,
When all the god came rushing on her soul.”

DRYDEN.

In answer to this, it is to be observed, that the temple of Apollo at Cumæ was an immense excavation in a solid rock. The rock was probably of the same kind with that on which the temple of Delphi was built, full of figures, out of which exhasted perpetually a poisonous kind of vapour. Over one of these figures was the tripod placed, from which the priests gave the oracle. Now we learn from St. Chrysolom, that the priests was a woman; "Quæ in tripodes fedens expansa malignum spiritum per interna immidium, et per genitalis partes subuentum expiciens, furor rerspletur, ipsique refolatis criniibus bacchareetur, ex ore fuprum emitentem, et fic furores verba loquebatur." By comparing this account with that quoted above from Justin, which is confirmed both by Paunfanius and by Strabo, it is evident, that what Chrysolom calls malignum spiritum was a particular kind of vapour blown forcibly through the fissure of the rock. But if there be a vapour of such a quality as, if received per partes genitalis, would make a woman furious, there is surely no necessity for calling into this scene at Cumæ the agency of a daemon or evil spirit. Besides, it is to be remembered, that in mystical and magical rites, such as this was, both the priests, and the persons confuting them prepared themselves by particular kinds of food, and sometimes, as there is reason to believe, by human sacrifices, for the approach of the god or daemon whose aid they invoked. On the present occasion, we know from the poet himself, that a cake was used which was composed of poppy meal and honey, and Plutarch speaks of a shrub called leucophyllas, used in the celebration of the mysteries of Hecate, which drives men into a kind of frenzy, and makes them confess all the wicked deeds which they had done or intended. This being the case, the illusions of fancy occasioned by poppy will sufficiently account for the change of the sybil’s appearance, even though the inhaled vapour should not have posseid that efficacy which Chrysolom and Justin attribute to it. Even some sorts of our ordinary food occasion strange dreams, for which opinions in particular are remarkable. Excessive drunkenness, as is well known, produces a disorder named the bacchanalian of Europe the blue devil, which consists of an immense succession of spectres, accompanied with extreme horror to the person who sees them. From these facts, which cannot be denied, there must arise a suspicion, that by using very unnatural food, such as human blood, the vilet of infects, 3 G ferpeute,
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Magic. serpents, and medicated cakes, by flattering themselves up in fantastic and caves, and by deviating every method to excite the wildest and most extravagant ideas or images in the fancy, the ancient magicians might by natural means produce every phenomenon which they attributed to their gods or demons. Add to this, that in ancient times magic was studied as a science. Now, as we cannot suppose that every one who studied it intended absolutely nothing, or that all who believed in it were wholly deceived; what can we infer, but that the science consisted in the knowledge of those drugs which produced the phantoms in the imagination, and of the method of preparing and properly employing them for that purpose? The celebrated Friar Bacon, indeed, as far back as the 13th century, wrote a book de Natura Magica; but though we should allow that this book proved to demonstration, that in his time no such thing as magic existed, it never could prove that the case had always been so. At that time almost all the sciences were lost; and why not magic as well as others? It is likewise an undoubted fact, that magic at all times prevailed among the Egyptians and Africans more than among the Europeans. The reason doubtless was, that the former had the requisites for the art in much greater perfection than we. Human sacrifices were frequent among them; they had the most poisonous serpents, and the greatest variety of vegetable poisons, together with that powerful narcotic opium; all which were of essential use in mystical and magic rites. They had besides, a burning fun, frightful feats and oaths; which, together with extreme fasting, were all called into their assistance, and were sufficient to produce, by natural means, the most wonderful phenomena which have ever been attributed to magical incantations. Even in our own days, we have the testimony of two travellers, whom we cannot suppose to be either liars or enthusiasts, that both the Indians and Africans perform feats for which neither they nor the most enlightened Europeans can account. The one is Mr. Grose, who visited the East Indies about the year 1762; and the other is Mr. Bruce, who informs us, that the inhabitants of these regions on the west coast of Africa pretended to communicate with the devil, and verify their affirmations in a manner that neither he nor other travellers knew what to make of it; but it does not from this follow, that Mr. Bruce believed that communication to be real. We have all seen one of the most illiterate men that ever assumed the title of Doctor, perform feats very surprising, and such as even a philosopher would have been puzzled to account for, if he had not been previously let into the secret; and yet no man supposes that Katterfield holds any communication with the devil, although he has sometimes pretended it among people whose minds he has professedly unlightened. To the objection, that we have a vast number of histories of witches, who in the last century confessed, that they were present with the devil at certain meetings; that they were carried through the air and saw many strange feats performed, too numerous and too ridiculous to be here mentioned. The best answer to this objection seems to be that given by Dr. Ferrier in his essay on Popular Illusions. "The following meeting of witches (says he) are supposed to be put beyond all doubt by the numerous confessions of criminals, who have described their ceremonies, named the times and places of their meetings with the persons present, and who have agreed in their relations, though separately delivered. But I would observe, first, that the circumstances told of these festivals are in themselves ridiculous and incredible; for they are represented as gloomy and horrible, and yet with a mixture of childish and extravagant fancies, more likely to disgust and alienate than conciliate the minds of their guests. They have every appearance of uncanny dreams. Sometimes the devil and his subjects say what; sometimes they preach to them; more commonly he was seen in the form of a black goat, surrounded by imps in a thousand frightful shapes; but none of these forms are new, they all resemble known quadrupeds or reptiles. Secondly, I observe, that there is direct proof furnished even by demonologists, that all those supposed journeys and entertainments were nothing more than dreams. Persons accused of witchcraft have been repeatedly watched about the time they had fixed for their meeting; they have been seen to anoint themselves with soporific compositions; after which they fell into profound sleep; and on awaking several hours afterwards, they have related their journey through the air, with their amusements at the festival, and have named the persons whom they saw there." This is exactly conformable to the practice of the ancient magicians and diviners, and seems to be the true way of accounting, as well for many of the phenomena of magic, as for that extravagant and shamefull superlusion which prevailed so much during the last century, and by which such numbers of innocent men and women were cruelly put to death (c). We may indeed be assured, that the devil has not in his power to reverse in a single instance the laws of nature without a divine permission; and we can conceive but one occasion (see Possession) on which such permission could be given consistently with the wisdom and the goodness of God. All the tales, therefore, of diabolical agency in magic and witchcraft must undoubtedly be false; for a power which the devil is not himself at liberty to exert, he cannot communicate to a human creature. Were the case otherwise; were those powers, "which (according to Johnson) only the control of Omnipotence restrains from laying creation waste, subject to the invocations of wicked mortals; were those spirits—

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(c) For some farther account of popular illusions, see Animal Magnetism.
The revival of learning, and the success with which the laws of nature have been investigated, have long ago banished this species of magic from all the enlightened nations of Europe. Among ourselves, none but persons grossly illiterate pay the least regard to magical charms; nor are they any where abroad more prevalent than among the inhabitants of Lapland and Iceland. These people, indeed, place an absolute confidence in the effects of certain idle words and actions; and ignorant soils from other parts of the world are deceived by their allusions and their ceremonies. The famous magical drum of the Laplanders is still in constant use in that nation; and Slesker, in his History of Lapland, has given an account of its structure.

This instrument is made of beech, pine, or fir, split in the middle, and hollowed on the flat side where the drum is to be made. The hollow is of an oval figure; and is covered with a skin clean dretled, and painted with figures of various kinds, such as flars, fans and moons, animals and plants, and even countries, lakes and rivers; and of later days, since the preaching of Christianity among them, the acts and sufferings of our Saviour and his apostles are often added among the rest. All these figures are separated by lines into three regions or clusters.

There is, besides these parts of the drum, an index and a hammer. The index is a bundle of braids or iron rings, the biggest of which has a hole in its middle, and the smaller ones hang to it. The hammer or drumlick is made of the horn of a rein-deer; and with this they beat the drum so as to make these rings move, they being laid on the top of that purpose. In the motion of these rings about the pictures figured on the drum, they fancy to themselves some prophecy in regard to the things they inquire about.

What they principally inquire into by this instrument, are three things. 1. What sacrifices will prove most acceptable to their gods. 2. What favours they shall have in their several occupations, as hunting, fishing, curing of diseases, and the like; and, 3. What is doing in places remote from them. On these several occasions they use several peculiar ceremonies, and place themselves in various odd postures as they beat the drum: which influences the rings to the one or the other side, and to come nearer to the one or the other set of figures. And when they have done this, they have a method of calculating a discovery, which they keep as a great secret, but which seems merely the business of the imagination in the diviner or magielan.

Magic Square, a square figure, formed of a series of numbers in mathematical proportion; so disposed in parallel and equal ranks, as that the sums of each row, taken either perpendicularly, horizontally, or diagonally, are equal.

Let the several numbers which compose any square number (for instance, 1, 2, 3, 4, 5, &c. to 25 inclusive, the square number) be disposed, in their natural order, after each other in a square figure of 25 cells, each in its cell; if now you change the order of the numbers, and dispose them in the cells in such manner, as that the five numbers which fill an horizontal rank of cells, being added together, shall make the same sum with the five numbers in any other rank of cells, whether horizontal or vertical, and even the same number with the five in each of the two diagonal ranks: this disposition of numbers is called a magic square, in opposition to the former disposition, which is called a natural square. See the figures following:

<table>
<thead>
<tr>
<th>Natural square</th>
<th>Magic square</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>16 13 20 21 22</td>
</tr>
<tr>
<td>6 7 8 9 10</td>
<td>11 12 13 14 15</td>
</tr>
<tr>
<td>11 12 13 14 15</td>
<td>16 17 18 19 20</td>
</tr>
<tr>
<td>16 17 18 19 20</td>
<td>21 22 23 24 25</td>
</tr>
</tbody>
</table>

One would imagine that these magic squares had that name given them in regard this property of all their ranks, which, taken any way, make the same sum, and the same sum, apparently extremely surprising, especially in certain ignorant ages, when mathematicians praised for magic; but there is a great deal of reason to suspect, that these squares merited their name still further, by the l. peritious operations they were employed in, as the construction of talismans, &c. for, according to the childish philosophy of those days, which attributed virtues to numbers, what virtues might not be expected from numbers so wonderful?

However, what was at first the vain practice of makers of talismans and conjurers, has since become the subject of a serious research among mathematicians; not that they imagine it will lead them to any thing of solid use or advantage. Magic squares favour too much of their original to be of much use; but only as it is a kind of play, where the difficulty makes the merit, and it may chance to produce some new views of numbers, which mathematicians will not lose the occasion of.

Eeman. Mochopolus, a Greek author of no great antiquity, is the first that appears to have spoken of magic squares: and by the age wherein he lived, there is reason to imagine he did not look on them merely as a mathematician. However, he has left us some rules for their construction. In the treatise of Cor. Agrippa, so much accused of magic, we find the squares or even numbers, viz. from three to nine inclusive, disposed magically; and it must not be supposed that those seven numbers were preferred to all the other without some very good reason: in effect, it is because their squares, according to the system of Agrippa and his followers, are planetary. The square of 3, for instance, belongs to Saturn; that of 4 to Jupiter; that of 5 to Mars; that of 6 to the Sun; that of 7 to Venus; that of 8 to Mercury; and that of 9 to the Moon. M. Bachet applied himself to the study of magic squares, on the hint he had taken from the planetary squares of Agrippa, as being unacquainted with the work of Mochopolus, which is only in manuscript in the French king's library; and, without the assistance of any author, he found out a new method for those squares whose root is uneven, for instance 25, 49, &c. but he could not make any thing of those whose root was even.

After him came M. Frenicle, who took the same subject in hand. A certain great algebraist was of opinion, that whereas the 16 numbers which compose the square might be disposed 209 276 588 80000 different ways in a natural square (as from the rules of comb
To this inquiry he thought fit to add a difficulty that had not yet been considered: the magic square of 7, for instance, being constructed, and its 49 cells filled, if the two horizontal ranks of cells, and, at the same time, the two vertical ones, the most remote from the middle be retrenched; that is, if the whole border or circumference of the square be taken away, there will remain a square whose root will be 5, and which will only consist of 25 cells. Now it is not at all surprising that the square should be no longer magical, because the ranks of the large ones were not intended to make the same sum, excepting when taken entirely with all the seven numbers that fill their seven cells; so that being mutilated each of two cell, and having lost two of their numbers, it may be well expected; that their remnants will not any longer make the same sum. But M. Frenicle would not be satisfied, unless when the circumference or border of the magic square was taken away, and even any circumstance at pleasure, or, in fine, several circumferences at once, the remaining square was still magical: which last condition, no doubt, made these squares vastly more magical than ever.

Again, he inverted that condition, and required that any circumference taken at pleasure, or even several circumferences, should be inalterable from the square; that is, that it should cease to be magical when they were removed, and yet continue magical after the removal of any of the rest. M. Frenicle, however, gives no general demonstration of his methods, and frequently seems to have no other guide but chance. It is true, his book was not published by himself, nor did it appear till after his death, viz. in 1693.

In 1703, M. Poignard, canon of Bruxells, published a treatise of sublime magic squares. Before him there had been no magic squares made but for severities of natural numbers that formed a square; but M. Poignard made two very considerable improvements. Instead of taking all the numbers that fill a square, for instance the 56 successive numbers, which would fill all the cells of a natural square, whose side is 6, he only takes as many successive numbers as there are units in the side of the square, which, in this case, are six; and these six numbers alone hedispose in such manner in the 36 cells that none of them are repeated twice in the same rank, whether it be horizontal, vertical, or diagonal; whence it follows, that all the ranks, taken all the ways possible, must always make the same sum, which M. Poignard calls repeated progression. 2. Instead of being confined to take these numbers according to the series and succession of the natural numbers, that is, in an arithmetical progression, he takes them likewise in a geometrical progression, and even in a harmonic progression. But with these two last progressions the magic must necessarily be different to what it was: in the squares filled with numbers in geometrical progression, it consists in this, that the products of all the ranks are equal; and in the harmonic progression, the numbers of all the ranks continue to follow that progression, he made squares of each of these three progressions repeated.

This book of M. Poignard gave occasion to M. de la Hire to turn his thoughts the same way, which he did with such success, that he seems to have well nigh completed the theory of magic squares. He first considers uneven squares: all his predecessors on the subject having found the construction of even ones by much the most difficult; for which reason M. de la Hire refers those for the last. This excess of difficulty may arise partly from hence, that the numbers are taken in arithmetical progression. Now in that progression, if the number of terms be uneven, that in the middle has some properties, which may be of service; for instance, being multiplied by the number of terms in the progression, the product is equal to the sum of all the terms.

M. de la Hire proposes a general method for uneven squares, which has some similitude with the theory of compound motions, so useful and fertile in mechanics. As that consists in decomposing motions, and resolving them into others more simple; so does M. de la Hire's method consist in resolving the square that is to be constructed into two simple and primitive squares. It must be owned, however, it is not quite so easy to conceive those two simple and primitive squares in the compound or perfect square, as in an oblique motion to imagine a parallel and perpendicular one.

Suppose a square of cells, whose root is uneven, for instance 7; and that its 49 cells are to be filled magically with numbers, for instance the first 7. M. de la Hire, on the one side, takes the first 7 numbers, beginning with unity, and ending with the root 7; and on the other 7, and all its multiples to 49, exclusively; and these only make six numbers, he adds 0, which makes this an arithmetical progression of 7 terms as well as the other: 0, 7, 14, 21, 28, 35, 42. This done, with the first progression repeated, he fills the square of the root 7 magically: in order to this, he writes in the first seven cells of the first horizontal rank the seven numbers proposed in what order he pleases, for that is absolutely indifferent; and it is proper to observe here, that these seven numbers may be ranged in 5040 different manners in the same rank. The order in which they are placed in the first horizontal rank, be it what it will, is that which determines their order in all the rest. For the second horizontal rank, he places in its first cell, either the third, the fourth, the fifth, or the sixth number, from the first number of the first rank; and after that writes the six others in order as they follow. For the third horizontal rank, he observes the same method with regard to the second that he observed in the second with regard to the first, and so of the rest. For instance, suppose the first horizontal rank filled with the seven numbers in their natural order, 1, 2, 3, 4, 5, 6, 7; the second horizontal rank may either commence with 2, with 4, with 5, or with 6: but in this instance it commences with 3; the third rank therefore must commence
The order of the numbers in the first rank being determined; if in beginning with the second rank, the second number 2, or the last number 7, should be pitched upon, in one of those cafes and repeated; and in the other cafe, the other diagonal would be false unless the number repeated seven times should happen to be 4; for four times seven is equal to the sum of 1, 2, 3, 4, 5, 6, 7: and in general, in every square consisting of an equal number of terms, in arithmetical progression, one of the diagonals would be false according to those two constructions, unless the term always repeated in that diagonal were the middle term of the progression. It is not, however, at all necessary to take the terms in an arithmetical progression; for, according to this method, one may construct a magic square of any numbers at pleasure, whether they be according to any certain progression or not. If they be in an arithmetical progression, it will be proper, out of the general method, to except those two constructions which produce a continual repetition of the same term in one of the two diagonals, and only to take in the cafe wherein that repetition would prevent the diagonal from being just, which case being absolutely disregarded when we computed that the square of 7 might have 20, 160 different constructions, it is evident that by taking that case in it must have validly more.

To begin the second rank with any other number besides the second and the last, must not, however, be looked on as an universal rule: it holds good for the square of 7; but if the square of 9, for instance, were to be constructed, and the fourth figure of the first horizontal rank were pitched on for the first of the second, the consequence would be, that the fifth and eighth horizontal ranks would likewise commence with the same number, which would therefore be repeated three times in the same vertical rank, and occasion other repetitions in all the rest. The general rule, therefore, must be conceived thus: Let the number in the first rank pitched on, for the commencement of the second, have such an exponent of its quota; that is, let the order of its place be such, as that if an unit be taken from it, the remainder will not be any just quota part of the root of the square; that is, cannot divide it equally. If, for example, in the square of 7, the third number of the first horizontal rank be pitched on for the first of the second, such construction will be just; because the exponent of the place of that number, viz. 3, subtracting 1, is a can not divide 7. Thus also might the fourth number of the same first rank be chosen, because 4—1, viz. 3, cannot divide 7; and, for the same reason, the fifth or sixth number might be taken. But in the square of 9, the fourth number of the first rank must not be taken, because 4—1, viz. 3, does divide 9. The reason of this rule will appear very evidently, by considering in what manner the returns of the fame numbers do or do not happen, taking them always in the same manner in any given series. And hence it follows, that the fewer divisions the root of any square to be constructed has, the more different manners of constructing it there are; and that the prime numbers, i.e. those which have no divisions, as 5, 7, 11, 13, &c. are those whose squares will admit of the most variations in proportion to their quantities.

The squares constructed according to this method have some particular properties not required in the problem; for the numbers that compose any rank parallel to one of the two diagonals, are ranged in the same order with the numbers that compose the diagonal to which they are parallel. And as any rank parallel to a diagonal must necessarily be shorter, and have fewer cells than the diagonal itself; by adding to it the correspondent parallel, which has the number of cells by which the other falls short of the diagonal, the numbers of those two parallels, placed as it were end to end, still follow the same order with those of the diagonal: besides that their sums are likewise equal; so that they are magical on another account. Instead of the squares, which we have hitherto formed by horizontal ranks, one might also form them by vertical ones; the cafe is the fame in both.

All we have hitherto said regards only the first primitive square, whose numbers, in the propose example, were 1, 2, 3, 4, 5, 6, 7; here still remains the second.
second primitive, whose numbers are 0, 7, 14, 21, 28, 35, 42. M. de la Hire proceeds in the same manner here as in the former; and this may likewise be constructed in 20,160 different manners, as containing the same number of terms with the first. Its construction being made, and of consequence, all its ranks making the same sum, it is evident, that if we bring the two into one, by adding together the numbers of the two corresponding cells of the two squares, that is, the two numbers of the first of each, the two numbers of the second, of the third, &c. and dispose them in the 49 corresponding cells of a third square, it will likewise be magical in regard to its rank, formed by the addition of equal sums to equal sums, which must of necessity be equal among themselves. All that remains in doubt is, whether or no, by the addition of the corresponding cells of the two squares, all the cells of the third will be filled in such manner, as that each not only contains one of the numbers of the progression from 1 to 49, but also that this number be different from any of the rest, which is the end and design of the whole operation.

As to this it must be observed, that if in the construction of the second primitive, square care has been taken, in the commencement of the second horizontal rank, to observe an order with regard to the first different from what was observed in the construction of the first square; for instance, if the second rank of the first square began with the third term of the first rank, and the second rank of the second square commence with the fourth of the first rank, as in the example it actually does; each number of the first square may be combined once, and only once, by adding with all the numbers of the second. And as the numbers of the first are here 1, 2, 3, 4, 5, 6, 7, and those of the second, 0, 7, 14, 21, 28, 35, 42, by combining them in this manner we have all the numbers in the progression from 1 to 49, without having any of them repeated; which is the perfect magic square propounded.

The necessity of constructing the two primitive squares in a different manner does not at all hinder but that each of the 20,160 constructions of the one may be combined with all the 20,160 constructions of the other: of consequence, therefore, 20,160 multiplied by itself, which makes 406,425,600, is the number of different constructions that may be made of the perfect square, which here consists of the 49 numbers of the natural progression. But as we have already observed, that a primitive square of seven numbers repeated may have above 23,160 several constructions, the number 406,425,600 must come vastly short of expressing all the possible constructions of a perfect magic square of the 49 first numbers.

As to the even squares, he constructs them like the uneven ones, by two primitive squares; but the construction of primitives is different in general, and may be so a great number of ways: and those general differences admit of a great number of particular variations, which give as many different constructions of the same even square. It scarce seems possible to determine exactly, either how many general differences there may be between the construction of the primitive squares of an even square and an uneven one, nor how many particular variations each general difference may admit of; and, of consequence, we are still far from being able to determine the number of different constructions of all those that may be made by the primitive squares.

The ingenious Dr Franklin seems to have carried this curious speculation farther than any of his predecessors in the same way. He has constructed not only a magic square of squares, but likewise a magic circle of circles, of which we shall give some account for the amusement of our readers. The magic square of squares is formed by dividing the great square, as in Plate 294. fig. 1. The great square is divided into 256 small squares, in which all the numbers from 1 to 256 are placed in 16 columns, which may be taken either horizontally or vertically. The properties are as follows:

1. The sum of the 16 numbers in each column, vertical and horizontal, is 2056.
2. Every half column, vertical and horizontal, makes 1028, or half of 2056.
3. Half a diagonal ascending added to half a diagonal descending, makes 2056, taking these half diagonals from the ends of any side of the square to the middle thereof; and so reckoning them either upward or downward, or sidewise from left to right hand, or from right to left.
4. The same, with all the parallels to the half diagonals, as many as can be drawn in the great square: for any two of them being directed upward and downward, from the place where they begin to that where they end, their sums will make 2056. The same doth hold and upward and downward manner; or all the same if taken sideways to the middle, and back to the same side again. N. B. One set of these half diagonals and their parallels is drawn in the same square upward and downward. Another such set may be drawn from any of the other three sides.
5. The four corner numbers in the great square, added to the four central numbers therein, make 1028; equal to the half sum of any vertical or horizontal column which contains 16 numbers; and equal to half a diagonal or its parallel.
6. If a square hole (equal in breadth to four of the little squares) be cut in a paper, through which any of the 16 little squares in the great square may be seen, and the paper be laid on the great square, the sum of all the 16 numbers seen through the hole, is equal to the sum of the 16 numbers in any horizontal or vertical column, viz. to 2056.

The magic circle of circles (fig. 2.) is composed of a series of numbers from 12 to 75 inclusive, divided into eight concentric circular spaces, and ranged in eight radii of numbers, with the number 12 in the centre; which number, like the centre, is common to all these circular spaces, and to all the radii.
The numbers are so placed, that the sum of all those in either of the concentric circular spaces abovementioned, together with the central number 12, make 360; equal to the number of degrees in a circle.

The numbers in each radius also, together with the central number 12, make just 360.

The numbers in half of, or any of, the above circular spaces, taken either above or below the double horizontal line, with half the central number 12, make 180; equal to the number of degrees in the semicircle.

If any four adjoining numbers be taken, as if in a square, in the radial divisions of these circular spaces, the sum of these, with half the central number, make 180.

There are, moreover, included, four sets of other circular spaces, bounded by circles which are eccentric with respect to the common centre; each of these sets containing five spaces. The centres of the circles which bound them are at A, B, C, and D. The set whose centre is at A is bounded by dotted lines; the set whose centre is at B is bounded by lines of short unconnected strokes; and the round D is bounded by lines of unconnected longer strokes, to distinguish them from one another. In drawing this figure by hand, the set of concentric circles should be drawn with black ink, and the four different sets of eccentric circles with four kinds of ink of different colours: as blue, red, yellow, and green, for distinguishing them readily from one another. These five sets of eccentric circular spaces intersect those of the concentric, and each other; and yet the numbers contained in each of the eccentric spaces, taken all around any of the 20 which are eccentric, make the same sum as those in the concentric, namely 360, when the central number 12 is added. Their halves also, taken above or below the double horizontal line, with half the central number, make 180.

Observe, that there is not one of the numbers but what belongs at least to two of the circular spaces, some to three, some to four, some to five; and yet they are all so placed as never to break the required number 360 in any of the 28 circular spaces within the primitive circle.

To bring these matters in view, all the numbers as abovementioned are taken out, and placed in separate columns as they stand around both the concentric and eccentric circular spaces, always beginning with the outermost and ending with the innermost of each set, and also the numbers as they stand in the eight radii, from the circumference to the centre; the common central number 12 being placed the lowest in each column.

1. In the eight concentric circular spaces.

2. In the eight radii.

3. In the five eccentric circular spaces, whose whole centre is at A.

4. In the five eccentric circular spaces, whose whole centre is at B.

5. In the five eccentric circular spaces, whose whole centre is at C.

6. In the five eccentric circular spaces, whose whole centre is at D.
the sum will be 180; equal to half the numbers in any circular space taken above or below the double horizontal line, and equal to the number of degrees in a femicircle. Thus, 14, 25, 63, and 6, make 180.

MAG. The sum of all lineal numbers taken above and below the line (22), and in the figure, is 22. a. 52. 62. 63. b. 52. 62. 63. c. 52. 62. 63. d. 52. 62. 63. e. 52. 62. 63. f. 52. 62. 63. g. 52. 62. 63. h. 52. 62. 63. i. 52. 62. 63. j. 52. 62. 63. k. 52. 62. 63. l. 52. 62. 63. m. 52. 62. 63. n. 52. 62. 63. o. 52. 62. 63. p. 52. 62. 63. q. 52. 62. 63. r. 52. 62. 63. s. 52. 62. 63. t. 52. 62. 63. u. 52. 62. 63. v. 52. 62. 63. w. 52. 62. 63. x. 52. 62. 63. y. 52. 62. 63. z. 52. 62. 63.

Magi. The sum of all the numbers in the figure (22), and in the figure, is 22. a. 52. 62. 63. b. 52. 62. 63. c. 52. 62. 63. d. 52. 62. 63. e. 52. 62. 63. f. 52. 62. 63. g. 52. 62. 63. h. 52. 62. 63. i. 52. 62. 63. j. 52. 62. 63. k. 52. 62. 63. l. 52. 62. 63. m. 52. 62. 63. n. 52. 62. 63. o. 52. 62. 63. p. 52. 62. 63. q. 52. 62. 63. r. 52. 62. 63. s. 52. 62. 63. t. 52. 62. 63. u. 52. 62. 63. v. 52. 62. 63. w. 52. 62. 63. x. 52. 62. 63. y. 52. 62. 63. z. 52. 62. 63.

Magni. The sum of all the numbers in the figure (22), and in the figure, is 22. a. 52. 62. 63. b. 52. 62. 63. c. 52. 62. 63. d. 52. 62. 63. e. 52. 62. 63. f. 52. 62. 63. g. 52. 62. 63. h. 52. 62. 63. i. 52. 62. 63. j. 52. 62. 63. k. 52. 62. 63. l. 52. 62. 63. m. 52. 62. 63. n. 52. 62. 63. o. 52. 62. 63. p. 52. 62. 63. q. 52. 62. 63. r. 52. 62. 63. s. 52. 62. 63. t. 52. 62. 63. u. 52. 62. 63. v. 52. 62. 63. w. 52. 62. 63. x. 52. 62. 63. y. 52. 62. 63. z. 52. 62. 63.
the ill effects of it, by putting a milder question to the prisoner: "How would you behave (says he) if Rome should pardon you?" "Our conduct (replied the generous captive) depends upon yours. If the peace you grant be an honourable one, you may depend on a constant fidelity on our parts; if the terms of it be hard and dishonourable, lay no stress on our adherence to you." Some of the judges construed these words as menaces; but the wiser part finding in them a great deal of magnanimity, cried out, that a nation whose only desire was liberty, and their only fear that of losing it, was worthy to become Roman. Accordingly, a decree passed in favour of the prisoners, and Prinbernus was declared a municipium. Thus the bold sincerity of one man saved his country, and gained it the privilege of being incorporated into the Roman state.

2. Subrius Flavius, the Roman tribune, being impeached for having conspired against the life of the emperor Nero, not only owned the charge, but glorified in it. Upon the emperor's asking him what provocation he had given him to plot his death? "Because I abhorred thee (said Flavius), though there was not in the whole army one more zealously attached to thee than I, so long as thou didst merit affection; but I began to hate thee when thou becamest the murderer of thy mother, the murderer of thy brother and wife, a charioteer, a comedian, an incendiary, and a tyrant." Tacitus tells us, that the whole conspiracy afforded nothing which proved so bitter and pernicious to Nero as this reproach. He ordered Flavius to be immediately put to death, which he suffered with amazing intrepidity. When the executioner desired him to stretch out his neck valiantly, "I wish (replied he) thou mayest strike as valiantly.""  

3. When the Scythian ambassadors waited on Alexander the Great, they gazed attentively upon him for a long time without speaking a word, being very probably surprised, as they formed a judgment of men from their air and stature, to find that he did not answer the high idea they entertained of him from his fame. At length, the oldest of the ambassadors (according to Q. Curtius) addressed him thus: "Had the gods given thee a body proportionable to thy ambition, the whole universe would have been too little for thee. With one hand thou wouldst touch, the east, and with the other the west; and, not satisfied with this, thou wouldst follow the sun, and know where he hides himself. But what have we to do with thee? we never set foot in thy country. May not those who inhabit woods be allowed to live, without knowing who thou art and whence thou comest? We will neither command over, nor submit to, any man. And that thou mayest be sensible what kind of people the Scythians are, know, that we received from heaven as a rich present, a yoke of oxen, a ploughshare, a dart, a javelin, and a cup. These we make use of, both with our friends and against our enemies. To our friends we give corn, which we procure by the labour of our oxen; with them we offer wine to the gods in our cups; and with regard to our enemies, we combat them at a distance with our arrows, and near at hand with our javelins. But thou, who boastest thy coming to extirpate robbers, thou thyself art the greatest robber upon earth. Thou hast plundered all nations than Magnanimity overcame: thou hast polluted Libya of Lydia, invaded Syria, Persia, and Bacchis; thou art forming a design to march as far as India; and now thou comest hither to feize upon our herds of cattle. The great possessions thou hast, only make thee covet more eagerly what thou hast not. If thou art a god, thou oughtest to do good to mortals, and not deprive them of their possessions. If thou art a mere man, reflect always on what thou art. They whom thou hast not molested will be thy true friends, the strongest friendships being contracted between equals; and they are esteemed equals who have not tried their strength against each other: but do not imagine that those whom thou conquerest can love thee."  

4. Richard I. King of England, having invaded the Roman city of Chalons, was shut in the shoulder with an arrow; an unskilful surgeon endeavouring to extract the weapon, mangled the flesh in such a manner, that a gangrene ensued. The cattle being taken, and perceiving he should not live, he ordered Bertram de Gourdon, who had shot the arrow, to be brought into his presence. Bertram being come, "What harm (said the king) did ever I do to thee, that thou shouldst kill me?" The other replied with great magnanimity and courage, "You killed with your own hand my father and two of my brothers, and you likewise designed to have killed me. You may now satiate your revenge. I should cheerfully suffer all the tortures that can be inflicted, were I fore of having delivered the world of a tyrant who filled it with blood and carnage." This bold and spirited answer struck Richard with remorse. He ordered the prisoner to be presented with one hundred shillings, and set at liberty; but Maccardeus, one of the king's friends, like a true subject, ordered him to be played alive.  

5. The following modern instance is extracted from a late French work intitled, École historique ou morale du soldat, &c. A mine, underneath one of the outworks of a citadel, was intrusted to the charge of a sergeant and a few soldiers of the Piedmontese guards. Several companies of the enemy's troops had made themselves masters of this work; and the loss of the place would probably soon have followed had they maintained their post in it. The mine was charged, and a tingle spark would blow them all into the air. The sergeant, with the greatest coolness, ordered the soldiers to retire, deiring them to request the king to take care of his wife and children; struck fire, set a match to the train, and sacrificed himself for his country.

Magnesia, or Magnesia, (anc. geog.) a town or a district of Thessaly, at the foot of mount Pelian, called by Philip, the son of Demetrius, one of the three keys of Greece, (Panini.)

Magnesia, or Magnesia Alba, in mineralogy and chemisrty, a kind of earth only discovered since the beginning of this century. It first began to be known at Rome by the name of the Count de Pallu's powder, which a canon there offered as a general remedy for all disorders. It was by many considered as a calcareous earth; but F. Hoffman showed it to be essentially distinct. The name was afterwards done
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Magna. Dr Black of Edinburgh and M. Margraaf of Berlin, though unknown to each other at the time. When pure it is extremely white, lofty, and light; the specific gravity about 2.330. It is one of the most insensible substances in nature; neither melting, nor forming a hardening nor contracting, in the focus of the most powerful burning-glares. An experiment was made on some of this earth in the summer of 1782 by Dr Mageljan, with Mr Parker's burning-glares; the effects of which are more powerful than those of any other, though its diameter is only 32 inches. The event seemed at first to be unfavourable to the conclusion above-mentioned; for a cubic inch of magnesia, a quarter of an inch each side, being put into its focus was hardened, and reduced to less than a third part of its bulk each way, viz. from .25 of an inch to .08. On applying a similar cube of magnesia, however, from Mr Henry's manufacture at Manchester, it neither became harder nor sensibly diminished in size. Bergman informs us, that magnesia, unless precipitated by the volatile alkali, or that by the nealkalified tartar, always contains some silicious or calcareous earth. Almost the same thing happens when it is separated by calcination from the remaining lixiviatous of the nitrous and marine acids; in which case, by such a violent fire, it adheres together, and even shows a tendency to vitrify.

Notwithstanding this extreme refractoriness of magnesia by itself, it melts easily with borax, though scarce affected by alkalis or the calcines of lead; when mixed with other earths it produces hard masses of various kinds; when mixed with calcareous, argillaceous, or silicious earths, it melts in the fire; and if four times its weight of green glaee is added to it, the mass forms a kind of porcelain so hard as to strike fire with steel. But neither an equal part of the above earths, nor of ponderous earth, glaees of lead, vegetable alkali, nor vitriolated tartar, added separately to magnesia, will melt in the fire; however, when mixed with common argillaceous earth, it melts into a hard mass. Magnesia differs from calcareous earth in having a much smaller attraction for fixed air. In this respect it is inferior even to fixed alkaline salts; so that it will not render any of these caeulous, though it will do so to the volatile alkali. It also parts very readily with its own fixed air by mere heat; and it was by making experiments on this substance that Dr Black made his first discoveries concerning fixed air. In its calcined state, however, it does not show any of the caeulity of lime, but may be safely taken internally; and is even preferred by some to that which contains fixed air. In this state it is much less soluble than when combined with fixed air, and does not effervece with any acid. When mixed with water, a very small degree of heat is excited, and in about 7062 times its weight of water it totally dissolves. It dissolves also very readily in aerial acid; by which means it is frequently united with fresh water. For the same reason, when we mix a solution of perfectly mild alkali, either fixed or volatile, with a solution of magnesia, no precipitation follows; because the great quantity of fixed air extracted by the union of the acid and alkali, instantly dissolves the precipitate as fast as it is formed. But if we put this mixture over the fire, it will grow thick, and coagulate as soon as it is heated to a cer-

tain degree; because the magnesia is unable to retain, Magnesia, in any considerable heat, as much fixed air as is necessary for its solution.

On putting magnesia into water, and afterwards drawing it, it is found to retain, 3.4 of its weight of aqueous fluid; but when fully saturated with aerial acid, it will absorb and retain, 4.4 of the same. When fully saturated with aerial acid, it is more soluble in cold than in hot water; because the heat of the latter dissolves part of the fixed air, as was observed concerning the alkaline salts.

Magnesia, when combined with different acids, forms salts exceedingly different from those produced by calcareous earth under similar circumstances; and of which an account is given under the article Chemistry. It is usually prepared either from the bittern of sea-salt, or from the salt prepared from that liquid under the name of Epom salt. The magnesia prepared directly from the bittern, however, is by no means equal in purity to that produced from the finer kinds of Epom salt. Hence, in order to have pure magnesia, Bergman gives the following directions:

"Let Epom salt, in well-formed crystals, be dissolved in distilled water; and from this the magnesia is to be precipitated by mild volatile alkali. Some of this earth that remains suspended in the solution, by means of aerial acid, may be easily precipitated by a simple ebullition. An hundred pounds of this magnesia, when rightly prepared, contains near 25 parts of fixed air, 60 of water, and 45 of pure earth. Its specific gravity is then 2.15. This method of preparation may answer very well for having a very pure magnesia; but when it is required to have it very light and pungent, which, by those who use it, is looked upon to be the only criterion of its goodness, we must use the following method:

Take any quantity of Epom salt, dissolve it in boiling water, and filter the solution. Dissolve also half the quantity of good pearl-ash, and filter this solution. Both of these solutions ought to be somewhat diluted; and it will be proper to use twice the quantity of water which would fairly dissolve the salts. Mix the two solutions when nearly cold, and stir them very well together. Let the mixture stand for some hours until the precipitate has fallen to the bottom in form of a coarse gritty powder. Put the whole then into a clean copper kettle, under which a moderate fire is made. Stir the matter incessantly with a large wooden spatula, to prevent the powder from sticking to the bottom. As the mixture heats, the powder begins to lose its sandy appearance, and to increase greatly in quantity; so that, though at first the mixture was quite thin, with only a small portion of sandy matter amongst it, before it has attained the boiling heat it will be so thick that it can scarcely be stirred. When the grittiness is quite gone, the matter must be put upon a filtering cloth, and warm water poured upon it till it runs insipid. The magnesia is then to be put upon chalk stones, which will absorb the greatest part of the moisture; and it may at last be fully dried in a stove.

Magnesia alba is a good absorbent; and undoubtedly to be preferred to crab's-eyes, on account of its purgative quality when united with an acid, which the other has not. It has been esteemed hurtful in bilious,
ions' habits where there is a disposition in the stomach contrary to acidity. This, however, according to Mr Henry, is doubtful: and where putrid bile is to be corrected, he thinks good purgatives may be answered by taking magnesia with an acid in a large dose of its fixed air, and then it is to be seized, thus extricated, will correct the putridity of the contents of the intestines, while they are at the same time evacuated downwards. He is also of opinion, that in cutaneous discharges it may enter the circulation in form of a neutral salt, and, by acting as a diaphoretic and diuretic, prove an excellent alternative. For some medical purposes, magnesia is used in a calcined state; in which case it is deprived of its fixed air, and then it proves nearly as apertient as a double quantity of magnesia in its uncalcined state. Mr Henry is of opinion, that it may be useful in colic and diarrhoea, and that it may be successively employed as a cathartic with patients labouring under the stone, who are using the lithium faponaceum; and that, joined with warm aromatic, it may be of service in correcting the great flatulency which is so much afflicts people of a gouty disposition. From several experiments made by the same author, it also appears that magnesia has a considerable antispasmodic power. The like virtue he attributes to all kinds of terebinthaceous powders: whence he concludes, that medicines of this kind are by no means improper in fevers of a purulent type; that where bile is suspected to be the cause of any purulent disease, those antispasmodics should be prescribed which particularly impede its corruption; that, as calcined magnesia is a more powerful antispasmodic than most other abortifacients, it merits a preference to these; and that where an acid canchymy prevails, magnesia or other abortifacients, taken immediately before or after meal-time, may, by increasing the putrefactive fermentation of animal-food, be of great service. He hath also found, that magnesia hath a power of promoting the solution of reflexive gums in water; and thus we have an elegant and easy method of preparing aqueous tinctures from their solid balsams. Such tinctures, however, are calculated only for extemporaneous prescription, as most of them deposit a sediment when they have been kept a week or two.

Black Magnesia. See Manganese.

Magnesia (anc. geog.), a maritime district of Thessaly, lying between the south part of the Sinus Thermaicus and the Pegaeus to the south, and to the east of the Pelasgiots. Magnesia, the people. Magnesia and Magnesius, the epithet; (Horace).

Magnesia, a town of Achaia Minor on the Maenander, about 15 miles from Ephesus. The ancients called there it was one of the three towns given him by Arraxerxes, with these words, “to furnish his table with bread.” It is also celebrated for a battle which was fought there, 190 years before the Christian æra, between the Romans and Antiochus king of Syria. The forces of Antiochus amounted to 70,000 men according to Appian, or 70,000 foot and 12,000 horse according to Livy, which has been exaggerated by Florus to 300,000 men; the Roman army consisted of about 28 or 30,000 men, 2000 of which were employed in guarding the camp. The Syrians lost 50,000 foot and 4000 horse; and the Romans only 300 killed, with 25 horse. It was founded by a colony from Magnesia in Thessaly, and was commonly called Magnesia on Maenander, to distinguish it from another, called Magnesia ad Sipyulum in Lydia at the foot of Mount Sipylos.

Magnesia ad Sipyulum, anciently Tantalus, the residence of Tantalus, and capital of Maonia, where now stands the lake Sale. A town of Lydia, at the foot of mount Sipylos, to the east of the Hermus; adjudged free under the Romans. It was destroyed by an earthquake in the reign of Tiberius.

Magnet (Magnes), the Loadstone: a sort of ferruginous stone, in weight and colour resembling iron ore, though somewhat harder and more heavy; endowed with various extraordinary properties, attractive, directive, inclinatory, &c. See Magnetism.

The magnet is also called Lapis Heracleus, from Heraclea, a city of Magnesia, a port of the ancient Lydia, where it is said to have been first found, and from which it is usually supposed to have taken its name. Though others derive the word from a shepherd named Magnet, who first discovered it with his crook of iron, his crook of magnet, who first discovered it with its iron of his crook on mount Ida. It is also called Lapis Nauticus, by reason of its use in navigation; and fiderites, from its attracting iron, which the Greeks call σιδήρον.

The magnet is usually found in iron mines, and sometimes in very large pieces half magnet half iron. Its power is different according to the different countries it is brought from. Norcan observes, that the best are those brought from China and Bengal, which are of an iron or fangineous colour; those of Arabia are reddish; those of Macedonia blackish; and those of Hungary, Germany, England, &c. the colour of unwrought iron. Neither its figure nor bulk is determinate, it is found of all forms and sizes.

The ancients reckoned five kinds of magnets, different in colour and virtue; the Ethiopic, Magnesian, Boetic, Alexandrian, and Natolian. They also took it to be male and female; but the chief use they made of it was in medicine; especially for the cure of burns and defluxions on the eyes. The moderns, more happy, employ it to conduct them in their voyages. See Navigation.

The most distinguishing properties of the magnet are, that it attracts iron, and that it points to the poles of the world; and in other circumstances also dips or inclines to a point beneath the horizon, directly under the pole, and that it communicates these properties, by touch, to iron. On which foundation are built the mariner’s needles, both horizontal and inclinatory. Afterline figure of the Magnet was known to the ancients; and is mentioned even by Plato and Euripides, who call it the Hercules’ stone, because it commands iron, which subdues every thing else: but the knowledge of its directive power, whereby it diposits its poles along the meridian of every place, and occasions needles, pieces of iron, &c. touched with it, to point nearly north and south, is of a much later date; though the exact time of its discovery, and the discoverer himself, are yet in the dark. The first tidings we hear of it is in 1269, when Marco Polo the Venetian is said by fome to have introduced the mariner’s compass; though not as an invention of his own, but as deri...
MAGNETISM.

The power by which the lodestone is influenced, manifesting itself by certain attractive and directive virtues, and which may be understood from the following phenomena afterwards mentioned, which are common to all magnetic bodies.

CHAP. I. Phenomena and Laws of Magnetism.

1. Phenomena of the Magnet.

1. A Magnet, whether natural or artificial, attracts iron, and all substances which contain it in its metallic state. A pure calc of iron is but little attracted; but if the calc be heated strongly in conjunction with charcoal dust, it will then be attracted, though it has not regained its metallic splendour, and is quite defective in malleability. The semimetal called nickel, and perhaps some others, are attracted by the magnet, though freed from iron as much as possible. From some accounts it has been suspected that brass was in a small degree affected by the magnet, and even that all very minute bodies are somewhat under its influence; but this seems not yet to be sufficiently ascertained.

2. If a magnet be suspended by a thread, nicely placed on a pivot, or let float in a basin of water, it will turn one and constantly the same side nearly towards the north pole of the earth, the other of course turning towards the south. Hence these parts of the magnet have been called its poles, taking the designations of north and south from those parts of the world towards which they turn. This property is called the polarity of the magnet; and when it is in the act of turning itself into this position, it is said to traverse. A plane drawn perpendicular to the horizon through both poles of a magnet, after it has turned itself, is called the magnetic meridian; and the angle it makes with the meridian of the place is called the declination of the magnet or of the magnetic needle.

3. When either the north or the south pole of two magnets are placed near to each other, they repel; but a north and a south pole attract each other.

4. A magnet placed in such a manner as to be entirely at liberty, inclines one of its poles to the horizon, and of course elevates the other above it. This property is called the inclination or dipping of the magnet; and is most conspicuous in artificial magnets or needles, which may be accurately balanced before the magnetic virtue is imparted to them.

5. By proper management any magnet may be made to communicate its virtue to a piece of steel or iron, which virtue it will retain for a longer or shorter time according to circumstances.

§ 2. Of the Different Substances attracted by the Magnet.

It has already been said, that iron is the only substance which the magnet particularly attracts, and that too when in its metallic state. Nevertheless this metal is so universally diffused, that there are few substances which do not contain a sufficient quantity of it to be in some degree affected by the magnet. Iron itself is attracted with different degrees of force according to the state in which it is with regard to malleability. Even the purest calc or solution that can be made, is said to be in some degree affected by the magnet; but of all substances soft iron is attracted with the greatest force when clean and of an uniform texture. Hardened steel is attracted with much less force than iron; but the scales separated from red-hot iron, the fused globules from flint and steel, or the finery cinder, are attracted as much as iron itself. The black calc of iron is attracted but very weakly; and the red calc or rust so little, that it is generally said to be quite insensible to the magnetic attraction; though this is not found to be strictly true, even when the calc is prepared by fire, and purified in the most careful manner. Sometimes the scales and calc are capable of acquiring a polarity, though weakly. Ores of iron are attracted with greater or less force according to the state of the metal in them, and according to the quantity of it they contain; though the attraction is always manifest even when they contain such a small quantity as scarcely to deserve the name of ores. They are generally much more attracted after calcination than before; because this operation communicates to them a portion of phlogiston by which they approach to a metallic state. Ores of lead, tin, and copper, are likewise attracted, as well as native cinnamar, on account of the quantity of iron they contain; and it is remarkable, that though pure lead in its metallic state is not in the least attracted, its calc is so in some degree. The calc of tin is also attracted, though in a still smaller degree than that of lead. Zinc, bismuth, and cobalt, but especially the ores of these semimetals, are attracted; but not antimony, unless it be first exposed to a gentle heat; and arsenic is not attracted at all. One kind of bismuth is said to be absolutely repelled by the magnet. Almost all other minerals are attracted, at least after having been exposed to the action.
Substances attracted by the Magnet.

Magnetism.

Calcereous earth is attracted less than any other kind, and the siliceous earth the most frequently. Sand, especially the black kind, is generally attracted; and amber as well as other combustible substances have the same property, after being burned. Almost every part of animal and vegetable bodies is affected by the magnet after being burned; but unburned animal or vegetable substances are very seldom if ever perceptibly attracted. It is also remarkable, that even foot, or the dust which falls upon any thing left exposed to the atmosphere, are perceptibly attracted. Colours cues precious stones, as the diamond and crys-
tals, are not attracted; neither the amethyst, topaz, chalcedony, or such as are deprived of their colour by fire; but all others, as the ruby, chrysolite, and tourmaline, are attracted. The emerald, and par
ticularly the garnet, are not only attracted, but frequently acquire an evident polarity. The opal is colourless and often acquires an evident magnetism. The tourmaline is the most probable to ascribe the attraction to the stone in the various directions.

Our author has been at considerable pains to investigate the magnetic properties of brags and other metals; having made many experiments upon the subject, of which the following are the results: 1. Hammered brags is much more generally attracted by the magnet than other kinds; and such as are not influenced in this manner, acquires the property by being hammered. 2. A piece of brags rendered magnetic by hammering, loses the property on being made red hot so as to become softened; by a second hammering it becomes again magnetic: and thus may be made to lose its property and recover it alternately. 3. Suspecting that the magnetic property might be occasioned by a small quantity of iron abraded from the hammer, the pieces of brags were beat between two pieces of card-paper; notwithstanding which precaution, it acquired the magnetic property as before. 4. Sometimes an evident degree of magnetism was communicated by two or three strokes, and with the card-paper not above 30 strokes were given to make the brags sensibly magnetic. 5. A piece of brags was hardened by beating it between two large flints, using one for the hammer and the other for the anvil; but still it acquired a magnetic property, tho' less than with the iron hammer, which might be explained by the roughness of the flints, and their not coming into contact sufficiently with the metal. Neither of the flints was found to have acquired the smallest degree of magnetic power either before or after the experiment. 6. By melting the brags in a crucible, it was found to have entirely lost its magnetism. 7. A piece of brags deprived of its magnetic property by fire, regained it after a few strokes of the hammer, though laid between two pieces of copper. 8. Most of the pieces of brags tried by our author became magnetic by hammering; but some, though rendered equally hard with the rest, did not affect the needle in the least; but these could not originally be distinguished from such as are capable of becoming magnetic. 9. As, notwithstanding the precautions made use of in the above experiments to prevent the iron of the hammer from being in any manner of way communicated to the brags, an objection might arise, that some quantity of the calx might be diffused through the metal, and acquire phlogiston by hammering, he tried the following experiment, which seemed decisive. A piece of brags which would acquire no magnetism by hammering, was put upon an anvil with a considerable quantity of crocus martis, which had no effect upon the needle. It was then hammered for a long time, turning it frequently, so that the crocus was beat into the substance of the brags, and gave it a red colour; nevertheless, it affected the needle in this state no more than before. 10. A hole of about an eighth part of an inch in length, and little more than one sixht of an inch in diameter, was drilled in a piece of brags which could not be rendered magnetic by hammering; after which the hole was filled with crocus martis, and hammered as before, but still it flowed no signs of magnetism (A). 11. On making this piece of brags, containing the crocus, red hot, it then affected the needle, but only in that place where the crocus was. 12. On repeating this experiment with black calx of iron instead of crocus martis, the brags was weakly attracted in that place where the calx was, and this attraction was neither augmented nor diminished by calculation. 13. On mixing a small quantity of iron with four times its weight of brags which could not be made magnetic by hammering, the whole was rendered powerless magnetic; but on again mixing this compound with 50 times its weight of the same brags, the attraction became so weak as to be scarcely perceptible; and was neither augmented by hammering nor diminished by softening. 14. On repeating most of his experiments, by letting the pieces of brags float upon quicksilver in the manner hereafter described, he found that very few of them were not affected; and even the indifference of any of them did not seem to be

(A) These two experiments seem inconsistent with our author’s assertion, that calces of iron are always affected in some degree by the magnet.
be very well ascertained; though these did not acquire any additional magnetism by hammering.

From all these experiments Mr Cavallo draws the following conclusions. 1. Most brasses become magnetic by hammering, and loses that property by annealing or softening in the fire; or at least its magnetism is so far weakened by it, as afterwards to be only discovered when floating on quicksilver. 2. The acquired magnetism is not owing to particles of iron naturally or artificially mixed with the brass. 3. The pieces of brass which have that property retain it without any diminution after a great number of repeated trials; but he found no method of giving magnetism to brass which it had not naturally. 4. A large piece of brass has generally a stronger magnetic power than a small one; and the flat surface draws the needle more powerfully than the edge or corner. 5. If only one end of a piece of brass be hammered, then that end alone will disturb the magnetic needle. 6. The magnetic power which brass acquires by hammering has a certain limit, beyond which it cannot be increased by further hammering. This limit is different in different pieces of brass, according to their thickness or quality. 7. In the course of his experiments, the following circumstance was twice observed: A piece of brass which had the property of becoming magnetic by hammering, and of losing that property by annealing lost its magnetic power entirely by being left in the fire till partially melted, but recovered it again on being fully cold. 8. A long continuance in a strong fire, which alters the texture of the metal, making it what some workmen call rosten, generally destroys the magnetic property also; whence this property seems to be owing to some particular configuration of its parts. 9. When brass is used in magnetic instruments, it ought either to be left entirely soft, or chosen of such a sort as will not become magnetic by hammering. 10. There are few substances in nature, which, when floated upon quicksilver, are not affected in some degree by the magnet.

Our author next proceeded to try the magnetic power of other metals, particularly the component parts of brasses, &c. copper, and zinc. With the former, the result was doubtful; and though pieces of hammer copper would sometimes attract the needle, yet the attraction was always exceedingly weak. Zinc had no effect, either in its natural state or hammered as much as it could bear without breaking. A mixture of it with tin had no effect. The same was observed of a piece of a broken reflector of a telescope made; of tin and copper; a mixture of tin, zinc, and copper; a piece of silver whether soft or hammered; a mixture of gold and silver; both hard and soft; and another mixture of gold and silver, a little copper, and a still less quantity of gold.

The magnetic property of nickel has been mentioned by several authors; but Mr Cavallo says he has found some pieces which did not affect the needle in the least. "It is probable (he says) that these pieces were not pure nickel, and perhaps some cobalt was contained in them; but I see no reason why the nickel, when alloyed with a little cobalt, should throw no attraction towards the magnet, if that property did really and essentially belong to it." Our author, lastly, made several experiments upon platina; the magnetic properties of which are found to be very similar to those of brass; the native grains becoming magnetic by hammering, and losing that property by heat; but the precipitate from aqua-regia, tined in a violent fire, or rather concreted together by this means, showed no sign of attraction whatever.

§ 3. Of the Attraction of the Magnet towards Iron in its Various States of Existence.

1. The first experiment which naturally occurs on this subject is, Whether mere heat could make any change in the magnetic properties of iron without destroying its texture or diminishing the power of the magnet to which it is applied. Kircher says, that he tried this experiment, and found that a piece of iron heated to such a degree as to be scarcely discernible from a burning coal, was in that state so powerfully attracted as if it had been cold. Mr Cavallo found the effect directly the reverse; for, having heated a piece of steel red hot, and in that state presented it to the magnet, so as to touch it repeatedly in various places, the least sign of attraction could be perceived. In this experiment, the redness of the iron could plainly be perceived in day-light; and our author acknowledges, that iron, tho’ its redness be perceptible in the dark, will still be attracted by the magnet. The result was the same on repeating the experiment a number of times over; but the attraction became as strong as ever a little after the redness ceased in the dark. The attraction seemed to begin sooner in steel than in iron. Our author does not pretend to say, that by heating iron to a red, or even to a white heat, the attraction of the magnet for it is absolutely annihilated; but it certainly was so far diminished that it did not affect the magnetic needle.

II. It was now tried what would be the effect of decomposing iron; and with this view an earthen vessel, containing about two ounces of iron-filings, was placed near the fourth end of the needle of the compass, by which the latter was drawn a little out of its direction. On adding some water, and then vitriolic acid, the attraction seemed to be increased, and the needle came nearer the vessel. This superior attraction continued till the effervescence began to cease: and at last it was found to be inferior to what it had been originally. To obviate some objections which might arise from the motion of the iron-filings, the experiment was repeated with steel-wire twisted in various directions, so as to present a large surface to the acid; and being placed at a proper distance from the needle, it attracted it out of its direction from 28° to 28°. After adding the diluted vitriolic acid, a strong effervescence ensued, and the needle was moved to 27° 47'; five minutes after that it floated at 27° 35'; and in five minutes more at 27° 30'; seeming even to come somewhat nearer in a little time after: but as it then appeared to have gained its maximum of attraction, the pot was removed, and the needle went back to its original station at 28°.

On repeating this experiment with different acids, it was found that the vitriolic increased the attraction more than either the nitrous or marine. With the former of these, the maximum of attraction was sooner
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IV. Using a globe of iron of the same diameter with the magnet instead of the cylinder, the results were:

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<th>Distance in inches</th>
<th>Attraction in grains</th>
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In the experiments with the cylinder, it was found that the magnet attracted a shorter cylinder with less force, but in the same proportion. From the others, it appears, that one magnet attracts another with less force than a piece of iron, but that the attraction begins from a greater distance; whence it must follow a different law of decreasement.

V. It has already been observed, that magnetic attraction takes place only between the opposite poles of two magnets; however, it frequently happens, that though the north pole of one magnet be presented to the north pole of another, that they show neither attraction nor repulsion; but that when placed very near each other, they will attract. This is explained by our author in the following manner: “When a piece of iron, or any other substance that contains iron, is brought within a certain distance of a magnet, it becomes itself a magnet, having the poles, the attractive power, and, in short, every property of a real magnet. That part of it which is nearest to the magnet acquires a contrary polarity; but it often happens that one of the magnets, being more powerful than the other, will change the pole of that other magnet in the same manner as it gives magnetism to any other piece of iron which is exposed to its influence; and then an attraction will take place between two poles apparently of the same names; though, in fact, it is an attraction between poles of different names, because one of them has actually been changed. Thus, suppose that a powerful magnet has been placed with its north pole very near the north pole of a weak magnet, it will be found, that, instead of repelling, they will attract each other, because that part of the weak magnet which before was a north pole, has been changed into a south pole by the attraction of the strong magnet.”

VI. Neither the attraction nor the repulsion of magnetism is sensibly affected by the interposition of bodies of any sort, excepting iron or ferrous substances in general. Thus suppose that when a magnet is placed at an inch distance from a piece of iron, an ounce, or any determinate weight, is required to move it; the same will be required, though a plate of metal,
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VII. By heat, the power of a magnet is weakened; and when it arrives at that degree called a white heat, it is entirely destroyed. On the other hand, the attraction is increased considerably by adding more and more weight to the magnet: for thus it will be found that the magnet will keep suspended this day a little more weight than it did the day before; which additional weight being added to it on the following day, or some day after, it will be able to suspend a weight still greater, and so on as far as a certain limit. On the other hand, by an improper situation, or by diminishing the quantity of iron appended to it, the power will decrease very considerably.

VIII. The magnetic attraction is communicable to any given piece of steel only in a certain degree; and therefore if a magnet is strong enough to give the maximum of attraction to the piece, it cannot be afterwards rendered more powerful by applying another magnet, however strong. Thus, indeed the steel may be made stronger for a few minutes; but this surplus of attraction begins to go off as soon as the strong magnet is withdrawn; and the power, continuing gradually to diminish, settles in a short time at that degree which is its limits ever after.

IX. Some have affected, that in the southern parts of the world, the north pole of the magnet is stronger than the south pole, and that in the northern parts the contrary takes place; others are of a quite contrary opinion, affirming, that in the northern regions the south pole is stronger than the north one: but neither of these opinions have yet been sufficiently confirmed by experience.

X. If a piece of iron be held to one of the poles of a magnet, the attractive power of the other pole will thus be augmented: Hence we may understand why a magnet will lift a greater weight from a piece of iron than from wood or any other substance, viz. that the iron appended to the magnet becomes itself a magnet while it remains in that situation; and thus, having two poles, the iron which is placed near the one increases the attractive power of the other which adheres to the magnet, and enables it to lift a greater weight than it would otherwise do.

XI. Soft iron acquires the magnetic power by being appended to a magnet; but it lasts only while the iron remains in that situation, vanishing as soon as the magnet and iron are separated from each other. With hard iron, but especially steel, the case is quite different; and the harder the iron or steel is, the more permanent is the magnetism which it acquires; though in proportion to this same hardness it is difficult to impress it with the virtue.

XII. The smallest natural magnets generally possess the greatest proportion of attractive power; so that there have frequently been seen magnets not weighing more than 40 or 50 grains, which would take up 40 or 50 times their own weight; but the greatest proportion of attractive power, perhaps ever known, belonged to the magnet worn by Sir Isaac Newton in his ring. It weighed only three grains, and was able to take up 743 grains, or nearly 250 times its own weight; and Mr Cavallo has seen one which could not weigh more than six or seven grains, and yet was capable of lifting 200. A semicircular steel magnet made by Mr Canteon, weighing an ounce and 1/3 penny-weights, took up 90 ounces; but magnets of about two pounds would lift more than five or six times their own weight, or indeed seldom so much. It frequently happens, that a piece cut off from a large natural magnet will lift more than the stone itself did when whole; which is to be attributed to the heterogeneous nature of the stone itself; for if part of it be impure, it is plain that this can do nothing else than obstruct the virtue of the remainder, which consequently must act more powerfully when the obstruction is removed.

XIII. As the two magnetic poles taken together are capable of lifting a much greater weight than a single one, and as they are generally situated in opposite parts of its surface, it has been customary to adapt two broad pieces of soft iron to them, letting the pieces project on one side of the magnet; because, in that case, the pieces themselves being rendered magnets, another piece of iron could be conveniently adapted to their projections so as to let both poles act the concert. These pieces of iron are generally held fast upon the magnet by means of a brass or silver box, in which case the magnet is said to be armed; and the pieces of iron are called its armature. For the same purpose, and to avoid the armature, artificial magnets have been commonly made in the shape of a horseshoe, having their poles in the two extremities. This is by far the best shape for magnets; and the horseshoe ones are always more powerful than straight magnetic bars.

§ 4. Of the Polarity of the Magnet.

Though, properly speaking, no magnet can have more than two poles, viz. a north and a south one, yet it frequently happens that both the natural and artificial kind are divided as it were into several magnets; each of which having likewise a north and south pole, the whole appears to have a number of poles, some of one denomination and some of the other. This plurality of poles arises sometimes from the shape, but more commonly from the heterogeneous nature, of the magnet itself; and with respect to those which have more than two poles, the following laws have been observed: 1. That the parts adjacent to one pole are endowed with a contrary polarity. 2. That the poles of one denomination are not always equal in number, but that they never differ by more than one; thus if the magnet has four south poles, it will either have three, four, or five north poles. Good and properly shaped magnets, however, have only two poles directly opposite to one another; though in truth it is always one half, or at least a great part of the magnet, that possesses one kind of polarity, the other having the contrary kind; the two points, which we call the poles, being only those where the attractive virtue is strongest. Those two points, in good magnets, are joined by a line passing through the centre, which line is called the axis of the magnet; and a circle whose plane is perpendicular to the axis encompassing the middle of the magnet is called its equator; and to complete the supposed similarity between the terraqueous globe and magnetical bodies, the latter have frequently
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Chap. II. Theory.

Magnetism has been formed of a spherical shape, with the poles equator marked upon their surface; in which case they have got the name of terrestris or small earth. On breaking a magnet into two or three parts, each one becomes a perfect magnet, though they have not always an equal number of poles of the same denomination. The poles of the broken pieces generally answer to those of the whole magnet which were nearest them, though this does not always hold good. A magnet with two poles will very readily place itself in the magnetic meridian, if suspended by a fine thread, or otherwise left at liberty to turn; but when there are more than two poles, it may happen that their opposite tendencies will counteract each other in such a manner that the magnet cannot traverse, though it will still attract and repel as though it had only two. Thus, suppose that an oblong magnet has a north polarity at both ends and a south polarity in the middle; if the north poles are both equally strong; then it is plain, that neither of them can point towards that quarter in preference to the other; but if a magnet of this kind be broken in the middle, the two parts will traverse readily. It very seldom happens, however, that both poles are equally strong; in which case one of them will always get the better of the other, and the magnet will traverse notwithstanding its having more than two poles. The polarity of the magnet is its most valuable property, as upon it depends the construction of the magnetic needle or mariner's compass useful in navigation; for an account of which, see the article Compass, and Needle.

For the variation of the needle, or its declination from the true north and south direction, see the article Variation.

An account of the inclination or dipping of the magnetic needle is given under the article Dipping Needle.

The directive, or polar power of a magnet, extends farther than its attractive power; thus if a magnet freely suspended, be placed in the neighbourhood of another, it will be found that they are affected each other's direction when their attraction towards iron or towards each other cannot be perceived. This may be easily tried by placing one of them in a scale of a balance and the other at the distance below it.

CHAP. II. Theory of Magnetism.

The phenomena of magnetism, like those of electricity depend on a cause for the subject to the investigation of our senses, that any regular and well-supported theory can as yet fearfully be expected. The subject indeed is still more difficult than that of electricity; for in the latter the fluid is often made visible and otherwise perceptible by our senses; but no experiment could ever render the cause of magnetism perceptible otherwise than by its effects. The idea of its being occasioned by a fluid entering in at one pole and passing out at another, took its rise, and became pretty general, from the following experiment: Having put a small artificial magnet among some iron filings laid upon a piece of paper, give the table a few gentle knockings with your hand, so as to shake the fillings a little, and they will dispose of themselves as represented in fig. 1.

where A B and C D represent the two poles of the magnet, and the dotted lines the disposition of the fillings. But Mr Cavaliere observes, that this experiment cannot be any proof of the fluid's circulation; because if the fluid, of whatever nature it may be, did really circulate from one pole to the other, and had any action on the fillings, there would be all driven towards that pole to which the fluid directed its course. The true cause of the disposition of the fillings is their becoming actually magnetic, and their two extremities being possessed of contrary polarities. Now, when there are many particles of iron near the magnet, those which touch its surface are rendered magnetic; consequently they attract other particles, and these being also rendered magnetic, attract others, and so on, forming fillings of small magnets, which gradually increase in power as they recede from the magnet. As each of these particles has two magnetic poles, by a little consideration it will appear, that the farthest ends of these fillings or lines which proceed from the parts adjacent to one of the poles of the magnet, for instance the north are likewise possessed of the north polarity; and the farthest extremities of those which proceed from the parts adjacent to the south pole of the magnet, are possessed of the south polarity: hence, when they come sufficiently near, they attract the extremities of the former fillings, and consequently form the curves delineated on the figure. The making of the table in this experiment serves to understand the filings, by making them jump up a little way, and thus place themselves in the proper situation; otherwise the action of the magnet will not have power sufficient to dispose properly those particles which stand at a considerable distance.

The late discoveries in electricity have naturally suggested another theory, viz. that the magnetic phenomena may be occasioned by a fluid analogous to the electric, or perhaps by the very same: and with a view to investigate this theory, the phenomena of magnetism and electricity have been accurately compared with each other, and the analogy between them carefully marked. This analogy is found to consist principally in the following particulars:

1. Electricity is of two kinds, positive and negative, each of which repels its own kind, and attracts the opposite. In magnetism, the north and south poles do the same; each being repulsive of its own kind of magnetism, and attracting the opposite.

2. In electricity, whenever a body in its natural state is brought near an electrified one, it becomes itself electrified, and possessed of the contrary electricity; after which an attraction takes place. In like manner, when a piece of iron or steel is brought within the influence of a magnet, it becomes itself possessed of a magnetism contrary to that which the magnet possesses, and of course attracted.

3. One sort of electricity cannot be produced without the other, neither is it possible to produce one kind of magnetism without the other also.

4. The electric power may be retained by certain substances, as amber, glass, &c., but easily pervades other substances, which are therefore called conductors. Magnetism has a similar conductor in soft iron; for by means of it the virtue may be extended farther than
...can be done without it; at the same time that the iron itself loses all magnetic power the moment it is separated from the magnet. Hardened iron, carbon iron, and steel, perform a part analogous to that of electricity; for the virtue does not easily pervade them, but is retained, and may be communicated by them to other unmagnetic pieces, in like manner as the electric virtue may be communicated to bodies by means of an excited electric. With regard to other substances, they seem not to be properly conductors of magnetism, because the fluid pervades them as though nothing were present, and they cannot transmit the virtue farther than it would go without them. With soft iron it is otherwise. Thus, if to one of the poles of a magnet we append a piece of iron of considerable length, the end farther from the magnet will likewise attract iron with much more force than the magnet could do at that distance without it, while at the same time this attractive power is plainly that of the magnet itself, and not any way inherent in the iron, as it vanishes the moment we separate them. If a piece of hard steel of an equal length with the iron be appended to the magnet by one of its ends, we will find that the distant end will not manifest any attraction, and it will be a considerable time before the magnetic virtue can diffuse itself for any distance along it; but when the separation is made, the steel will be found to be magnetic, and will preserve its virtue for a long time.

5. The electric virtue exerts itself most powerfully on points, which are found to carry it off or receive it in vast quantities. In like manner a magnet will hold a piece of iron more powerfully by a corner, or blunt point, than by a flat surface. On sharp points indeed the magnet has but little hold by reason of the deficiency of surface.

6. From some experiments related under the article Electricity, it appears possible to superinduce the negative and positive electricity upon one another; and in magnetism it is possible to do the same. Thus, if we place a wire of some length upon a pivot, so that it can turn very easily, by touching both ends of it upon the poles of a magnet it will acquire a polarity; one end being repelled by one pole and attracted by the other. If now we give the north end, for instance, a very flight touch with the north pole of the magnet, we will find that it has a small degree of north magnetism superinduced upon it, so that on approaching the south pole of the magnet it will be repelled, but by approaching the magnet nearer, or holding the wire for a little iron flying away, the south magnetism of the wire will be entirely destroyed, and the north magnetism appear as before. This experiment is not very easily made; its success depends on having the first magnetism as strong and the second as weak as possible.

These are the most remarkable particulars in which magnetism and electricity are found to agree; but the differences between them are no less remarkable than those particulars. The magnetic power affects none of our senses, and most perceptibly at least attracts only iron; while electricity attracts and repels bodies of every kind indiscriminately. The electric virtue exists on the surface, but that of the magnet pervades the whole substance. A magnet loses nothing of its power by communicating its virtue to other bodies, but electricity always does; and, lastly, the magnetic virtue is permanent; whereas that of electricity, without the greatest care, is exceedingly perishable, and capable of being destroyed.

Notwithstanding these disgressions, however, the analogies between magnetism and electricity are so great, that the hypothesis of a magnetic fluid has now gained great credit; and upon this hypothesis Professor Ampère has attempted to solve the phenomena of magnetism in the following manner:

1. This fluid is sufficiently subtle to penetrate the substance of all terrestrial bodies, and like the electric fluid is supposed to be repulsive of itself.

2. There is a mutual attraction between the magnetic fluid and iron, but an indifference between it and all other bodies.

3. There is a great resemblance between the magnetic fluid and iron, and magnet, but an indifference between it and all other bodies.

4. Iron and all ferruginous substances contain a quantity of magnetic fluid equally dispersed throughout their substance when those bodies are not magnetic. In this state they show neither attraction nor repulsion, because the repulsion between the particles of magnetic fluid is balanced by the attraction between the matter of those bodies and the fluid; in which case the bodies are said to be in a natural state: but when in a ferruginous body the quantity of magnetic fluid is driven out, then the body becomes magnetic; one extremity of it being now overcharged with magnetic fluid and the other undercharged. Bodies thus constituted, viz. rendered magnetic, exert a repulsion between their overcharged extremities in virtue of the repulsion between the particles of that excess of magnetic fluid, which is more than overbalanced by the attraction of their matter. There is an attraction exerted between the overcharged extremity of one magnetic body and the undercharged extremity of the other, on account of the attraction between that fluid and the matter of the body; but to explain the repulsion which takes place between them, overcharged extremities, we must either imagine that iron when deprived of the magnetic fluid is repulsive of itself, or that the undercharged extremities appear to repel each other only because of them attracting the opposite overcharged extremities.

A ferruginous body, therefore, according to this hypothesis, is rendered magnetic by having the equable diffusion of magnetic fluid through its substance disturbed, so as to have an overplus of it in one or more parts and a deficiency in others, its magnetism remaining as long as its impermeability prevents the restoration of the balance between the overcharged and undercharged parts. A piece of iron is rendered magnetic by the vicinity of a magnet; because when the overcharged part or pole of the magnet is presented to it, the overplus of the magnetic fluid in that pole repels the fluid away from the nearest extremity of the iron; which therefore becomes undercharged, or posseled of the contrary polarity, to the most remote part of the iron, which consequently becomes overcharged, or posseled of the same polarity as the presented pole of the magnet. When the piece of iron is rendered magnetic by presenting it to the undercharged extremity or pole of the magnet, then the...
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Theor. part of the iron which is nearest to it becomes overcharged, &c. because that part of the magnet, being deprived of its magnetic fluid, attracts the magnetic fluid of the iron to that extremity of the iron which lies nearest to itself.

Hence, in order to give magnetism to a piece of steel, the strength of the magnet employed must be such as to overcome the reticence which the subsidence of the steel makes against the free passage of the magnetic fluid; hence a piece of soft steel is rendered magnetic more easily than a hard one, and a strong magnet will render magnetic such bodies as a weak one cannot affect. When two magnetics of equal power have their opposite poles presented to each other, they mutually preserve and strengthen the powers of each other; but when poles of the same denomination are forced together, if the powers are equal, they mutually weaken each other; or if unequal, the weaker will have its poles altered, or perhaps its attractive power entirely destroyed in a short time.

Before we make any remarks upon this hypothesis, it will be necessary to take notice of another, which Mr. Cavallo considers as so well established, "that there can hardly be a philosopher sceptical enough to doubt of its truth." This is that the earth itself is a magnet; which position he says is proved almost to a demonstration in the following manner.

1. Almost all the phenomena which may be exhibited with a common magnet may also be exhibited with the earth, as far as it can be tried. And,

2. Vaft masses of iron or ferruginous matter actually magnetic are dug out of the earth almost in every part of it.

In support of the above position, he adds the phenomena of the compass, dipping-needle, and the magnetism (to be afterwards explained) which soft iron receives when properly charged. No experiment has yet been tried to account for their phenomena; if the earth has its opposite poles situated in different parts of the world, that it could not be owing to any regular cause diffused over the whole. Four magnetic poles were then supposed to lie within the earth, and to be moveable with respect to each other; and that therefore the variation, whose theory would now be very intricate, ought to be derived from all their actions conjointly: but notwithstanding all this complication of poles, it might still be objected, that some kind of regularity, not observed in the variation of the magnetic compass, ought to have taken place. So that as yet there is no theory which seems to explain the variation with any kind of certainty.

The different hypothesis on this subject are more fully considered under the article Variation: here we shall only observe, that with respect to the magnetism of the earth, the particulars already related seem to decide against its existence. The most unequivocal proof we have of the existence of magnetism is the attraction of iron; and this capital mark is deficient, or at least has never been proved, in the earth. The poles of all the magnets, we know, are fixed and invariable; nor are we obliged to have recourse to magnets within magnets, or other ancillary suppositions, to account for their phenomena; if the earth is a magnet, therefore, the magnetism it possesses must be of a kind so different from the property usually distinguished by that name, that we can in no respect determine them to be the same.

Mr. Cavallo is of opinion that "the magnetism of the earth arises from the magnetism of all the magnetic substances contained in it, and intermixed with other bodies; that the magnetic poles of the earth may be considered as the centres of the polarities of all the particular aggregations of the magnetic substances; and that those principal poles must change place relatively to the surface of the earth, according as the particular aggregations of magnetic substances within the earth are in some manner or other altered, so as to have their power diminished, increased, approached
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But new laws of motion, acting in short as if it were another fluid, in which state we call it electricity, or the electric fluid. In this state it passes through the substance of the earth from the equator towards the polar regions, getting out again in the vicinity of the poles, ascending into the high atmospheric regions, and then returning from the equatorial parts from whence it came. On this supposition, which appears to be greatly confirmed by various natural phenomena, it is easy to see, why in the northern and southern parts the direction of the currents issuing from the earth should always become more and more perpendicular to the earth as we approach the poles, and on the contrary why their direction must be horizontal or nearly so in the equatorial parts. The discovery of this general cause therefore seems to be the nearest approach we can as yet make to the knowledge of the origin of magetical phenomena. In what manner iron more than other metals is influenced by this fluid, or why the direction of a current of electric matter either to or from the earth, should cause such strong attractions as magetical bodies are sometimes endowed with, we have as yet no data for understanding.

Chap. III. Practice of Magnetism.

This consists in communicating the magnetic virtue from one body to another; making artificial magnets, compasses, dipping-nails, &c.; and investigating the various phenomena resulting from bodies placed in different situations.

§ 1. To communicate Magnetism by the Loadstone.

Magnetism is communicated merely by presenting a piece of iron or steel to one of the poles of a magnet or loadstone, even without touching it; though a strong and permanent power cannot be given without contact, or even stroaking the one up the other for a number of times. In this operation, that part of the ferruginous body which touches the pole of the magnet acquires the contrary magnetism; that is, if it touches the north pole, it will turn towards the south, et vice versa. The power acquired is strongest when soft iron is applied, weaker with hardened iron, and weakest of all with hard steel: but the permanency of it follows just the reverse of this rule; for steel or hardened iron will preserve its virtue for many years, but soft iron loses it the moment we withdraw the magnet. When we define a strong and permanent virtue, therefore, it is best to use the hardest steel, and to impregnate it by means of one or more powerful
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Practice. If, when the pole of the magnet which gives the virtue be applied to that end of the steel which is to be made the south pole, the same method may be employed in rendering a weak magnet more powerful than before, or in restoring the virtue to one which has left it.

The operation of communicating magnetism to pieces of steel or iron, is called touching them; and as this is of the utmost utility in navigation, for the purpose of giving polarity to needles, very considerable pains have been bestowed upon the subject, in order to discover the methods of giving them the magnetic virtue in the most efficient and permanent manner. When only one magnetic bar is to be made use of, one of its poles must be applied as represented fig. 2, where C D represents the needle or steel bar to be impressed. The magnet A B is then to be drawn all along the surface of it, till it reaches the extremity D. The magnet being then removed, must be applied to the extremity C, and drawn over the needle as before. Thus the needle must be rubbed several times; by which means it will acquire a considerable degree of magnetism. In this method, that other extremity of the needle which the magnet touched last acquires the contrary magnetism; that is, if B be the north pole of the magnet, C will be the north pole, and D the south of the needle. This method, however, is never found to be equally effectually with that in which two magnets, or both poles of one magnet, are made use of.

To communicate magnetism by means of two magnetic bars, place the bar or needle A B, fig. 3, upon a table; then let the two magnetic bars C D, E F, straight upright upon it a little distance, equal on both sides from the middle of the bar A B, and in such a manner that the south pole D of one of the bars may be nearest to that end of the bar A B which is to become the north pole, &c. These two bars must then be slid gradually towards one extremity the bar, keeping them constantly at the same distance from each other; and when one of them, for instance CD, is arrived at A, then they must be slid the contrary way, till EF arrives at B; and thus the bar A B must be rubbed a greater or smaller number of times, till it will be found by trial to have acquired a considerable power. When the magnetic bars are powerful, and the bar A B of very good steel, and not very large, a dozen strokes are fully sufficient; but when the bars are to be removed from the bar A B, care must be taken to bring them to the same situation where they were first placed; viz. at a little and equal distance from the middle of the bar A B, from whence they may be lifted up.

If it be required to communicate the greatest magnetic power possible, we may proceed in the following manner: 1. The magnetic bars may be joined at top as in fig. 4, interposing a piece of wood, or any other substance excepting iron; for thus the opposite poles being contiguous in the upper part, strengthen each other, and of consequence the lower ones are also strengthened. 2. The bar to be rendered magnetic may be placed between the bars of soft iron, as shown in the same figure. 3. The magnetic bars may be inclined contrary ways, as recommended by Mr. Hutton, making an angle of about 15 degrees with the bar A B. See fig. 5. In the same manner a bar may be rendered magnetic by an armed or horse-shoe magnet. In any of the methods hitherto mentioned, however, the bar to be rendered magnetic must be stroked on every side; and to let the magnetic centre fall just in its middle, care must be taken to stroke one half of the bar just as much as the other. Whenever a steel bar, or, in general, any piece of ferrous matter, is rendered magnetic by the application of two bars, or by the two poles of one magnet, the operation is called the double touch, but the single touch when only one bar is applied.

Artificial magnets of a semicircular form, or shaped like a horse-shoe, have the magnetism communicated to them in the same manner with those which are straight, only the magnetic bars used for this purpose must follow the curvature of the bar to be impressed. Thus, suppose it is required to impress the crooked piece of steel ABC, fig. 6, lay it flat on a table, and to its extremities apply the magnets D E, F G, joining their extremities FG with the conductor or piece of soft iron FG. Apply then the magnetic bars H I to the middle of the piece ABC, and stroke it with them from end to end, following the direction of the bent steel, so that on one side of it the magnetic bars may stand as represented by the dotted lines L K. When the piece of steel has been thus rubbed a sufficient number of times on one side it is then to be turned, and rubbed in like manner on the other, until it has acquired a sufficient degree of magnetism.

From considering that soft iron, or soft steel, acquires magnetism very easily, though it loses it with equal facility, Mr. Cavallo was induced to suppose, that if magnetism were to be communicated to a piece of hard steel while softened by heat, and the metal were then to be hardened by pouring cold water upon it while in the act of receiving the magnetism, it was possible the virtue might be first communicated to them in a very high degree, and then be fixed by means of the hardening of the steel. To determine this matter fix magnetic bars were placed in an oblong earthen vessel, in such a manner that the north poles of them might be opposite to the south poles of the three other, forming two parcels of bars lying in the same direction, and about three inches asunder, which was nearly the length of the steel-bar intended to be rendered magnetic. The bar was made quite red hot, and in that state was placed between the magnetic bars. Cold water was then immediately poured upon it; by which it was hardened to such a degree that the file could not touch it; but though it had thus received a considerable degree of magnetism, the power was not superior to what might have been communicated in the ordinary way. On repeating the experiment with steel-bars of different sizes, it was found that short bars receive a proportionally greater degree of power than long ones, and that because the latter cannot be sufficiently penetrated by the magnetic power when the magnets are placed at their ends; and if a number of magnets be placed along the sides, in order to communicate a greater degree of virtue, it frequently happens that the bar acquires a number of poles. Our author is nevertheless of opinion, that this method is of considerable use: though by it we cannot
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§ 2. To communicate the Magnetic Virtue without any Magnet either natural or artificial.

This may be done with a soft iron-bar in the manner already related, viz. by turning it in a position perpendicular to the surface of the earth, or any other excepting a line directly perpendicular to the dipping-needle. The magnetism thus acquired, however, is always weak, and is instantly lost; while a steel-bar will not receive any perceptible degree of magnetism by this method. But if an iron-bar be made red hot, and left to cool in the magnetic line, or if it be repeatedly struck with a hammer while in that line, it will acquire a small degree of permanent magnetism; though this will soon vanish by leaving the bar in an improper position, or by inverting and striking it again. The magnetism lasts longer in proportion to the hardness of the iron; but a longer time will be required to give it the degree of virtue it is capable of receiving by this method. If an iron bar is left for a long time in the direction of the magnetic line, or even in a perpendicular posture, it will sometimes acquire a great degree of power. Mr Boyle makes mention of an iron-bar, ten feet long, which had acquired so much virtue by standing in this posture, that it exceeded a loadstone of three pounds and an half weight, and would turn the needle at eight or ten feet distance. Even tongs, poker, and other kitchen utensils, by being often heated, and set to cool again in an erect posture, are frequently observed to gain a magnetic virtue. Sometimes iron-bars, which were not capable of receiving permanent magnetism on previous occasions, have, merely by exposure to the atmosphere for a great length of time, acquired a considerable degree of power; at the same time it has been remarked, that these bars became much harder by this exposure; the cause of which has not yet been discovered.

Iron or steel acquires a very perceptible degree of magnetism by drilling, hammering, or other methods by which they are put into violent action. The cause of this magnetism Mr Cavallio looks for in the earth itself, the changeable nature of the metal by heat or cold, and the vibratory motion into which its parts are accidentally put. For the same reasons (says he) it seems that magnetism, in certain cases, is produced by electricity; the particulars observed concerning which are the following:—When the bar or needle is laid horizontally in the magnetic meridian, whichever way the shock of an electric jar or battery enters, the end of the needle which lies towards the north acquires the north polarity, viz. the power of turning towards the north when freely suspended, the other end acquiring the south polarity. If the bar before it receives the shock has some polarity, and is placed with its poles contrary to the usual direction, then its original polarity is always diminished, and sometimes reversed. When the needle is struck standing perpendicularly in this hemisphere, the lower end becomes the north pole, even when it had some magnetism before, and receives the shock while standing with its south pole downwards. When all other circumstances are alike, the degree of magnetism received seems to be the same, whether the needles are struck while standing horizontally in the magnetic meridian or perpendicular to the horizon. When a needle is placed in the magnetic equator, a shock through its length very seldom renders it magnetic; but if the shock be passed through its width, it acquires the virtue, the extremity which lay towards the east generally becoming the north pole. If a needle or bar strongly magnetic or a natural magnet, be struck by the electric shock, its power is thereby diminished. When the shock is too strong, so that the needle is thereby rendered considerably hot, it acquires either no magnetism at all or a very small degree of it. Hence a stroke of lightning often renders pieces of iron or steel magnetic, as well as those bodies which naturally contain iron, as some bricks, &c.

There are various methods of communicating a permanent magnetism to ferrous bodies, by means of a bar rendered magnetic by the earth; of which the most simple is that described by Mr Marcel, whose experiments were made in the year 1726. Being employed in making some observations on the magnetic power which he found in great pieces of iron, he took a large vice weighing 90 pounds, in which he fixed a small anvil weighing 12 pounds. The steel to which he wished to give the magnetic virtue was laid upon the anvil in a north and south position, which happened to be the diagonal of the square surface of the latter. He then took a piece of iron an inch square, and 33 inches long, weighing about eight pounds, having one end rounded and brightly polished, the other being tapered. Holding then the steel fast upon the anvil with one hand, he took the iron-bar in the other; and holding it accounted of their effect, have, merely by exposure to the atmosphere for a great length of time, acquired a considerable degree of power; at the same time it has been remarked, that these bars became much harder by this exposure; the cause of which has not yet been discovered.

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own weight of iron; and after being six years kept in the most careless manner, was found to have rather gained than lost any thing of its virtue. In the course of his experiments, Mr Marsel found that the end at which he began to rub was always the north pole, whatever position the steel was laid in. On rubbing a piece of steel from one end to the middle, and then from the other end to the middle, it acquired two north poles, one at each end, the middle being a south pole. Beginning to rub from the middle towards each end, he found a north pole in the middle and a south pole at each extremity.

Magnetism may be communicated to a small piece of soft steel in the following manner. Take two iron bars of about an inch square, and upwards of three feet in length, keep them in the magnetical line or in a perpendicular posture, as represented fig. 7. Let the piece of steel CB be either fastened to the edge of a table or held by an assistant; and placing the lower extremity of the bar A B, and the upper extremity of the bar C D, on opposite sides, and in the middle of the extremities, moving both bars at the same time. When both are arrived at the extremities of the steel, remove them from it, and apply them again to the middle. Do so for 40 or 50 times, and the steel will be found to have a considerable degree of magnetic power.

Care, however, must be taken, in removing the bars, not to draw them along the surface of the steel, or the experiment will not succeed, because the magnetism is destroyed by the contrary strokes.

The late Dr Godwin Knight possessed a surprising skill in magnetism, being able to communicate an extraordinary degree of attractive or repulsive virtue, and to alter or reverse the poles at pleasure; but as he refused to discover his methods upon any terms whatever (even, as he said, though he should receive in return as many guineas as he could carry) these curious and valuable secrets have died with him.

In the 6th volume of the Philosophical Transactions however, Mr Benjamin Wilson hath given a process which at least discovers one of the leading principles of Dr Knight's art, and may perhaps be a means of discovering the whole to those who shall be so liberal. The doctor's process, according to Mr Wilson, was as follows. Having provided himself with a great quantity of clean iron-filings, he put them into a large tub that was more than one third filled with clean water; he then, with great labour, worked the tub to and fro for many hours together, that the friction between the grains of iron by this treatment might break off such smaller portions as would remain suspended in the water for a time. The obtaining of these very small particles in sufficient quantity seemed to him to be one of the principal desiderata in the experiment. The water being by this treatment rendered very muddy, he poured the same into a clean iron vessel, leaving the filings behind; and when the water had stood long enough to become clear, he poured it out carefully, without disturbing such of the sediment as still remained, which now appeared reduced almost to impalpable powder. This powder was afterwards removed into another vessel in order to dry it; but as he had not obtained a proper quantity thereof by this one leap, he was obliged to repeat the process many times. Having at last procured enough of this very fine powder, the next thing was to make pastes of it, and that with some vehicle which would contain a considerable quantity of the phlogistic principle; for this purpose, he had recourse to linseed oil in preference to other fluids. With these two ingredients only he made a stiff paste, and took particular care to knead it well before he moulded it into convenient shapes. Sometimes, while the paste continued in its soft state he would put the impression of a seal upon the several pieces; one of which is in the British Museum. This paste was then put upon wood, and sometimes on tiles, in order to bake or dry it before a moderate fire at about the distance of a foot or thereabouts. He found that a moderate fire was most proper, because a greater degree of heat made the composition frequently crack in many places. The time required for the baking or drying of this paste was generally about five or six hours before it attained a sufficient degree of hardness.

When that was done, and the several baked pieces were become cold, he gave them their magnetic virtue in any direction he pleased, by placing them between the extreme ends of his large magazine of artificial magnets for a few seconds or more, as he saw occasion. By this method the virtue they acquired was such, that, when any of those pieces were held between two of his best ten-guinea bars, with its poles purposely inverted, it immediately off itself turned about to recover its natural direction, which the force of those very powerful bars was insufficient to counteract.

In the 6th volume of the Philosophical Transactions we have the following account, from Dr Fothergill, of Dr Knight's method of imitating natural magnets, but which is by Cavallo supposed to be owing to some mistake or misinformation. "I do not know what he, that ever the doctor (Dr Knight) left behind him any description of a composition he had made to form artificial lodestones, I have seen in his possession, and many other of his friends have likewise seen, such a composition, which retained the magnetic virtue in a manner much more fixed than either any real lodestone or any magnetic bar however well tempered. In the natural ones he could change the poles in an instant, so likewise in the hard iron bars; but in the composition the poles were immovable. He had several small pieces of this composition which had strong magnetic powers. The largest was about half an inch in breadth, very little longer than broad, and near a quarter of an inch thick. It was not armed, but the ends were powerfully magnetic; nor could the poles be altered, tho' it was placed between two of his largest bars, and they were very strongly impregnated. The mass was not very heavy, and had much the appearance of a piece of black lead, though not quite so limy. I believe he never divulged this composition; but I think he once told me, the basis of it was filings of iron reduced by long continued attrition to a perfectly impalpable state, and then incorporated with some plant matter to give it due consistence." From these accounts it appears that the basis of Dr Knight's artificial lodestones was the black powder to which iron filings are reduced by water, and which is known among the apothecaries by the name of Martis: Ethlops; for whence Mr Cavallo gives the following receipt for imitating the natural magnets.

"Take some martsial ethlops, or, which is more easily
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Practice. Easily procured, reduce into very fine powder the scales of iron which fall from red-hot iron when hammered, and are found abundantly in smiths shops. Mix this powder with drying linseed oil, so as to form it into a very stiff paste, and shape it in a mould so as to give it any form you require; whether of a terrella, a human head, or any other. This done, put it into a warm place for some weeks, and it will dry so as to become very hard; then render it magnetic by the application of powerful magnets, and it will acquire a considerable power."

As to the method of making artificial magnets of steel, none has succeeded in it better than Mr. Cantou, whose process is as follows.

Procure a dozen of bars, six of soft steel, each three inches long, one quarter of an inch broad, and one-twentieth of an inch thick; with two pieces of iron, each half of the length of one of the bars, but of the same breadth and thickness; also six pieces of hard steel, each five inches and a half long, half an inch broad, and three-twentieths of an inch thick; with two pieces of iron of half the length, but the whole breadth and thickness of one of the hard bars; and let all the bars be marked with a line quite round them at one end. Then take an iron poker and tongs (fig. 8.), or two bars of iron, the longer they are and the longer they have been used, the better; and fixing the poker upright between the knees, it to hold, near the top, one of the soft bars, having its marked end downwards, by a piece of weaving silk, which must be pulled tight by the left hand, that the bar may not slide: then grasping the tongs with the right hand, a little below the middle, and holding them nearly in a vertical position, let the bar be stroked by the lower end from the bottom to the top, about ten times on each side, which will give it a magnetic power sufficient to lift a small key at the marked end; which end, if the bar was suspended on a point, would turn towards the north, and is therefore called the north pole; and the unmarked end is, for the same reason, called the south pole. Four of the soft bars being impregnated after this manner, lay the two (fig. 9.) parallel to each other, at the distance of one fourth of an inch, between the two pieces of iron belonging to them, a north and a south pole against each piece of iron; then take two of the four bars already made magnetic, and place them together so as to make a double bar in thickness, the north pole of one with the south pole of the other; and the remaining two being put to these, one each side, so as to have two north and two south poles together; separate the north from the south poles at one end by a large pin, and place them perpendicularly with that end downward on the middle of one of the parallel bars, the two north poles towards its south and the two south poles towards its north end: slide them backward and forward three or four times the whole length of the bar, and removing them from the middle of this, place them on the middle of the other bar as before directed, and go over that in the same manner; then turn both the bars the other side upwards, and repeat the former operation: this being done, take the two from between the pieces of iron; and, placing the two outermost of the touching bars in the room, let the other two be the outermost of the four to touch these with; and this process being repeated till each pair of bars have been touched three or four times over, which will give them a considerable magnetic power, put the half-dozen together after the manner of the four (fig. 10.), and touch them with two pair of the hard bars placed between their irons, at the distance of about half an inch from each other; then lay the soft bars aide; and with the four hard ones let the other two be impregnated (fig. 11.), holding the touching bars apart at the lower end near two tenths of an inch; to which distance let them be separated after they are set on the parallel bar and brought together again before they are taken off; this being observed, proceed according to the method described above, till each pair have been touched two or three times over. But as this vertical way of touching a bar will not give it quite so much of the magnetic virtue as it will receive, let each pair be now touched once or twice over in their parallel position between the irons (fig. 12.), with two of the bars held horizontally, or nearly so, by drawing at the same time the north pole of one from the middle over the south end, and the south of the other from the middle over the north end of a parallel bar; then bringing them to the middle again, without touching the parallel bar, give three or four of these horizontal strokes to each side. The horizontal touch, after the vertical, will make the bars as strong as they possibly can be made, as appears by their not receiving any additional strength, when the vertical touch is given by a great number of bars, and the horizontal by two of a superior magnetic power. The whole process may be gone through in about half an hour; and each of the large bars, if well hardened, may be made to lift 28 Troy ounces, and sometimes more. And when these bars are thus impregnated, they will give to an hard bar of the same size its full virtue in less than two minutes; and therefore will answer all the purposes of magnetism in navigation and experimental philosophy much better than the lodestone, which is known not to have a sufficient power to impregnate hard bars. The half dozen being put into a cafe (fig. 13.) in such a manner as that two poles of the same denomination may not be together, and their irons with them as one bar, they will retain the virtues they have received; but if their power should, by making experiments, be ever so far impaired, it may be restored without any foreign assistance in a few minutes. And if, out of curiosity, a much larger set of bars should be required, these will communicate to them a sufficient power to proceed with; and they may, in a short time, by the same method, be brought to their full strength.

To expedite the process of making magnets, the bars should be fixed in a groove, or between brass pins, to prevent them from sliding; or they may be kept steady by means of a weight and ruler, as in fig. 11.

§ 3. Apparatus for making Experiments in Magnetism, with an Account of various Experiments tending to illustrate and prove the Laws already laid down.

The apparatus necessary in magnets is but small, consisting only of a few magnets or magnetic bars, a magnetic horizontal needle or compass, and a dipping needle. For those who do not intend to be very accurate, a common artificial horse-shoe magnet and a few fewing needles may be sufficient; but where greater accuracy is required, it will then be necessary to have
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Practice. have a good set of magnetic bars, commonly six; a few small magnetic needles, a larger needle in a box with a graduated circle, and a dipping needle; to which may be added some pieces of steel-wire, a few bars of soft iron, &c.

The magnetic bars ought to be made of the best steel, and tempered quite hard. There is not, however, any method known as yet, by which we can distinguish the kind of steel which is best for magnetic purposes. It will be proper, therefore, previous to the construction of the bars, to try the quality of the metal in the following manner: Take a piece of it about three inches long and a quarter of an inch thick, no matter whether round or square; make it red-hot, and in that condition plunge it into cold water, which hardens it so that a file will not touch it. Apply then two powerful magnetic bars; holding the north pole of one to one extremity of the steel, and the south pole of the other magnet to the other extremity of the steel. Having kept them in this position for about a minute, separate them from the steel, and then try whether it will keep suspended a key or other piece of iron which may be at hand. By treating in this manner pieces of different steel, it will easily be perceived which is capable of lifting the greatest weight, and consequently the most proper for the construction of the bars.

Having determined the quality of the material, the next thing to be considered is the shape of the bars; for unless the length and breadth of them bear a certain proportion to each other, they will not be capable of receiving their utmost power. The best shape, according to Mr. Cavallo, is when the length is ten times the breadth, and 20 times the thickness. The usual dimensions are five inches in length, half an inch in breadth, and a quarter of an inch in thickness. Cylindrical bars are less convenient. It is not absolutely necessary to polish these bars; though it will be better to do so, they being in this state much less liable to rust. One extremity is generally marked with a line all round, to distinguish one pole from another; and it is the north pole which is usually marked in this manner. When kept together, the magnetic bars must be placed alternately with the marked end of one contiguous to the unmarked end of the other. Two pieces of soft iron called supports always belong to each set of bars. Each of these is equal in size to the half of one of the bars; so that when placed contiguous to one another in one direction, they may equal one of the bars. These are useful when other bodies are to be rendered magnetic. For the construction of the Compass and Dipping Needle, see these articles.

Experiments with the above described Apparatus.

1. To determine whether any substance is attracted by the magnet or not. If the substance to be examined contains iron, the attraction will evidently show itself on bringing near it one of the magnetic bars. The quantity of attraction will always be known by the force requisite to separate them, and its proportion is estimated by the degree of that force. Thus if two ounces are required to separate a magnet from any substance, the degree of attraction is reckoned double to that which requires only one ounce to separate them. If the attraction be so small that it cannot be perceived in this way, it must be put to swim upon water in an earthen or wooden vessel, by means of a piece of wood or cork. In this way the attraction will be much more easily manifested by the body coming towards the magnet when approached to it. It will sometimes be necessary to bring the magnet within one-tenth of an inch of the body to be attracted; and as the latter advances, care must be taken to withdraw the magnet; for if they be suffered to strike against each other, the body, if hard, will generally recede; and it will likewise be proper to prevent the magnet to the body when the latter is at rest.

By letting the substances to be attracted swim upon quicksilver, a still smaller degree of attraction can be perceived. In using this fluid, the following particulars must be attended to. 1. The aperture of the vessel in which the quicksilver is kept must be at least six inches in diameter. The reason of this is, that, as the surface of the quicksilver descends near the sides of the vessel, the curvature of surface formed by that descent is proportionately greater in the narrow vessels than larger ones. If the vessel is only three or four inches in diameter, the body to be attracted will perpetually run from one side to another; common soup-plate, however, will be found a very convenient vessel for this purpose. 2. It will be necessary to have the quicksilver very pure; and as it is very difficult to preserve it in that state, it must be frequently pulled through a piece of writing paper rolled up conically, and having a small aperture of about 1/4th of an inch diameter in the lower part. The neighbouring air must not be disturbed, that the body may be kept without motion; and while in this state, one of the poles of the magnet is to be presented to it in the same manner as when the experiment is tried with water. It was in this manner that Mr. Cavallo made his experiments on the magnetism of brass and other metals of which we have already given an account.

If it be suspected that the given body have some magnetism already, the very same process is required; only obseverving to present a piece of soft and clean iron to the body when swimming upon water or quicksilver. A piece of iron about half an ounce weight, and an inch in length, will be very proper for this purpose.

2. To find the poles of a magnetic body. — Present the various parts of the body successively to one of the poles of a magnetic needle, and it will soon be discovered which parts of the given body are possessed of contrary polarity by the needle's standing perpendicularly towards them. One of the poles being thus discovered, turn the opposite pole of the magnetic needle towards the body, and it will soon find out its other pole. When the magnetism of the body to be examined is very weak, there will be danger of reversing the polarity by bringing the needle too near; and as the distance at which this effect will take place cannot be determined, it will always be proper to keep it so far distant that it can only faintly affect the needle. Where there are only two poles, they may be found out merely by sprinkling some iron-fillings upon the body; for these will stand erect upon the polar points. They may be distinguished by letting the body to float in water, or tying it to a thread and letting it hang freely.
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freely, so that one may turn towards the north and the other towards the south. This method, however, will not succeed when there are more than two poles, nor even very well in that case, unless they lie in parts directly opposite to one another.

3. Effects of the magnet on soft iron. Having placed a magnetic needle upon a table, bring a bar of soft iron about eight inches long and a quarter of an inch thick, so near that it may draw one end of the needle a little out the way. In this situation approach gradually the north pole of a magnet to the other extremity of the bar, and the north end of the needle will recede from the bar more and more in proportion as the magnet is brought nearer the bar. If the experiment be repeated with the other pole of the magnet, the north end of the needle will then be attracted by the bar. The reason of this is, that when we bring the north pole of the magnet towards one end of the bar, the latter acquires a south polarity, and the other one of course a north polarity. Hence the needle is repelled, because magnetic poles of the same kind repel one another; but when the south pole is brought near the end of the bar, that end which it approached receives the north polarity, and the other of course the south; hence the needle, instead of being repelled, is now attracted. By approaching a small magnetic needle to different parts of the bar, it will be found that one half of it possesses one kind of polarity, and the other the contrary kind; the magnetic centre, however, or the limit between the two polarities, is not always in the middle of the bar, but is generally nearer that end which is preferred to the magnet. The difference increases as the bar is lengthened; and when the latter exceeds a certain length it acquires several poles. This depends on the strength of the magnet; and when it happens, the first magnetic centre comes very near to the end of the bar which stands next the magnet, and successive centres are formed between every two poles. Thus, supposing the north pole of a magnet to be brought to the end of such a bar, the end it touches becomes a south pole; a few inches farther a north polarity takes place, after that a south polarity, and so on. The poles become weaker and weaker as they recede from the end which the magnet touches; so that if the bar be of considerable length, they totally vanish long before they come to the other end. Hence, by applying a magnet to one end of a long bar, we will not thereby give any magnetism to the other; and this will happen when a magnet capable of lifting two pounds of iron is applied to a bar of about an inch square and five feet long.

4. The action of magnets shown by the repulsion of two pieces of wire. Tie two pieces of soft wire each to a separate thread, and having suspended them close by each other, bring one of the poles of a magnet under them, and they will immediately repel; the divergence becoming greater as the magnet is brought nearer within a certain limit, and will decrease as the magnet is removed. If steel wires or common sewing needles be used, the repulsion will continue for a considerable time after the magnet is removed; and this divergence will even be greater after the removal of the magnet, as its attraction tends to draw them nearer to each other; and, if brought too near, no repulsion will be shown by them. The experiment may be greatly diversified by using four or more needles, and presenting a north pole to one pair and a south pole to another, &c.

5. In what circumstances a magnet can lift the greatest weight. By means of a crooked wire we may show that the power of a magnet varies according to circumstances. Thus, let a piece of wire about a quarter of an inch in diameter, and four or five inches long, be bent in the manner represented by ABC, fig. 14, with a sharp corner at C. Tie it fast to a piece of bar, or let it be held by an assistant with the bar downwards. Then apply either pole of the magnet DE to one of its extremities; and if in this situation a small piece of iron, as H, be put to the corner C, it will remain suspended. On applying the opposite pole of another magnet to the other extremity of the wire, the piece of iron will immediately fall off; but if a pole of the same kind be applied it will not only be still kept suspended but be more strongly attracted than before.

In the case just mentioned, the first magnet is assisted by the action of the second; but in order to strengthen a magnet in this manner it does not appear necessary to use a magnet at all. Thus, having found a trial how much a magnet bar can act, procure an oblong piece of iron about four inches long, and somewhat heavier than the bar can bear. Apply one end of this to the pole of the bar, holding it with your hand till you place under the other end a larger piece of iron. It will then be found that the magnet will support the piece of iron which it could not do before. The lower piece of iron is to be placed between an inch and three quarters of an inch below the under part of the oblong piece which hangs at the magnet. The same effect will be produced by the opposite pole of another magnet; but a pole of the same denomination would weaken the attraction.

6. The generation of poles, and of magnetic centres, in the part of a broken magnet. Take a magnetic bar about six or eight inches long and a quarter of an inch diameter, whose magnetic centre will be in the middle, or near it. Break off about one third part by a smart stroke of an hammer, and it will be found that the broken part, though in the magnet it had but one polarity, will now have acquired a north and south pole, with a magnetic centre, as if it were a distinct magnet. The experiment may be diversified as follows: Having made a steel bar about six inches long and a quarter of an inch thick quite hard, break it into two unequal parts. Join these, and press them hard together, giving it the magnetic virtue at the same time by means of two powerful magnets while the parts remain in this position, so that the bar looks as if it had not been broke, it will have only two poles; but as soon as they are separated, each part will be found to become a distinct magnet, having a north and south pole proper to itself.

7. To remove the magnetic centre in a magnet. This may be done in various ways; as by striking a magnetic bar repeatedly, heating it, hard rubbing, &c.; but in all these methods the magnetism of the bar is diminished at the same time that the centre is removed; so that they ought not to be continued beyond what is necessary to produce a sensible removal of the magnetic centre.
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8. The disadvantages of using magnets of unequal power, and of steel not properly hardened.—Having communicated the magnetic virtue to a steel bar by means of a magnet of any given power, then rub it with a weaker magnet, and it will be found, that the power of the bar, instead of being augmented, will now be diminished; being no stronger than if it had been rubbed only with the weak magnet. The impurity of using soft steel in making artificial magnets may be understood from the following example: Take two wires about 14 inches long, and one eighth of an inch in thickness; let one be of very hard steel, the other of soft steel or iron, though not of the best sort: then, by means of magnetic bars, give the virtue to those wires, treating them both in the same manner, and it will be generally found that the hard wire will have only two poles, but the other a greater number.

9. To weaken or destroy the magnetism of a wire by bending.—Having communicated the magnetic virtue to an iron or to soft steel wire of about four or five inches long and one-twentieth of an inch in diameter, roll it round a flich so as to make four or five revolutions. When taken off the flich it will be found to have its virtue quite destroyed, or at least very much weakened by the bending. This effect cannot be produced but when the texture of the wire is strained by the bending; for if it be of fuch an elastic nature as to recover its figure after being once rolled round the flich, little change is made on the magnetic power. When only the middle of the wire is bent, little or no change takes place in the magnetic power. If a piece of magnetic wire be cleft, or split lengthwise, the parts will sometimes have the fame poles, and some times the contrary, but when one part is much thinner than the other, the flender part will generally have its poles reversed.

10. To improve natural magnets.—This may be done by the fame methods which are used to communicate the virtue to steel bars or to iron-ores: but the natural magnets being generally very soft, we can seldom do more than place them between two strong magnetic bars: However, when they are of sufficient length they must be rubbed with other bars besides those between which they are put; using the fame precautions as in making artificial magnets. When subjected to this operation, it will always be proper to remove the armature from them.

11. To arm natural or artificial magnets.—The first step towards this operation is to find out the poles of the magnet, after which it is to be properly shaped: that of a parallelopipedon is the best; in which case care must be taken to let the poles fall about the middle of two opposite surfaces: and in this direction the magnet ought to have the greatest length possible for a natural magnet is weakened much more by having a part cut off from its length than its breadth. This being done, provide two plates of soft iron, equal in breadth to those surfaces where the poles stand, and projecting a little on one side of the fiones, as shown by fig. 15. The projections marked DD must be much narrower than the breadth of the plates; from a quarter to half an inch being sufficient for the larger magnets, and about one tenth of an inch for small ones, for the purpose of applying to them the surface of the iron F. The thickness of the plates CD and must be proportioned to the strength of the magnet AB; and this proportion cannot easily be determined without an actual experiment. The best method, therefore, is to make them somewhat thick at first, and then keep filing them down as long as the power of the magnet increases; after which the filing is to be discontinued. The armature may be kept on either by tying or by a box; which last is the preferable method. The armature of spherical magnets must be adapted to their shape and each large enough to cover a quarter of it. In like manner may artificial magnets be armed, and thus a compound magnet may be produced much more powerful than any single one. Thus Dr Knight constructed two very powerful artificial magnets, or magnets of magnetic bars, which are now in the repository of the Royal Society. Each of these consists of 240 bars disposed in four lengths, so as to form a parallelopipedon, each length containing 60 bars. They are all kept together by iron braces, and the whole suspended on pivots, with a wooden pedestal or carriage, by which they may be easily placed in any required position. If the artificial magnets be made in the shape of horse-shoe or of a semicircle, they have no occasion for armature, it being sufficient to join them either by rivetting or by means of a box; and indeed even when straight bars are used, a compound magnet may be made without armature; but then as the poles cannot act in the same plain, it is necessary to have two magazines in order to give magnetism the more conveniently to other bodies. The power of a magnet is rather augmented by being armed, for the same reason that it is increased by a piece of iron attached to it. E is a brass ring, by which it may be suspended with the iron adhering to it, which is the best method for preserving its virtue.

12. Magnetism requires some time to penetrate thro' iron. Having placed a bulky piece of iron, suppose one weighing 40 or 50 pounds, so near a magnetic needle as to draw it a little out of its direction, apply one of the poles of a strong magnet to the other extremity of the iron, and you will find that it requires some seconds before the needle can be affected by it. The interval is greater or less according to the size of the iron and the strength of the magnet.

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Construction of the MAGNETIC PERSPECTIVE GLASS. Provide an ivory tube, about two inches and a half long, and of the form expressed in fig. 16. The sides of this tube must be thin enough to admit a considerable quantity of light. It is to open at one end with a ferev; at that end there must be placed an eye-glass of about two inches focus, and at the other end any glafs you please. Have a small magnetic needle, like that placed on a compass. It must be strongly touched, and so placed at the bottom of the tube that it may turn freely round. It is to be fixed on the centre of a small ivory circle C, of the thickness of a counter, which is placed on the object, glass D, and painted black on the side next it. This circle must be kept fast by a circular rim of pasteboard, that the needle may not rife off its pivot, after the same manner as in the compass. This tube will thus become a compass, sufficiently transparent to show
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how the motions of the needle. The eye-glass serves more clearly to distinguish the direction of the needle; and the glass at the other end, merely to give the tube the appearance of a common perspective. It will appear from the laws of magnetism already laid down, that the needle in this tube, when placed over, and at a small distance from, a magnet, or any machine in which it is contained, will necessarily place itself in a position directed by that magnet, and consequently show where the north and south pole of it is placed; the north end of the needle constantly pointing to the south end of the magnet. This effect will take place, though the magnet be inclosed in a case of wood, or even metal, as the magnetic effluvia penetrates all bodies. You must observe, however, that the attracting magnet must not be very far distant from the needle, especially if it be small, as in that case its influence extends but to a short-distance. This tube may be readily constructed, by placing the needle in a perpendicular direction, on a small axis of iron, on which it must turn quite freely, between two small plates of brass placed on each side the tube: the two ends of the needle should be in exact equilibrium. The north and south ends of this needle will, in like manner, be attracted by the south and north ends of the magnetic bar. The former construction, however, appears preferable, as it is more easily excited, and the situation of the needle much more easily distinguished.

Exp. 1. The magnetic paradox.

Having placed a small piece of iron wire not above a tenth part of an inch long upon a table, fig. 17. Hold the magnetic bar EF about four or five inches above the table, with either of its poles pointing to the table, and so that the perpendicular let fall from the pole may touch the table at G, two or three inches from the wire; which distances, however, are subject to variations arising from the power of the magnet.

When the magnet is held in a proper position with respect to the iron, the latter will evidently attract one of its ends, as is shown at CD, forming an angle with the table, which is larger the nearer the wire comes to the point G, where it stands quite upright. Knock the table gently, and the wire CD will gradually proceed towards G, every shock making it jump up and advance a little way. This will naturally be attributed to the attraction of the magnet; which not being sufficiently strong to draw the wire directly towards it, is just able to bring it gradually towards G when the motion of the table lifts it up. But it, instead of holding the magnet over the table, it be placed before it at HI, the wire will now make an obtuse angle towards G; as is shown at K, and, on knocking the table, will recede from the magnet as if repelled, though in truth it is as much attracted as before.

The cause of this seeming repulsion will be understood from fig. 18. where the wire is represented by KL, and the magnet by H. The former being rendered magnetic by the proximity of the magnet; H, is inclined to it according to the laws already laid down; but, by reason of its weight, and being supported only at one end, it inclines less than it would do if it were freely suspended by its centre. Let MN be a line passing through the centre of the wire; then by the motion of the table, the wire being lifted up, the end K will be at liberty to descend farther in the direction in which it is attracted by the magnet than it was before. It will then take the position represented by KQ, its centre remaining nearly in the line perpendicular MN. We see nearly, because the action of the magnet will undoubtedly move the whole wire somewhat nearer to itself; and the motion of the centre will be a diagonal compounded of the forces of gravity and of the magnet. The latter, however, being much smaller, will, by conspiring with the action of gravity, draw down the nearest end of the wire to far so that a perpendicular line PO let fall from the extremity of it will touch the table in a point farther distant from the magnet than K. In this perpendicular the wire will depend very nearly, and then refuse its proper situation, parallel, or nearly so, to KL, when a second shock will remove it a little farther off, for the reason already assigned. The former part of the experiment may be easily explained upon the same principles. The whole may be diversified by using iron-things instead of the wire. In this case, when the magnet is held over the table, they will be gradually collected about the point G, and dispersed from it while the magnet is held under.

2. The communicative crown.

Take a crown piece, and bore a hole in the side of it; in which place a piece of wire, or a large needle, well polished, and strongly touched with a magnet.

Then close the hole with a small piece of pewter, that it may not be perceived. Now the needle in the magnetic perspective before described, when it is brought near to this piece of money, will fix itself in a direction corresponding to the wire or needle in that piece. Desire any person to lend you a crown piece, which you dexterously change for one that you have prepared as above. Then give the latter piece to another person, and leave him at liberty either to put it privately in a muff-box, or not; he is then to place the box on a table, and you are to tell him, by means of your glass, if the crown is or is not in the box. Then, bringing your perspective close to the box, you will know by the motion of the needle, whether it be there or not; for as the needle in the perspective will always keep to the north of itself, if you do not perceive it has any motion, you conclude the crown is not in the box. It may happen, however, that the wire in the crown may be placed to the north, in which case you will be deceived. Therefore be sure of success; when you find the needle in the perspective remain stationary, you may make some pretence to desire the person to move the box to another position, by which you will certainly know if the crown-piece be there or not. You must remember, that the needle in the perspective must here be very sensible, as the wire in the crown cannot possibly have any great attractive force.

2. The magnetic table.

Under the top of a common table place a magnet that turns on a pivot, and fix a board under it, that nothing may appear. There may also be a drawer under the table, which you pull out to show that there is nothing concealed. At one end of the table there must
must be a pin that communicates with the magnet, and by which it may be placed in different positions; this pin must be so placed as not to be visible to the spectators. Strew some needle-filings or very small nails over that part of the table where the magnet is. Then ask any one to lend you a knife, or a key, which will then attract part of the nails or filings. Then placing your hand in a careless manner on the pin at the end of the table, you alter the position of the magnet; and giving the key to any person, you direct him to make the experiment, which he will then not be able to perform. You then give the key to another person; at the same time placing the magnet, by means of the pin, in the first position, when that person will immediately perform the experiment.

4. The mysterious watch.

You direct any person to lend you his watch, and ask him if he thinks it will or will not go when it is laid on the table. If he says it will, you place it over the end of the magnet, and it will presently flop (A). You then mark with chalk, or a pencil, the precise point where you placed the watch; and moving the position of the magnet, as in the last experiment you give the watch to another person, and direct him to make the experiment; in which he not succeeding, you give it to a third person, at the same time replacing the magnet, and he will immediately perform the experiment.

5. The magnetic dial.

Provide a circle of wood or ivory, of about five or six inches diameter, as fig. 19, which must turn quite free on the sand B (fig. 20.), in the circular border A; on the circle must be placed the dial of pasteboard C (fig. 19.), whose circumference is to be divided into 12 equal parts, in which must be inscribed the numbers from 1 to 12, as on a common dial. There must be a small groove in the circular frame D, to receive the pasteboard circle; and observe, that the dial must be made to turn so free, that it may go round without moving the circular border in which it is placed. Between the pasteboard circle and the bottom of the frame, place a small artificial magnet E (fig. 21.), that has a hole in its middle, or a small protruberance. At the centre of the frame place a small pin P, which serves to show where the magnetic needle L, that is placed on a pivot at the centre of the dial is to flop. This needle must turn quite free on its pivot, and its two sides should be in exact equilibrium. Then provide a small bag, that has five or six divisions, like a lady’s work-bag, but smaller. In one of these divisions put small square pieces of pasteboard, on which are written the numbers from 1 to 12, and if you please you may put several of each number. In each of the other divisions you must put 12 or more like pieces; observing, that all the pieces in each division must be marked with the same number. Now the needle being placed upon its pivot, and turned quickly about, it will necessarily flop at that point where the north end of magnetic bar is placed, and which you previously knew by the situation of the small pin in the circular border. You therefore present to any person that division of the bag which contains the several pieces on which is wrote the number opposite to the north end of the bar, and tell him to draw any one of them he pleases. Thus placing the needle on the pivot, you turn it quickly about, and it will necessarily flop, as we have already said, at that particular number.

Another experiment may be made with the same dial, by defining two persons to draw each of them one number out of two different divisions of the bag; and if their numbers, when added together, exceed 12, the needle or index will flop at the number they exceed it; but if they do not amount to 12, the index will flop at the sum of those two numbers. In order to perform this experiment, you must place the pin against the number 5, if the two numbers to be drawn from the bag be 10 and 7, or again 9 if they be 7 and 2. — If this experiment be made immediately after the former, as it easily may, by dexterously moving the pin, it will appear the more extraordinary.

6. The dexterous painter.

Provide two small boxes, as M and N (fig. 22.), four inches wide, and four inches and a half long. Let the box M be half an inch deep, and N two thirds of an inch. They must both open with hinges, and shut with a clasp. Have four small pieces of light wood, (fig. 23, 24, 25, 26.) of the same size with the inside of the box M (fig. 22.), and about one third of an inch thick. In each of these let there be a groove, as AB, EF, CD, GH; these grooves must be in the middle, and parallel to two of the sides. In each of these grooves place a strong artificial magnet, as fig. 27. The poles of these magnets must be properly disposed as regard to the figures that are to be painted on the boards; as is expressed in the plate. Cover the bars with paper, to prevent their being seen; but take care, in putting it on, not to wet the bars, as they will thereby rust, which will considerably impair their virtue. When you have painted such subjects as you choose, you may cover them with a thin clear glass. At the centre of the box N, place a pivot (fig. 28.), on which a small circle of pasteboard OPQR (fig. 29.) is to turn quite free; under which is to be a touched needle S. Divide this circle into four parts, which are to be disposed with regard to the poles of the needle, as is expressed in the figure. In these four divisions you are to paint the like subjects as are on the four boards, but reduced to a smaller compass. Cover the inside of the top of this box with a paper M, (see fig. 22.) in which must be an opening O, at about half an inch from the centre of the box, that you may perceive, successively, the four small pictures on the pasteboard circle just mentioned. This opening is to serve as the cloth on which the little painter is supposed to draw one of the pictures. You may cover the top of the box, if you please, with a thin glass. Then give the first box to any person, and tell him to place any one of the four pictures in it privately, and when he has closed it, to give it you. You then place the other box over it; when the moveable circle, with the needle, will turn till it comes in the same position with the bar in the first.

(a) To perform this experiment, you must use a strong magnetic bar; and the balance of the watch must not be of brass, but steel.
first box. It will then appear that the little dexterous painter has already copied the picture that is inclosed in the first box.

7. The cylindric oracle.

Provide a hollow cylinder of about six inches high and three wide, as AB, fig. 30. Its cover CD must be made to fix on any way. On one side of this box or cylinder let there be a groove, nearly of the same length with that side, in which place a small fited bar (fig. 31), that is strongly impregnated, with the north pole next the bottom of the cylinder. On the upper side of the cover describe a circle, and divide it into ten equal parts, in which are to be written the numbers from 1 to 10, as is expressed in fig. 32. Place a pivot at the centre of this circle, and have ready a magnetic needle. You are then to provide a bag, in which there are several divisions, like that described in exper. 5. In each of these divisions put a number of papers, on which the name or similar questions are wrote. In the cylinder put several different answers to each question, and feal them up in the manner of small letters. On each of these letters or answers is to be wrote one of the numbers of the dial or circle at the top of the box. You are supposed to know the number of the answers to each question. You then offer one of the divisions of the bag, observing which division it is, to any person, and desire him to draw one of the papers. Next put the top on the cylinder, with that number which is wrote on the answer directly over the bar. Then placing the needle on the pivot, you turn it briskly about, and it will naturally stop at the number over the bar. You then desire the person who draws the question to observe the number at which the needle stands, and to search in the box for a paper with the same number, which he will find to contain the answer. You may repeat the experiment by offering another division of the bag to the same or another person; and placing the number that corresponds to the answer over the magnetic bar, proceed as before.

It is easy to conceive of several answers to the same question. For example, suppose the question to be, Is it proper to marry?

Answer 1. While you are young, not yet; when you are old, not at all.
2. Marry in haste, and repent at leisure.
3. Yes, if you can get a good fortune; for something has some favour, but nothing has no favour.
4. No, if you are apt to be out of humour with yourself; for then you will have two perils to quarrel with.
5. Yes, if you are sure to get a good husband (wife); for that is the greatest blessing of life. But take care you are sure.
6. No, if the person you would marry is an angel; unless you will be content to live with the devil.

8. The enchantcd ewer.

Fix a common ewer, as A (fig. 33.) of about 12 inches high, upon a square stand BC; in one side of which must be a drawer D, of about four inches square and half an inch deep. In the ewer place a hollow tin cone, inverted, as AB, fig. 34. of about four inches and a half diameter at top, and two inches at the bottom; and at the bottom of the ewer there must likewise be a hole of two inches diameter.

Upon the stand, at about an inch distance from the bottom of the ewer, and directly under the hole, place a small convex mirror HI, of such convexity that a person's visage, when viewed in it, at about 15 inches distance, may not appear above two inches and a half long.

Upon the stand likewise, at the point I, place a pivot of half an inch high, on which must be fixed a touched needle RQ, inclosed in a circle of very thin pasteboard OS, fig. 35. of five inches diameter. Divide this pasteboard into four parts, in each of which draw a small circle: and in three of these circles paint a head as x, y, z, the drefs of each of which is to he different, one, for example, having a turban, another a hat, and the other a woman's cap. Let that part which contains the face in each picture be cut out, and let the fourth circle be entirely cut out; as it is expressed in the figure. You must observe, that the poles of the needle are to be disposed in the same manner as in the plate.

You are next to provide four small frames of wood or pasteboard, n<o> 1, 2, 3, 4, each of the same size with the inside of the drawer. On these frames must be painted the same figures as on the circular pasteboard; with this difference, that there must be part of them cut out. Behind each of these pictures place a magnetic bar, in the same direction as is expressed in the plate; and cover them over with paper, that they may not be visible. Matters being thus prepared, you first place in the drawer the frame n<o> 4, on which there is nothing painted. You then pour a small quantity of water into the ewer, and desire the company to look into it, asking them if they see their own figures as they are. Then you take out the frame n<o> 4, and give the three others to any one, directing him to choose in which of those drefs he would appear. Then put the frame with the dresse he has chose in the drawer; and a moment after, the person looking into the ewer will see his own face surrounded with the dresse of that picture. For, the pasteboard circle (divided, as above described, into four parts, in three of which are painted the same figures as on three of the boards, and the fourth left blank) containing a magnetic needle, and the four boards having each a concealed magnet; therefore, when one of them is put in the drawer under the ewer the circle will correspond to the position of that magnet, and consequently the person looking into the top of the ewer will see his own face surrounded with the head-dresses of the figure in the drawer. This experiment, well performed, is highly agreeable. As the pasteboard circle can contain only three heads, you may have several such circles, but you must then have several other frames and the ewer must then be made to take off from the stand.

9. The box of metals.

Provide a wooden box, about 13 inches long and seven wide, as ABCD (fig. 36.). The cover of this box should be as thin as possible. Have six small boxes or tables, about an inch deep, all of the same size and form, as EFGHIK, that they may indifferently

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Plate cclxxviii.

Chap. IV.

Entertaining Experiments.

nately go into similar holes made in the bottom of the large box. In each of these tablets is to be placed a small magnetic ball and their poles are to be disposed as expressed in the figure. Cover each of these tablets with a thin plate of one of the fixed following metals, viz. gold, silver, copper, iron, pewter, and lead. You must also have a magnetic perspective, at the end of which is to be two circles, one divided into fix equal parts, and the other into four, as in fig. 37. from the centre of which there must be drawn an index N, whose point is to be placed to the north. Therefore, when you are on the side CD of the box, and hold your perspective over any one of the tablets that are placed on the holes E, F, G, so that the index drawn on the circle is perpendicular to the side AB, the needle in the perspective will have its fourth pole directed to the latter that denotes the metal contained in that tablet. When you hold the perspective over one of the boxes placed in the holes H, I, K, you repeat the question, observing that there must be but seven words in each answer; in the following manner. In the first division of the circle O (fig. 37), which is opposite to the first question, write the first word of the first answer. In the second division of the next circle, write the second word; and so on to the last word, which will be in the seventh division of the seventh circle. In the eighth division of the first circle, write the first word of the second answer; in the ninth division of the second circle, write the second word of the same answer; and so on to the 14th division of the seventh circle, which must contain the last word of that answer. The same must be done for all the seven questions; and to each of them must be assigned two answers, the words of which are to be dispersed through the seven circles. At the centre of each of these circles place a pivot; and have two magnetic needles, the pointed end of one of which must be north, and the other south, QR, fig. 39.) Now, the index of the central circle being directed to any one of the questions, if you place one of the two magnetic needles on each of the seven smaller circles, they will fix themselves according to the direction of the bars on the correspondent circles at the bottom of the box, and consequently point to the seven words that compose the answer. If you place one of the other needles on each circle, it will point to the words that are diametrically opposite to those of the first answer, the north pole being in the place of the south pole of the other. Thus you present this planetarium to any person, and desire him to choose one of the questions there wrote; and you then set the index of the central circle to that question, and putting one of the needles on each of the seven circles, you turn it about; and when they all settle, they will point to the seven words that compose the answer. The two answers may be one favourable and the other unfavourable; and the different needles will serve to diversify the answers when you repeat the experiment.

There may be also a moveable needle to place against the names of the months; and when the party has fixed upon a question, you place that needle against the month in which he was born, which will give the business an air of mere mystery. On the centre of the large circle may be the figure of the sun; and on each of the seven smaller circles one of the characters of the five planets, together with the earth and moon.
MAGNETISM.

Chap. IV.

Being thus prepared, you offer a person the fix et- 
entiments, and desire him to choose any one of them him- 
self, and conceal the others, or give them to different 
persons. He is then to open his eawe, read the que-

tion it contains to himself, and return the eawe to 
you, after replacing the question. You then put the 
eawe in the egg, and placing the eawe upon the wa-
ter in the baue, you tell the company the will pre-
fently discover in which of the vases the answer is con-
tained. The same experiment may be repeated with 
all the ewes.

12. The multifarious verse.

The eight words that compose this Latin verfe,  
(Tot sunt ibi dotes, quot culi fidera, virgo, (A),  
being privately placed in any one of the different com-
binations of which they are susceptible, and which are  
40320 in number, to tell the order in which they are  
placed.  

Provide a box that flushes with hinges, and is eight  
iches long, three wide, and half an inch deep. Have  
eight pieces of wood about one third of an inch thick, 
two inches long, and one and a half wide, which will 
therefore, when placed close together, exactly fill the 
box. It each of these pieces or tablets place a mag-
etic bar, with their poles as is expressed in the figure. 

The bars being covered over, write on each of the ta-
bles, in the order they then stand, one of the words of 
the foregoing Latin verfe. On a very thin board of 
the same dimensions with the box, draw the eight 
circles, A, B, C, D, E, F, G, H, (fig. 43.) whose 
centres should be exactly over those of the eight tablets 
in the box when the board is placed upon it. Di-

vide each of those circles into eight parts, as in the 
figure; and in each of those divisions write one of the 
words of the Latin verfe, and in the precise order ex-
pressed in the plate; so that, when the board is placed 
over the box, the eight touched needles placed at 
the centre of the circles may be regulated by the poles 
of the bars in the box, and consequently the word that 
the needle points to in the circle be the same with that 
touched on the tablet. Cover the board with a glafs, 
to prevent the needles from rising off their pivots, as is 
done in the fea-compas. Over the board place four 
plates of glafs, I, L, M, N, fig. 44. which will give 
the machine the figure of a truncated pyramid, of 
eight inches high. Cover it with a glafs, or rather a 
board, in which are placed two lenfes, O O, of eight 
iches focus, and distant from each other about half 
an inch. Line the four plates of glafs that compose 
the sides with very thin paper, that will admit the 
light, and at the same time prevent the company from 
seeing the circles on the board.

These preparations being made, you give the box to 
any one, and tell him to place the tablets on which the 
words are wrote, privately, in what position he thinks 
proper, then to close the box, and, if he pleafe, to wrap 
it up in paper, seal it, and give it you. Then placing 
the board with the pyramid upon it, you immediately 
tell him the order in which the tablets are placed, 
by reading the words to which the needles on the 
circles point.

Animal

(a) I. e. Thy virtues, virgin, are as numerous as the stars of heaven.
MAGNETISM.

Plate CCLXXVIII.

Fig. 37.

Fig. 38.

Fig. 39.

Fig. 40.

Fig. 41.

Fig. 42.

Fig. 43.

Fig. 44.
Animal Magnetism, a sympathy lately suppos'd by some persons to exist between the magnet and the human body; by means of which the former became capable of curing many diseases in an unknown way, something resembling the performances of the old magicians. This fanciful system, to call it by no worse name, of animal magnetism, appears to have originated, in 1774, from a German philosopher named Hehl, who greatly recommended the use of the magnet in medicine. M. Meffmer, a physician of the same country, by adopting the principles of Hehl, became the direct founder of the system; but, afterwards deviating from the tenets of his instructor, he left his patronage, as well as that of Dr. Ingenhousz, which he had formerly enjoyed. Meffmer had already distinguished himself by a dissertation on the influence of the Stars upon the human body, which he publicly defended in a thesis before the university of Vienna; but he was so unable, before the opposition of Hehl and Ingenhousz, to his system fell almost instantly into disrepute. Meffmer appealed to the academy of sciences at Berlin; but they rejected his principles as insufficient of foundation, and unworthy of the smallest attention. He then made a tour through Germany, publishing every where the great cures he performed by means of his animal magnetism, while his enemies every where pursued him with detections of the falsehood of his assertions.

Meffmer, fully undaunted by so many defeats, returned to Vienna; but meeting there with no better successes than before, he retired to Paris in the beginning of the year 1779. Here he met with a very different reception. He was first patronized by the author of the Dictionnaire des Merveilles de la nature; in which work a great number of his cures were published, Meffmer himself receiving likewise an ample testimony of his candour and solid reasoning. Our physician soon collected some patients; and in the month of April 1778 retied with them to Creteil, from whence he in a short time returned with them perfectly cured. His successes were now as great as his disappointment had been before. Patients increased so rapidly that the Doctor was soon obliged to take in pupils to assist him in his operations. These pupils succeeded equally well as Meffmer himself; and so well did they take care of their own emolument, that one of them, named M. Deilon, realized upwards of L. 100,000 Sterling. In 1779 Meffmer published a memoir on the subject of Animal Magnetism, promising afterwards a complete work upon the same, which should make as great a revolution in philosophy as it had already done in medicine.

The new system now gained ground daily; and soon became so fashionable, that the jealousy of the faculty was thoroughly awakened, and an application concerning it was made to government. In consequence of this a committee was appointed to inquire into the matter, consisting partly of physicians and partly of members of the royal academy of sciences with Dr. Benjamin Franklin at their head. This was a thunderbolt to the supporters of the new doctrine. Meffmer himself refused to have any communication with the committee; but his most celebrated pupil Deilon was less scrupulous, and explained the principles of his art in the following manner:

1. Animal magnetism is an universal fluid, constituting an absolute plenum in nature, and the medium of all mutual influence between the celestial bodies and between the earth and animal bodies.

2. It is the most subtle fluid in nature; capable of a flux and reflux, and of receiving, propagating, and continuing all kinds of motion.

3. The animal body is subjected to the influence of this fluid by means of the nerves, which are immediately affected by it.

4. The human body has poles and other properties analogous to the magnet.

5. The action and virtue of animal magnetism may be communicated from one body to another, whether animate or inanimate.

6. It operates at a great distance without the intervention of any body.

7. It is increased and reflected by mirrors; communicated, propagated, and increased by sound; and may be accumulated, concentrated, and transported.

8. Notwithstanding the univercity of this fluid, all animal bodies are not equally affected by it: on the other hand there are some, though but few in number, the presence of which destroys all the effects of animal magnetism.

9. By means of this fluid nervous disorders are cured immediately, and others mediately; and its virtues, in short, extend to the universal cure and preservation of mankind.

From this extraordinary theory, Meffmer, or M. Deilon, had fabricated a paper, in which he stated that there was in nature but one disease and one cure, and that this cure was animal magnetism; and lastly, M. Deilon engaged, 1. To prove to the commissioners, that such a thing as animal magnetism existed; 2. To prove the utility of it in the cure of diseases; after which he was to communicate to them all that he knew upon the subject. The commissioners accordingly attended in the room were the patients underwent the magisterial operations. The apparatus consisted of a circular platform made of oak, and raimed about a foot and an half, from the ground; which platform was called the baquet. At the top of it were a number of holes, in which were iron rods with moveable joints for the purpose of applying them to any part of the body. The patients were placed in a circle round, each touching an iron rod, which he could apply to any part of the body with pleasure; they were joined to one another by a cord passing round their bodies, the design being to increase the effect by communication. In the corner of the room was a piano forte, on which some airs were played, occasionally accompanied with a long. Each of the patients held in his hand an iron rod ten or twelve feet long; the intention of which, as Deilon told the commissioners, was to concentrate the magnetism in its point, and thus to render its effects more sensible. Sound is another conductor of this magnetism; and in order to communicate the magnetism to the piano forte, nothing more is necessary than to bring the iron rod near it. Some magnetism is also furnished by the person who plays it: and this magnetism is transmitted
MAG [450] MAG

Animal

Magnetism

Magnetism of the platform was said to be so contrived as to concentrate the magnetism, and was the reason whence the virtue did itself among the patients. Its structure, however, is not mentioned; but the committee satisfied themselves, by means of a needle and electrometer, that neither common magnetism nor electricity was concerned.

Besides the different ways of receiving the magnetism already mentioned, viz. by the iron, cord, and piano forte, the patients also had it directly from the Doctor's finger, and a rod which he held in his hand, and which he carried about the face, head, or such parts of the patient as were diseased; observing always the direction of what he called the poles. The principal application of magnetism, however, was by pressure of the hands or fingers on the hypochondria or lower regions of the stomach.

The effects of these operations upon Dr. M's patients were very different. Some felt nothing, neither had the magnetism any effect whatever upon them. Some spit, coughed, sweated, and felt, or pretended to feel, extraordinary heats in different parts of the body. Many women, but very few men, had convulsions, which Dr. M. called their crises, &c. The commissioners at last found that they could come to no satisfactory conclusion while they attended in this public way, and therefore determined to try the experiments themselves privately. As the fluid itself, however, was totally imperceptible by any of the senses, they could only ascertain themselves of its existence by ultimately curing diseased, or by observable effects upon the human body. Being well assured, however, that though many diseases were cured, it would not amount to any proof of the existence of animal magnetism, they determined to observe its effects on the human economy. For this purpose they made the following experiments:

1. They tried it upon themselves, and felt nothing.
2. Seven of Dr. M's patients were magnetised at Dr. Franklin's house, four of whom felt nothing: three felt, or affected to feel something.
3. Several persons in a higher sphere of life were magnetised, and felt nothing.
4. The commissioners, now determined to discover what strange imagination had in this business, blindfolded several of the common people, and made them sometimes think that they were magnetised, at other times they magnetised them without letting them know that they did so: the consequence was, that when they supposed themselves magnetised, the patients likewise thought they felt something, and vice versa.
5. A magnetised tree was said to produce convulsions; a young man, blindfolded, fell into convulsions when he imagined himself near the tree, though he was really at a considerable distance from it. Dr. M. accounted for this on the principle of all trees being magnetic; but in this case, every one susceptible of magnetism, would be excited with convulsions when he approached a tree. The same influence of imagination was observed in a woman accustomed to have convulsions when magnetised. They came on when nothing was done to her, on being told when blindfolded, that she was magnetised.

Other instances are given, from which it was evident that the patients were impostors, or in such a most wretched state of debility both of mind and body, that the most trifling effects of the former had the most powerful effects on the latter. The commissioners therefore entirely disapproved of the whole. The touch, imitation, and imagination, they concluded, were the great causes of the effects produced by Mr. D's operations; and by means of these they supposed that convulsions, which in themselves are a very violent disorder, might be spread much farther than could be wished, even through a whole city. It was observed that the operator sometimes professed strongly, and for a length of time, upon different parts of the body, particularly the hypochondria and pit of the stomach; and it is well known that a strong pressure on these parts will produce disagreeable sensations in those who enjoy perfect health.

It is needless to add more upon this subject, than that M. complained of the report of the commissioners, petitioned parliament, was by them commanded to discover the mysteries of his doctrine; and that it is now exploded by every man of sense. The conclusion of the academicians concerning it was, that it is not entirely unfeif even to philosophy; as it is one of the mysteries of nature. In this dictionary we have endeavoured to correct the error of the philosophers, and to inform the public of the real nature of the powers of imagination.

MAGNEIZ (Nicolas), a learned and laborious ecclesiastic, who died in the year 1749 at an advanced age. He is known by his excellent Latin dictionary, intituled Novitius, printed at Paris 1721, 2 vols. 240. Notwithstanding the great utility of this dictionary to masters, and the merited esteem in which it is held, it has never undergone another edition; for in that which bears the date of 1723, there is no circumstance of difference except the frontispiece. In this dictionary, besides the words to be met with in the classics, we find all those which occur in the Bible, the breviary, and the ecclesiastical authors, the terms of art, the names of great men, heathen gods, bishops, councils, heresies, &c.; in short, more than 6000 words which are not to be found in the common dictionaries.

MAGNIFYING, the making of objects appear larger than they would otherwise do; whence convex lenses, which have the power of doing this, are called magnifying glasses. See Optics.

MAGNITUDE, whatever is made up of parts locally extended, or that has several dimensions; as a line, surface, solid, &c.

MAGNOLIA, the laurel-leaved tulip tree, in botany: A genus of the polygynia order, belonging to the polyandra class of plants; and in the natural method ranking under the 52d order, Coeruleae. The calyx is triphyllous; there are nine petals; the capsules bivalved and imbricated; the seeds pendulous, and in the form of a berry.

Species. 1. The glanca, or small magnolia, is native of Virginia, Carolina, and other parts of North America. It grows in moist places from seven or eight to 15 or 16 feet high, with a slender stem. The
Magnolia. wood is white and spongy, the bark smooth and of a greenish white colour; the branches furnished with thick smooth leaves, like those of the bay, but of an oval shape; and their edges, and the moist underneath. The flowers are produced at the extremities of the branches, are white, composed of fix concave petals, and have an agreeable scent. After the fruit is past, the fruit increases in size till it becomes as large as a walnut with its cover; but of a conical shape, having many cells round the outside, in each of which is a flat seed about the size of a small kidney-bean. When ripe, the fruit is of a brown colour, the seeds discharged from their cells, and hang by a slender thread. The grandiflora, or great magnolia, is a native of Florida and South Carolina. It rises to the height of 80 feet or more, with a straight trunk upwards of two feet diameter, having a regular head. The leaves resemble those of the laurel, but are larger, and continue green throughout the year. The flowers are produced at the ends of the branches, and are of a purplish white colour. 3. The tripetala, or umbrellla-tree, is a native of Carolina. It rises, with a slender trunk, to the height of 16 or 20 feet; the wood is soft and spongy; the leaves remarkably large, and produced in horizontal circles, somewhat resembling an umbrella, from whence the inhabitants of those countries have given it this name. The flowers are composed of ten or eleven white petals, that hang down without any order. The leaves drop off at the beginning of winter. 4. The semenatis, with oval, spear-shaped, pointed leaves, is a native of the inland parts of North America. The leaves are near eight inches long, and five broad; ending in a point. The flowers come out early in the spring, and are composed of 12 white petals; the wood is of a fine grain, and an orange colour.

Culture, &c. All these species are propagated by seeds, which must be procured from the places were they grow naturally. They should be put up in sand, and sown over as soon as possible; for if they are kept long out of the ground, they rarely grow. The glanca generally grows in a poor swampy soil, or on wet meadows. The English and Swedes in Pennsylvania, and New Jersey call it beaver-tree, because the root of it is the dainty of beavers, which are caught by its means. It drops its leaves early in autumn, though some of the young trees keep them all the winter. This tree is seldom found to the north of Pennsylvania, where it begins to flower about the end of May. The scent of its blossoms is exquisite: for by it you can discover, within three quarters of an English mile, whether these little trees stand in the neighbourhood, provided the wind be not against it; for the whole air is filled with this sweet and pleasant odour. It is beyond description agreeable to travel in the woods about that time, especially towards night. They retain their flowers for three weeks, and even longer, according to the quality of the soil on which the trees stand; and during the whole time of their being in blossom, they spread their odoriferous exhalations. The berries likewise look very fine when they are ripe; for they have a rich red colour, and hang in bunches on slender stalks. The cough and other peccal diseases are cured by putting the berries into rum or brandy, of which a draught every morning may be taken: the virtues of this remedy were universally extolled, and even praised, for their salutary effects in consumptions. The bark being put into brandy, or boiled in any other liquor, is said not only to cure peccal diseases, but likewise to be of some service against all internal pains and heat; and it was thought that a decoction of it could stop the dysentery. Persons who had caught cold boiled the branches of the beaver-tree in water, and drank it to their great relief. Kaif.

Magnus (John), archbishop of Upsal, was born at Linkoping in 1488. Being made apostolical nuncio, he used his utmost endeavours to prevent Gustavus Vasa from becoming king of Sweden, and the introduction of Lutheranism into his dominions; and spared no means to attain these ends. He died at Rome in 1545. He wrote a history of Sweden, and a history of the archbishops and bishops of Upsal.

Magnus (Olaus), archbishop of Upsal in Sweden, succeeded his brother John Magnus in 1544. He appeared with great credit at the council of Trent in 1546, and suffered much afterwards for the Catholic religion. We have of his writing, A History of the Manners, Customs, and Wars of the Northern Nations of Europe.

Magnus Campus, (anc. geog.), a tract lying towards Scythopolis, or Bethan in Gallilee, beyond which it extends into Samaria; Josephus placing the common boundary between these two districts, in the Campus Magnus. Called also Erebelen, (Judith) ; 30 miles long, and 18 broad; having Samaria with mount Ephraim to the north, and Seleucia in Cilicia to the east, mount Carmel to the west, and Lebanon to the north.

Magnus Portus, (anc. geog.), a port of the Beltica, in Britain, on the Channel. Now thought to be Portsmouth, in Hampshire.—Another Portus Magnus of Baticia in Spain; a port to the east of Abdera.

Mago, the name of several Carthaginian generals. See Carthage.

Mago, (anc. geog.) a citadel and town of the Balearis Minor, or Minorca. Now Maon, or Mahon. E. long. 4° 6' lat. 39° 5'.

Magonztiacum, Magonia, or Moguntiacum, truncated afterwards by the poets to Moguntia, Magnantia, and Moguntia: a town of Gallia Belgica. Now Mnts., capital of the electorate of that name; situated at the confluence of the Rhine and Maine. E. long 80', lat. 50°.

Magophonia (formed from μαγος, "magos," and φωνη, "voice"), the name of a feast among the ancient Persians, held in memory of the expulsion of the Magians. The Magus Smerdis having usurped the throne of Perseus, upon the death of Cambyses, 321 years before Jesus Christ, seven of the principal lords of the court conspired to drive him out of it.—Their design was executed with good success: Smerdis and his brother, another Magus, called Patizithes, were killed. Upon which the people also rose, and put all the Magi to the sword, infulomuch that there would not one have escaped, had not night come upon them. Darius, son of Hyphasis, was then elected king; and, in memory of this massacre of the Magi, a feast was instituted, fays Herodotus, called Magophonia. See Magi.

Mappy, in ornithology. See Corvus.
MAHOMET, or MOHAMMED, styled the Impoller, was born in the reign of Anshuwaran the Juf, emperor of Persia, about the end of the 6th century of the Christian era. He came into the world under some disadvantages. His father Abd’allah was a younger son of Abd’almothaleb; and dying very young, and in his father’s lifetime, left his widow and infant son in very mean circumstances. His whole subsistence was furnished by the charity of his friends and relations; and in order to provide for his posterity, he gave his freedom on that occasion, (which was made in the month of Ramadan, in the 40th year of his age,) by the coran of his age, which is therefore usually called the year of his mission.

Encouraged by so good a beginning, he resolved to proceed, and try for a time what he could do by private persuasion, not daring to hazard the whole affair by exposing it toouddenly to the public. He then made overtures of ease under his own roof, viz. his wife Khadijah, his servant Zeid Ebn Haretha, to whom he gave his freedom on that occasion, (which was made in the month of Ramadan, in the 40th year of his age,) by the coran of his age, which is therefore usually called the year of his mission.

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Mahomet, at length rose up, and declared that he would be his affil- liant; and vehemently threatened those who should oppose him. Mahomet upon this embraced Ali with great demonstrations of affection, and desired all who were present to hearken to and obey him as his depu- ty; at which the company broke out into a great laughter, telling Abu Taleb that he must now pay obedience to his son.

This repulse, however, was so far from discouraging Mahomet, that he began to preach in public to the people; who heard him with some patience till he came to upbraiding them with the idolatry, obstinacy, and perfidiousness of themselves and their fathers: which so highly provoked them, that they declared themselves his enemies; and would soon have procured his ruin, had he not been protected by Abu Taleb. The chief of the Koreih warmly solicited this person to deliver his nephew, making frequent remonstrances against the innovations he was attempting; which proving ineffectual, he again threatened him, if he did not prevail on Mahomet to desist. At this Abu Taleb was so far moved, that he earnestly dissuaded his nephew from pursuing the affair any farther, representing the great danger he and his friends were in from the innovations he was attempting; and going to inspect the writing, to their great astonishment found it to be as Abu Taleb had laid; and the league was thereupon declared void.

In the same year Abu Taleb died, at the age of above fourscore; and it is the general opinion that he died an infidel: though others say, that when he was at the point of death he embraced Mahometanism; and produce some passages out of his poetical compositions to confirm their assertion. About a month, or, as some write, three days after the death of this great benefactor and patron, Mahomet had the additional mortification of losing his wife Khadijah, who had so generously made his fortune. For which reason this year is called the year of mourning.

On the death of these two persons, the Koreih began to feel more trouble than ever to their prophet, and especially some of them who had formerly been his intimate friends; insomuch that he found himself obliged to seek for shelter elsewhere, and first pitched upon Tayef, about 60 miles east from Mecca, for the place of his retreat. Thither therefore he went, accompanied by his fervent Zeitl, and applied himself to two of the chief of the tribe of Thakir, who were the inhabitants of that place; but they received him very coldly. However, he laid there a month; and some of the more confidante and better sort of men treated him with a little respect: but the slaves and inferior people at length rose against him; and bringing to the wall of the city, obliged him to depart and return to Mecca, where he put himself under the protection of Al Motaam Ebn Adi.

This repulse greatly discouraged his followers. However, Mahomet was not wanting to himself; but boldly continued to preach to the public assemblies at the pilgrimage, and gained several profelytes; and among them six of the inhabitants of Yathreb of the Jewish tribe of Khazraj; who, on their return home, failed not to speak much in commendation of their new religion, and exhorted their fellow citizens to embrace the same.

In the 12th year of his mission it was that Mahomet gave out that he had made his night-journey from Mecca to Jerusalem, and thence to heaven, to much spoken of by all that write of him. Dr Prideaux thinks he invented, either to answer the expectations, or...
of those who demanded some miracle as a proof of his million; or else, by pretending to have conversed with God, to establishe the authority of whatever he should think fit to leave behind by way of oral tradition, and make his sayings to serve the same purpose as the oral laws of the Jews. But it does not appear that Mahomet himself ever expected to gain a regard should be paid to his sayings, as his followers have since done; and seeing he all along disclaimed any power of performing miracles, it seems rather to have been a fatch of policy to raife his reputation, by pretending to have actually conversed with God in heaven, as Moses had heretofore done in the mount, and to have received payment to his favings, as his followers have forming miracles, it feems rather to have been actually.

Which happy incident not only retrieved the prophet's credit, but increafed it to fuch a degree, that he was secure of being able to make his disciples swallow whatever he pleaded to impose on them for the future. And this fiction, notwithstanding its extravagance, was one of the most ariftant contrivances Mahomet ever put in practice, and what chiefly contributed to the raising of his reputation to that great height to which it afterwards arrived.

In this year, caufed by the Mahometans the accepted year, 12 men of Yathreb or Medina, of whom 10 were of the tribe of Khezraj, and the other two of that of Aws, came to Mecca, and took an oath of fidelity to Mahomet at al Akaba, a hill on the north of that city. This oath was called the women's oath; not that any women were present at this time, but because a man was not thereby obliged to take up arms in defence of Mahomet or his religion; it being the fame oath that was afterwards exacted of the women, the form of which we have in the Koran, and is to this effect: viz.

That they should renounce all idolatry; and they should not steal, nor commit fornication, nor kill their children (as the Pagan Arab used to do when they apprehended they should not be able to maintain them), nor forge calumies; and that they should obey the prophet in all things that were reasonable. When they had solemnly engaged to all this, Mahomet sent one of his disciples, named Mafab Ebn Omair, home with them, to instruct them more fully in the grounds and ceremonies of his new religion.

Mafab being arrived at Medina, by the assistance of those who had been formerly converted, gained several profelytes, particularly Olaid Ebn Hodeira, a chief man of the city, and Saad Ebn Moath, prince of the tribe of Aws; Mahometanism spreading fo far, that there was scarce a house wherein there were not some who had embraced it.

The next year, being the 13th of Mahomet's mission, Mafab returned to Mecca, accompanied by 73 men and two women of Medina who had professed Islam, besides some others who were assemblerubleviers. On their arrival, they immediately went to Mahomet, and offered him their assistance, of which he was now in great need; for his adversaries were by this time grown so powerful in Mecca, that he could not stay there much longer without eminent danger. Wherefore he accepted their proposal, and met them one night, by appointment, at al Akaba abovementioned, attended by his uncle al Abbas; who, though he was not then a believer, wished his nephew well, and made a speech to those of Medina; wherein he told them, that as Mahomet was obliget to quit his native city, and seek an asylum elsewhere, and they had offered him their protection, they would do well not to deceive him; that if they were not firmly resolved to defend, and not betray him, they had better declare their minds, and let him provide for his safety in some other manner. Upon their protesting their sincerity, Mahomet swore to be faithful to them, on condition that they should protect him against all insults as heartily as they would their own wives and families. They then asked him what recompence they were to expect of he should happen to be killed in his quarrel; he answered, Paradise. Whereupon they pledged their faith to him, and so returned home; after Mahomet had chosen 12 out of their number, who were to have the fame authority among them as the 12 apostles of Christ had among his disciples.

Hitherto Mahomet had propagated his religion by fair means; so that the whole success of this enterprise, before his flight to Medina, must be attributed to persuasion only, and not to compulsion. For before this second oath of fealty or inauguration at al Akaba, he had no permission to use any force at all; and in several places of the Koran, which he pretended were revealed during his stay at Mecca, he declares his buffers was only to preach and admonish; that he had no authority to compel any person to embrace his religion; and that, whether people believe or not, was none of his concern, but belonged solely unto God. And he was so far from allowing his followers to use force, that he exhorted them to bear patiently those injuries which were offered them on account of their faith; and, when perfecuted himself, chose rather to quit the place of his birth and retire to Medina, than to make any resistance. But this great patience and moderation seem entirely owing to his want of power, and the great superiority of his opposers for the first 12 years of his mission; for no sooner was he enabled, by the affittance of his nephew, to make war against his enemies, than he gave out, that God had allowed him and his followers to defend themselves against the infidels; and at length, as his forces increased, he pretended to have the divine leave even to attack them; and to destroy idolatry, and yet up the true faith by the sword; finding, by experience, that his designs would otherwise proceed very slowly, if they were not utterly overturned; and knowing, on the other hand, that innovators, when they depend solely on their own strength, and can compel, seldom run any risks; from whence, says Machiavel, it follows, that all the armed prophets have succeeded, and the unarmed ones have failed. Moses, Cyrus, Theless, and Romulus, would not have been able to other wise, by the observance of their institutions for any length of time, had they not been armed. The first passage of the Koran which gave Mahomet the permission of defending
That Mahomet had a right to take up arms for his own defence against his unjust persecutors, may perhaps be allowed; but whether he ought afterwards to have made use of that means for the estabishing of his religion, it is not easy to determine. For the fecular power may or ought to interpose in affairs of this nature, mankind are not agreed. The method of converting by the sword gives no very favourable idea of the faith which is so propagated, and is disallowed by every body in choice of another religion, though the same persons are willing to admit of it for the advancement of their own: supposing that, though a false religion ought not to be establisht by authority, yet a true one may; and accordingly force is almost as constantly employed in these cases by those who have the power in their hands, as it is constantly complained of by those who suffer the violence. It is certainly one of the most convincing proofs that Mahometanism was no other than a human invention, that it owed its progress and estabishment almost entirely to the sword: and it is one of the strongest demonstrations of the divine original of Christianity, that it prevailed against all the force and powers of the world by the dint of its own truth, after having flood the assaults of all manner of perfections, as well as other oppositions, for 300 years together, and at length made the Roman emperors themselves submit thereto: after which time, indeed, this proof seems to fall, Christianity being then establisht, and Paganism abolished, by public authority, which has had great influence in the propagation of the one and destruction of the other ever since. But to return.

Mahomet, having provided for the security of his companions as well as his own, by the league offensive and defensive which he had now concluded with those of Medina, directed them to repair thither, which they accordingly did; but himself with Abu Beer and Ali fled behind, having not yet received the divine permission, as he pretended, to leave Meccah. The Koreish fearing the consequence of this new alliance, began to think it absolutely necessary to prevent Mahomet's escape to Medina; and having held a council thereon, after severall smaller expeditions had been rejected, they came to a resolution that he should be killed; and agreed that a man should be chosen out of every tribe for the execution of this design; and that each man should have a blow at him with his sword, that the guilt of his blood might fall equally on all the tribes, to whose united power the Hafhehimes were much inferior, and therefore durst not attempt to revenge their kinman's death.

This conspiracy was scarce formed, when by some means or other, it came to Mahomet's knowledge; and he gave out that it was revealed to him by the angel Gabriel, who had now ordered him to retire to Medina. Whereupon, to amuse his enemies, he directed Ali to lie down in his place, and wrap himself up in his green cloak, which he did; and Mahomet escaped miraculously, as they pretend, to Abu Beer's house, unperceived by the conspirators, who had already assembled at the prophet's door. They, in the mean time, looking through the crevice, and seeing Ali, whom they took to be Mahomet himself, asleep, continued watching there till morning, when Ali arose, and they found themselves deceived.

From Abu Beer's house Mahomet and he went to a cave in mount Thur, to the south-call of Mecca, accompanied only by Amer Ibn Foheirah, Abu Beer's servant, and Abdalla Ibn Qeethah, an idoler whom they had hired for a guide. In this cave they lay hid three days to avoid the search of their enemies; which they very narrowly escaped, and not without the assistance of more miracles than one: for some say that the Koreish were struck with blindness, so that they could not find the cave; others, that after Mahomet and his companions were got in, two pigeons laid their eggs at the entrance, and a spider covered the mouth of the cave with her web, which made them look no farther. Abu Beer, seeing the prophet in such imminent danger, became very sorrowful; whereupon Mahomet comforted him with these words, recorded in the Koran, 'Be not grieved, for God is with us.' Their enemies being retired, they left the cave, and set out for Medina, by a by-road; and having fortunately, or, as the Mahometans tell us, miraculously escaped some who were sent to pursue them, arrived safely at that city; whither Ali followed them in three days, after he had settled some affairs at Mecca.

The first thing Mahomet did after his arrival at Medina, was to build a temple for his religious worship, and a house for himself, which he did on a parcel of ground which had before served to put camels in, or, as others tell us, for a burying-ground, and belonged to Shal and Soheil, the sons of Amran, who were orphans. This action Dr Prideaux excuses against, representing it as a flagrant instance of injustice; for that, says he, he violently dispossessed these poor orphans, the sons of an inferior artificer (whom the author he quotes calls a carpenter), of this ground, and so founded the first fabric of his worship with the like wickedness as he did his religion. But, to say nothing of the improbability that Mahomet should act in so impolitic a manner at his first coming, the Mahometan writers set this affair in a quite different light: one tells us he treated with the lads about the price of the ground, but they desired he would accept it as a present; but however, as it was of good credit allure us, he actually bought it; and the money was paid by Abu Beer. Besides, had Mahomet accepted it as a present, the orphans were in circumstances sufficient to have afforded it: for they were of a very good family, of the tribe of Najjar, one of the most illustrious among the Arabs; and not the sons of a carpenter, as Dr Prideaux's author writes, who took the word Najjar, which signifies 'a carter,' for an appellative, whereas it is a proper name.

Mahomet, being securely settled at Medina, and able not only to defend himself against the insults of his enemies, but to attack them, began to send out small parties to make reprisals on the Koreish; the first party consisting of no more than nine men, who intercepted and plundered a caravan belonging to that tribe, and in the action took two prisoners. But what established his affairs very much, was the foundation on which he built all his succeeding greatness,
Mahomet was the gaining of the battle of Bedr, which was fought in the second year of the Hegira, and is so famous in the Mahometan history. Some reckon no less than 27 expeditions wherein Mahomet was personably present, in nine of which he gave battle, besides several other expeditions in which he was not present. His forces he maintained partly by the contributions of his followers for this purpose, which he called by the name of zakat or alms, and the paying of which he very artfully made one main article of his religion; and partly by ordering a fifth part of the plunder to be brought into the public treasury for that purpose, in which matter he likewise pretended to act by divine direction.

In a few years, by the success of his arms (notwithstanding he sometimes came off by the wound) he considerably raised his credit and power. In the sixth year of the Hegira he set out with 1400 men to visit the temple of Mecca, not with any intent of committing hostilities, but in a peaceable manner. However, when he came to al-Hodeibiah, which is situated partly within and partly without the sacred territory, the Koreish sent to let him know that they would not permit him to enter Mecca, unless he forced his way; whereupon he called his troops about him, and they all took a solemn oath of fealty or homage to him, and he resolved to attack the city; but those of Mecca sending Arwa Ebn Madud, prince of the tribe of Thakif, as their ambassador, to desire peace, a truce was concluded between them for ten years, by which any person was allowed to enter into league either with Mahomet, or with the Koreish, as he thought fit.

It may not be improper, in order to show the inconceivable veneration and respect the Mahometans by this time had for their prophet, to mention the account which the abovementioned ambassador gave the Koreish at his return, of their behaviour. He said he had been at the courts both of the Roman emperor and of the king of Persia, and never saw any prince to highly respect by his subjects as Mahomet was by his companions; for, whenever he made the abidation, in order to fay his prayers, they ran and caught the water that he had used; and whenever he flipt they immediately licked it up, and gathered every hair that fell from him with great veneration.

In the seventh year of the Hegira, Mahomet began to think of propagating his religion beyond the bounds of Arabia; and sent messengers to the neighbouring princes, with letters to invite them to Mahometism. Nor was this project without some success. Khojru Parviz, then king of Persia, received his letter with great diffusion, and tore it in a passion, fending away the messenger very abruptly; which when Mahomet heard, he faid God.health bear his kingdom. And soon after a messenger came to Mahomet from Badhon king of Yaman, who was a dependent on the Persians, to acquaint him that he had received orders to fend him to Khojru. Mahomet put off his answer till the next morning, and then told the messenger it had been revealed to him that night that Khojru was slain by his son Shiruyeh; adding, that he was well assured of his new religion and empire should rise to a great height as that of Khojru; and therefore bid him advise his master to embrace Mahometism. The messenger being returned, Badhan a few days received a letter from Shiruyeh, informing him of his father's death, ordering him to give the prophet no further disturbance. Whereupon Badhan and the Persians with him turned Mahometans.

The emperor Heraclius, as the Arabian historians assure us, received Mahomet's letter with great respect, laying it on his pillow, and dilified the bearer handsomely. And some pretend that he would have professed this new faith, had he not been afraid of losing his crown.

Mahomet wrote to the same effect to the king of Ethiopia, though he had been converted before according to the Arab writers; and to Mokawaks, governor of Egypt, who gave the messenger a very favourable reception, and sent several valuable presents to Mahomet, and among the rest two girls, one of which, named Mary, became a great favourite with him. He also sent letters of the like purport to several Arab princes; particularly one to al Hareth Ebn Abi Shamer king of Ghafeen, who returning for answer that he would go to Mahomet himself, the prophet said, may his kingdom perish; another to Pawla Ebn Ali, king of Yamama, who was a Christian, and, having some time before professed Islamism, had lately returned to his former faith; this prince sent back a very rough answer, upon which Mahomet cursing him, he died soon after; and a third to al Mondar Ebn Sawa, king of Bahrin, who embraced Mahometism, and all the Arabs of that country followed his example.

The eighth year of the Hegira was a very fortunate year to Mahomet. In the beginning of it, Khed Ebn al Walid and Amru Ebn al As, both excellent soldiers, the first of whom afterwards conquered Syria and other countries, and the latter Egypt, became proselytes to Mahometism. And soon after the prophet sent 3000 men against the Grecian forces, to revenge the death of one of his ambassadors, who, being sent to the governor of Bofra on the same errand as those who went to the abovementioned princes, was slain by an Arab, of the tribe of Ghafian, at Mut, a town in the territory of Balka in Syria, about three days journey eafward from Jerusalem, near which town they encountered. The Grecians being vastly inferior in number (for, including the auxiliary Arabs, they had an army of 100,000 men, the Mahometans were repulsed in the first attack, and lost successively three of their generals, viz. Zeid Ebn Hareth Mahomet's freedman, Jaafar the son of Abu Taleb, and Abdallah Ebn Rawaha; but Khed Ebn al Walid succeeding to the command, overthrew the Greeks with a great slaughter, and brought away abundance of rich spoil; on occasion of which action Mahomet gave him the title of Seif min foyuf Allah, "one of the swords of God."

In this year also Mahomet took the city of Mecca, the inhabitants whereof had broken the truce concluded on two years before. For the tribe of Beer, who were confederates with the Koreish, attacking those of Khozaa, who were allies of Mahomet, killed several of them, being supported in the action by a party of the Koreish themselves. The consequence
Mahomet immediately gave orders for preparations to be made, that he might surprize the Meccans while they were unprovided to receive him: in a little time he began his march thither: and by that time he came to Mecca, pardoned all the inhabitants except six men and four women, who were more obnoxious than ordinary; some of them having apostatised, and others abjured Mahometanism, being not in a condition to defend themselves against so formidable an army, surrendered at discretion; and Abu Sofian saved his life by turning Mahometan. About 28 of the idolaters were killed by a party under the command of Khaled; but this happened contrary to Mahomet's orders, who, when he entered the town, pardoned all the idolaters on their submission, except only six men and four women, who were more obnoxious than ordinary (some of them having apostatised), and were solemnly proscribed by the prophet himself; but of these no more than three men and one woman were put to death, the rest obtaining pardon on their embracing Mahometanism, and of one of the women making her escape. The remainder of this year Mahomet employed in destroying the idols in and round Mecca, sending several of his generals on expeditions for that purpose, and to invite the Arabs to Islamism: wherein it is no wonder if they now met with success.

The next year, being the ninth of the Hegira, the Mahometans call the year of embassies: for the Arabs had been hitherto expecting the issue of the war between Mahomet and the Koreish; but, soon after that tribe, the principal of the whole nation, and the genuine descendants of Ishmael, whose prerogatives none offered to dispute, had submitted, they were satisfied that it was not in their power to oppose Mahomet; and therefore began to come in to him in great numbers, and to send embassies to make their submissions to him, both to Mecca, while he stood there, and also to Medina, whether he returned this year. Among the rest, five kings of the tribe of Hamyar professed Mahometanism, and sent ambassadors to notify the same.

In the 10th year, Ali was sent into Yaman to propagate the Mahometan faith there; and, as it is told, converted the whole tribe of Hamdan in one day. Their example was quickly followed by all the inhabitants of that province, except only those of Najran, who, being Christians, chose rather to pay tribute.

Thus was Mahometanism established, and idolatry rooted out, even in Mahomet's lifetime (for he died the next year), throughout all Arabia, except only Yemen, where Moefia, who set up also for a prophet as Mahomet's competitor, had a great party, and was not reduced till the califat of Abu Becc; and the Arabs being then united in one faith, and under one prince, found themselves in a condition of making those conquests which extended the Mahometan faith over to a great part of the world.

Mahomet, the name of several emperors of the Turks: of whom the most celebrated is,

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Mahomet II. farmed the Great, their seventh sultan. See Turkey.

He was born at Adrianople the 24th of March 1430, and is to be remembered chiefly by us for taking Constantiopole in 1453, and thereby driving many learned Greeks into the West, which was a great cause of the restoration of learning in Europe, as the Greek literature was then introduced there. He was one of the greatest men upon record, with regard to the qualities necessary to a conqueror: for he conquered two empires, twelve kingdoms, and two hundred considerable cities.

He was very ambitious of the title of Great, and the Turks gave it him; even the Christians have not disputed it with him; for he was the first of the Ottoman emperors whom the Western nations dignified with the title of Grand Seignior or Great Turk, which posterity has preferred to his descendants. Italy had suffered greater calamities, but she had never felt a terror equal to that which this sultan's victories imprinted. The inhabitants seemed already condemned to wear the turban; it is certain, that pope Sixtus IV. represented to himself Rome as already involved in the dreadful fate of Constantiopole: and thought of nothing but escaping into Provence, and once more transferring the holy see to Avignon. Accordingly, the news of Mahomet's death, which happened the 3d of May 1481, was received at Rome with the greatest joy that ever was beheld there. Sixtus caused all the churches to be thrown open, made the tradepeople leave off their work, ordered a feast of three days, with public prayers and processions, commanded a discharge of the whole artillery of the castle of St Angelo all that time, and put a stop to his journey to Avignon.

He appears to be the first sultan who was a lover of arts and sciences; and even cultivated polite letters. He often read the history of Augustus, and the other Caesars; and he perused those of Alexander, Constantine, and Theodosius, with more than ordinary pleasure, because these had reigned in the same country with himself. He was fond of painting, music, and sculpture; and he applied himself to the study of agriculture. He was much addicted to astrology; and used to encourage his troops by giving out, that the motion and influence of the heavenly bodies promised him the empire of the world. Contrary to the genius of his country, he delighted so much in the knowledge of foreign languages, that he not only spoke the Arabian, to which the Turkish laws, and the religion of their legislator Mahomet, are appropriated, but also the Persian, the Greek, and the French, that is, the corrupted Italian. Landin, a knight of Rhodes, collected several letters which this sultan wrote in the Syriac, Greek, and Turkish languages, and translated them into Latin. Where the originals are, nobody knows; but the translation has been published several times: as at Lyons 1520, in 40; at Basil 1554, 12mo; in a collection published by Opera, at Marburg 1604, in 8vo; and at Leipzig 1690, in 12mo. Melchio Antonio, professor of eloquence at Strasburg, published at Montbichard, 1595, a collection of letters, in which there are three written by Mahomet II. to Scanderbeg. One cannot discover the least air of Turkish ferocity in these letters: they are written in as civil terms, and as obliging a manner,
MAHOMETANISM, or Mahometism, the system of religion broached by Mahomet, and still adhered to by his followers. See Mahomet, and Alcoran.

Mahometanism is professed by the Turks, Peruvians, and several nations among the Africans, and many among the East-Indians.

The Mahometans divide their religion into two general parts, faith and practice: of which the first is divided into six distinct branches: Belief in God, in his angels, in his scriptures, in his prophets, in the resurrection and final judgment, and in God's absolute decrees. The points relating to practice are, Prayer, with washings, &c. alms, pilgrimages to Mecca, and circumcision.

1. Of the Mahometan Faith. 1. That both Mahomet, and those among his followers who are reckoned orthodox, had and continue to have just and true notions of God and his attributes, appears from plain in the Koran itself, and all the Mahometan divines, that it would be loss of time to refute those who suppose the God of Mahomet to be different from the true God, and only a fictitious deity or idol of his own creation.

2. The existence of angels, and their purity, are absolutely required to be believed in the Koran; and he is reckoned an infidel who denies there are such beings, or hates any of them, or afflicts any distinction of sexes among them. They believe them to have pure and subtil bodies, created of fire; that they neither eat nor drink, nor propagate their species; that they have various forms and offices, some adoring God in different postures, others singing praises to him, or interceding for mankind. They hold, that some of them are employed in writing down the actions of men; others in carrying the throne of God, and other services.

The four angels, whom they look on as more eminently in God's favour, and often mention on account of the offices assigned them, are, Gabriel, to whom they give several titles, particularly those of the holy spirit, and the angel of revelations, supposing him to be honoured by God with greater confidence than any other, and to be employed in writing down the divine decrees; Michael, the friend and protector of the Jews; Azrael, the angel of death, who separates men souls from their bodies; and Irafil, whose office it will be to found the trumpet at the resurrection.

The Mahometans also believe, that two guardian angels attend on every man, to observe and write down his actions, being changed every day, and therefore called al Maokkibat, or "the angels who continually succeed one another."

The devil, whom Mahomet names Elhit, from his despair, was once one of those angels who are nearest to God's preference, called Asazil; and fell, according to the doctrine of the Koran, for refusing to pay homage to Adam at the command of God.

Besides angels, and devils, the Mahometans are taught by the Koran to believe an intermediate order of creatures, which they call jin or genii, created also of fire, but of a groffer fabric than angels, since they eat and drink, and propagate their species, and are subject to death. Some of these are supposed to be good and others bad, and capable of future salvation or damnation, as men are; whence Mahomet pretended to be sent for the conversion of genii as well as men.

3. As to the scriptures, the Mahometans are taught by the Koran, that God, in divers ages of the world, gave revelations of his will in writing to several prophets, the whole and every one of which is absolutely necessary for a good Mohammed to believe. The number of these sacred books were, according to them, 104. Of which to were given to Adam, 50 to Seir, 40 to Edris or Enoch, 10 to Abraham; and the other four, being the Pentateuch, the Psalms, the Gospel, and the Koran, were successively delivered to Moses, David, Jesus, and Mahomet; which last being the seal of the prophets, these revelations are now closed, and no more are to be expected. All these divine books, except the four last, they agree to be now entirely lost, and their contents unknown; though the Sabians have several books which they attribute to some of the antediluvian prophets. And of those four, the Pentateuch, Psalms, and Gospel, they say, have undergone so many alterations and corruptions, that, though there may possibly be some part of the true word of God therein, yet no credit is to be given to the present copies in the hands of the Jews and Christians. The Mahometans have also a gospel in Arabic, attributed to St. Barnabas; wherein the history of Jesus Christ is related in a manner very different from what we find in the true gospels, and correspondent to those traditions which Mahomet has followed in his Koran. Of this gospel the Moriscoes in Africa have a translation into Spanish; and there is, in the library of Prince Eugene of Savoy, a manuscript of some antiquity, containing an Italian translation of the same gospel; made, it is to be supposed, for the use of renegades. This book appears to be no original forgery of the Mahometans; though they have, no doubt, interpolated and altered it since, the better to serve their purpose; and in particular, instead of the Paraclete, or Comforter, they have in this apocryphal gospel inserted the word Periolyte, that is, the "famous," or "illustrious," by which they pretend their prophet was foretold by name, that being the significatioll of Mohammed in Arabic: and this they say to justify that passage of the Koran, where Jesus Christ is formally asserted to have foretold his coming, under his other name of Ahmed, which is derived from the same root as Mohammed, and of the same import. From these, or some other forgeries of the same stamp, it is that the Mahometans quote several passages, of which there are not the least footsteols in the New Testament.

4. The number of the prophets, which have been from time to time sent by God into the world, amounts to no less than 224,000, according to one Mahometan tradition; or to 124,000, according to another: among whom 373 were apostles, sent with special commissions to reclaim mankind from infidelity and superstitition; and six of them brought new laws or dispensations, which successively abrogated the preceding: these were Adam, Noah, Abraham, Moses, Jesus, and Mahomet. All the prophets in general, the Mahometans believe to have been free from great
fins and errors of consequence, and professors of one and the same religion, that is, Islam notwithstanding the different laws and institutions which they observed. They allow of degrees among them, and some of them to be more excellent and honourable than others. The first place they give to the revealers and establishers of new dispensations, and the next to the apostles.

In this great number of prophets, they not only reckon divers patriarchs and persons named in scripture, but not recorded to have been prophets (wherein the Jewish and Christian writers have sometimes led the way), as Adam, Seth, Lot, Ishmael, Nun, Jethro, &c. and introduce some of them under different names, as Noach, Heber, and Jethro, who are called, in the Koran, Edris, Hud, and Shoaib; but several others whose very names do not appear in scripture (though they endeavour to find some persons there to fix them on), as Saleh, Khedr, Dhu'ikaf, &c.

5. The belief of a general resurrection and a future judgment.

When a corpse is laid in the grave, they say he is received by an angel, who gives him notice of the coming of the two examiners; who are two black livid angels, of a terrible appearance, named Maker and Nakir. Those order the dead person to prepare, and examine him concerning his faith, as to the unity of God, and millions of Mahomet: if he answer rightly, they suffer the body to rest in peace; and it is refreshed by the air of paradise; but, if not, they take him on the temples with iron maces, till he roars out eminent dignity. 3. That a maid-servant named Nakir. Nakir. Each; or, as others say, their lines will become venomous beasts, the grievous ones stinging like dragons, the smaller like scorpions, and the other like serpents: circumstances which some undertand in a figurative sense.

As to the soul, they hold, that when it is separated from the body by the angel of death, who performs his office with prudence and gentleness towards the good, and with violence towards the wicked, it enters into that which they call al-karazah, or the interval between death and the resurrection. If the departed person was a believer, they say two angels meet it, who convey it to heaven, that its place there may be assigned, according to its merit and degree. For they distinguish the souls of the faithful into three classes: the first of prophets, whose souls are admitted into paradise immediately; the second of martyrs, whose spirits, according to a tradition of Mahomet, rest in the crops of green birds, which eat of the fruits and drink of the rivers of paradise; and the third of other believers concerning the state of whose souls before the resurrection, there are various opinions.

Though some among the Mahometans have thought that the resurrection will be merely spiritual, and no more than the returning of the soul to the place whence it first came (an opinion defended by Ibn Sina, and called by some the opinion of the philosopher); and others who allow man to consist of body only, that it will be merely corporeal; the received opinion is, that both body and soul will be raised; and their doc-
word Cæser, i. e. infidel, that every person may be known for what he really is. They add, that the same beaustria to demonstrate the vanity of all religions except Islam, and to speak the Arabic. All this stuff formed to be the subject of a confounded idea of the beaustria in the Revelations. 3. War with the Greeks and the taking Constantinople by 70,000 of the pofterity of Isaac, who shall not win that city by force of arms, but the walls shall fall down while they cry out, There is no God but God, God is most great! As they are dividing the spoil, news will come to them of the appearance of Antichrist; whereupon they shall leave all, and return back. 4. The coming of Antichrist, whom the Mahometans call Masbû al Da‘ijat; i. e. the falseprophet Christ, and simply al Da‘ijat. He is to be one-eyed, and marked on the forehead with the letters C. F. R., signifying Cæser, or infidel. They say that the Jews give him the name of Muffah Ben David, and pretend he is to come in the last days, and to be lord both of land and sea, and that he will restore the kingdom to them.

5. The defeat of Jesus on earth. They pretend that he is to descend near the white tower to the east of Damascus, where the people are returned from the taking of Constantinople: that he is to embrace the Mahometan religion, marry a wife, get children, kill Antichrist; and at length die after 40 years, or, according to others, 24 years continuance on earth.

Under him, they say, there will be great insecurity and plenty in the world, all hatred and malice being laid aside; when lions and camels, bears and sheep, shall live in peace, and a child shall play with serpents unharmed. 6. War with the Jews; of whom the Mahometans are to make a prodigious slaughter, the very trees and fomen discovering such of them as hide themselves, except only the tree called gharkad, which is the tree of the Jews. 7. The eruption of Gog and Magog, or, as they are called in the east, Tajuq and Majaj; of whom many things are related in the Koran and the traditions of Mahomet. These barbarians, they tell us, having passed the lake of Tiberias, which is the vanguard of their vast army, will drink the Jordan, come to Jerusalem, and there greatly defeat Jesus and his companions; till, at his request, God will destroy them, and fill the earth with their carcasses, which will be frozen to ice in the heat of summer, and carried away, at the prayers of Jesus and his followers. Their bows, arrows, and quivers, the Moabians will burn for seven years together; and at last, God will send a rain to cleanse the earth and to make it fertile.

8. A smoke which shall fill the whole earth. 9. An eclipse of the moon. Mahomet is reported to have said, that there would be three eclipses before the last hour; one to be seen in the east, another in the west, and the third in Arabia. 10. The returning of the Arabs to the worship of Allat and al Uzza, and the rest of their ancient idols, after the decease of every one in whose heart there was faith equal to a grain of mustard-seed, none but the very worth of men being left alive. For God, they say, will send a cold destructive wind, blowing from Syria Damascus, which shall sweep away the souls of all the faithful, and the Koran itself, so that men will remain in the grossest ignorance for 100 years.

11. The discovery of a vast heap of gold and silver by the retreating of the Euphrates, which will be the destruction of many. Mahometan. 12. The demolition of the Caaba, or temple of Mecca, by the Ethiopians. 13. The speaking of beaustria and inanimate things. 14. The breaking out of fire from the province of Hejaz; or, according to others, in Yaman.

15. The appearance of a man of the descendants of Kahtan, who shall drive men before him with his staff. 16. The coming of the Mahdî, or director concerning whom Mahomet prophesied, that the world should not have an end till one of his own family should govern the Arabsians, whose name should be the same with his own name, and whose father's name should also be the same with his father's name; and who should fill the earth with righteousness. This person the Shiites believe to be now alive, and concealed in some secret place till the time of his manifestation; for they suppose him no other than the last of the 12 Imams, named Mahomet Abû takism, as their prophet was; and the son of Hafîn al Afsri, the 11th of that succession. He was born at Sermanrai, in the 255th year of the Hegira. From this tradition, it is to be presumed, an opinion pretty current among the Christians took its rise, that the Mahometans are in expectation of their prophet's return.

17. A wind which shall sweep away the souls of all who have but a grain of faith in their hearts, as has been mentioned under the tenth sign.

These are the greater signs, which, according to their doctrine, are to precede the resurrection, and shall leave the hour of it uncertain; for the immediate sign of its being come will be the first blast of the trumpet, which they believe will be founded three times. The first they call the blast of confirmation; at the hearing of which all creatures in heaven and earth shall be troubled with terror, except those whom God shall please to exempt from it. The effects attributed to this first sound of the trumpet are very wonderful: for they say the earth will be shaken, and not only all buildings, but the very mountains levelled; that the heavens shall melt, the sun be darkened, the stars fall, on the death of the angels, who, as some imagine, hold them suspended between heaven and earth, and the sea shall be troubled and dried up, and, or according to others, turned into flames; the moon, and stars being thrown into the Koran, to cause the completion of the terror of that day, adds, that women who give suck shall abandon the care of their infants, and even the camels which have gone 10 months with young (a most valuable part of the substance of that nation) shall be utterly neglected. A farther effect of this blast will be that concourse of beaustias mentioned in the Koran, though some doubt whether it be to precede the resurrection or not. They who suppose it will precede, think that all kinds of animals, forgetting their respective natural fierceness and timidity, will run together in one place, being terrified by the sound of the trumpet and the sudden shock of nature.

The Mahometans believe that this first blast will be followed by a second, which they call the blast of exmination; by which all creatures both in heaven and earth shall die or be annihilated, except those which God shall please to exempt from the common fate; and this they say, shall happen in the twinkling of an eye, nay in an instant; nothing surviving except God alone, with
with paradise and hell, and the inhabitants of those two places, and the throne of glory. The last who shall die will be the angel of death.

Forty years after this will be heard the blast of resurrection, when the trumpet shall be sounded the third time by Irafil, who, together with Gabriel and Michael, will be previously restored to life, and, standing on the rock of the temple of Jerusalem, shall, at God's command, call together all the dry and rotten bones, and other dispersed parts of the bodies, and the very persons to judgment. This angel, having by the divine order, let the trumpet to his mouth, and called together all the souls from all parts, will throw them into his trumpet, from whence, on his giving the last found at the command of God, they will fly forth like bees, and fill the whole space between heaven and earth, and then repair to their respective bodies, which the opening earth will furnish to arise; and the first who shall so arise, according to a tradition of Mahomet, will be himself. For this birth the earth will be prepared by the rain above-mentioned, which is to fall continually for 40 years, and will reframe the feed of a man, and be supplied from the water under the throne of God, which is called living water; by the efficacy and virtue of which the dead bodies shall spring forth from their graves, as they did in their mother's womb, or, nay, the very earth itself, will be ready to bear witness to this solemn undertaking; in the meantime the Mahometans believe God will at length, at his own time, bring forth the fruits of the earth, till they become capable of bearing witness. This examination being past, and every one's works weighed in the scales, and according as the books wherein they are written shall be weighed, they say that the books wherein they are written will be thrown into the scales, and according as those wherein the good and evil actions are recorded shall predominate, sentence will be given: those whose balances laden with good works shall be heavy will be saved; but those whose balances are light, will be condemned. Nor will any one have cause to complain that God suffers any good actions to pass unrewarded, because the wicked for the good they do have their reward in this life, and therefore can expect no favour in the next.

This examination being past, and every one's works weighed in a just balance, that mutual retaliation will follow, according to which every creature will take vengeance one of another, or have satisfaction made them for the injuries which they have suffered. And, since there will be then no other way of returning like for like,
like, the manner of giving this satisfaction will be by taking away a proportional part of the good works of him who offered the injury, and adding it to those of him who suffered it. Which being done, if the angels (by whose ministry this is to be performed) say, Lord, we have given to every one his due, and there remaineth of this person's good works fome such as equalleth the weight of an ant, God will, of his mercy, cause it to be doubled unto him, that he may be admitted into paradise; but, if, contrary, his good works be exhausted, and there remain evil works only, and there be any who have not yet received satisfaction from him, God will order that an equal weight of their finer be added unto his, that he may be punished for them in his stead, and will be sent to hell laden with both. This will be the method of God's dealing with mankind. As to brutes, after they shall have likewise taken vengeance of one another, he will command them to be changed into dust; wicked men being referred to more grievous punishment, so that they shall cry out on hearing this sentence pasied on the brutes, Would to God that we were dust also. As to the gentiles, many Mahometans are of opinion, that fuch of them as are true believers, will undergo the fame fate as the irrational animals, and have no other reward than the favour of being converted into dust; and for this they quote the authority of their prophet.

The trials being over, and the assembly dissolved, the Mahometans hold, that those who are to be admitted into paradise will take the right hand way, and those who are defined to hell-fire will take the left; but both of them must first pass the bridge called in Arabic al Sirat, which they lay is laid over the midst of hell, and describ.e to be finer than a hair, and sharper than the edge of a sword; so that it seems very difficult to conceive how any one shall be able to stand upon it: for which reason most of the fchools of the Mozaffarites reject it as a fable; though the orthodox think it a sufficient proof of the truth of this article, that it was ferioufly afirmed by him who never affected a falsehood, meaning their prophet: who, to add to the difficulty of the passage, has likewise declared, that this bridge is beter on each fide with briars and hooked thorns: which will however be no impediment to the good; for they shall pass with wonderful ease and swiftness, like lightning, or the wind, Mahomet and his MoKRJEf leading the way; whereas the wicked, what with the flipperines and extreme narrowness of the path, the entangling of the thorns, and the extinction of the light which directed the former to paradise, will soon miff their footing, and fall down headlong into hell, which is gaping before them. As to the punishment of the wicked, the Mahometans are taught, that hell is divided into seven stories or apartments, one below another, designed for the reception of as many different classes of the damned. The firft, which they call Jannatin, they say, will be the receptacle of thofe who acknowledged one God, that is, the wicked Mahometans; who after having there been punished according to their demerits, will at length be released. The second, named Ladh, they align to the Jews; the third, named al Holama, to the Christian: the fourth, named al Sir to the Sabians; the fifth, named Sahir, to the Magians; the sixth named al Jabin, to the idolaters, and the seventh, which is the lowest and worst of all, and is Mahomet called al Haywat, to the hypocrites, or thofe who outwardly professed fome religion, but in their hearts were of none. Over each of these departments they believe there will be fent a guard of angels, ro in number; to whom the damned will confefs the Juf judgment of God, and beg them to intercede with him for some alleviation of their pain, or that they may be delivered by being annihilated. Mahomet has, in his Koran, and traditions, been very exact in describing the various torments of hell, which, according to him, the wicked will suffer both from intense heat and excessive cold. We shall however, enter into no detail of them here; but only observe, that the degrees of these pains will also vary in proportion to the crimes of the sufferer, and the apartment he is condemned to; and that he who is punished the most lightly of all will be shod with shoes of fire the fervour of which will caufe his skull to boil like a cauldron. The condition of these unhappy wretches, as the fame prophet teaches, cannot be properly called either life or death; and their misery will be greatly increafed by their defire of being ever delivered from that place. Hence the frequent expression in the Koran, they must remain therein for ever. It must be remarked, however, that the infidels alone will be liable to eternity of damnation; for the MoKRJEf, or thofe who have embraced the true religion, and have been guilty of heinous sins will be delivered thence after they have expiated their crime by their sufferings. The time which thofe believers fhall be detained there, according to a tradition handed down from their prophet, will be no lefs than 900 years, or more than 7000. And, as to the manner of their delivery, they fay that they fhall be diftinguifh'd by the marks of proftration on thofe parts of their bodies with which they used to touch the ground in prayer, and over which the fire will therefore have no power; and that, being known by this characteristic, they will be releafed by the mercy of God, at the interceffion of Mahomet and the bleffed whereupon thofe who fhall have been dead will be reftored to life, as has been faid; and thofe whose bodies fhall have contrived any footnotes or filth from the flames and fmoke of hell, will be immerfed in one of the rivers of paradise, called the river of life, which will wash them whiter than pearls.

The righteous, as the Nihomtans are taught to believe, having fount over the difficulties, and paffed the sharp bridge abovementioned, before they enter paradise, will be refrefted by drinking at the pond of their prophet, who describes it to be an exact square of a month's journey in compass; its water which is supplied by two pipes from al Cawther, one of the rivers of paradise, being whiter than milk or silver, and more odiferous than musk, with as many cups fet around it as there are stars in the firnent; of which water whoever drinks will thrift no more for ever. This is the first taste which the bleffed will have of their future and now near-approaching felicity.

Though paradise be fo very frequently mentioned in the Koran, yet it is a difpute among the Mahometans whether it be already created, or to be created hereafter; the Mozaffarites and fome other sectaries
They say it is situated above the seven heavens (or in the seventh heaven), and next under the throne of God; and, to express the amenity of the place, tell us, that the earth of it is of the finest wheat-flour, or of the purest milk, or, as others will have it, of saffron: that its stones are pearls and jacinths, the walls of its buildings enriched with gold and silver, and that the trunks of all its trees are of gold: among which the most remarkable is the tree called Tuba, or the tree of happiness. Concerning this tree, they fable, that it stands in the palace of Mahomet, though a branch of it will reach to the house of every true believer; that it will be laden with pomegranates, grapes, dates, and other fruit, of surprising bigness, and of tastes unknown to mortals. So that if a man desire to cat of any particular kind of fruit, it will immediately be presented him; or, if he choose flesh, birds ready dressed will be let before him, according to his will. They add, that the boughs of this tree will spontaneously bend down to the hand of the person who would gather of its fruits; and that it will supply the blessed not only with food, but also with silken garments, and beasts to ride on (ready saddled and bridled, and adorned with rich trappings, which will burst forth from its fruits; and that this tree is so large, that a person, mounted on the fleetest horse, would not be able to gallop from one end of its shade to the other in 100 years.

As plenty of water is one of the greatest additions to the pleasures of any place, the Koran often speaks of the rivers of paradise as a principal ornament thereof; some of these rivers, they fay, flow with water, some with milk, some with wine, and others with honey; all taking their rise from the root of the tree Tuba.

But all these glories will be eclipsed by the resplendent and ravishing girls of paradise, called from their large black eyes, Hur al oyen, the enjoyment of whose company will be a principal felicity of the faithfull. These, they fay, are created, not of clay, as mortal women are, but of pure milk; being, as their prophet often affirms in his Koran, free from all natural impurities, defects and inconveniences incident to the sex, of the finest modesty, and secluded from public view in pavilions of hollow pears, so large that no one will be able to cross them, unless they be armed with a sword (or, as others fay, 60 miles) long, and as many broad.

The name which the Mahometans usually give to this happy mansion, is al Jannat, or “the garden;” and sometimes they call it, with an addition, Jannat al Ferdows, “the garden of paradise;” Jannat Eden, “the garden of Eden;” (though they generally interpret the word Eden, not according to its acceptance in Hebrew, but according to its meaning in their own tongue, wherein it signifies “a settled or perpetual habitation,”) Jannat al Mawwa, “the garden of abode;” Jannat al Naim, “the garden of pleasures;” and the like: by which several appellations some understand so many different gardens, or at least places of different degrees of felicity (for they reckon no less than 100 such in all), the very meanest whereof will afford its inhabitants so many pleasures and delights, that one would conclude they must even sink under them, had not Mahomet declared, that, in order to qualify the blessed for a full enjoyment of them, God will give to every one the abilities of 100 men.

6. God's absolute decree and predestination both of good and evil. The orthodox doctrine is, that whatever hath or shall come to pass in this world, whether it be good, or whether it be bad, proceedeth entirely from the divine will, and is irreversibly fixed and recorded from all eternity in the preferved table: God having secretly predetermined not only the adverse and prosperous fortune of every person in this world, in the most minute particulars, but also his faith or infidelity, his obedience or disobedience, and consequently his everlasting happiness or misery after death; which fate or predestination it is not possible by any foresight or wisdom to avoid.

7. Of this doctrine Mahomet makes great use in his Koran for the advancement of his designs; encouraging his followers to fight without fear, and even desperately, for the propagation of their faith, by representing to them, that all their caution could not avert their inevitable destiny, or prolong their lives for a moment; and deterring them from disobeying or rejecting him as an oppressor, by setting before them the danger they might thereby incur of being, by the just judgment of God, abandoned to seduction, hardness of heart, and a reprobate mind, as a punishment for their obstinacy.

II. Religious practice. 1. The first point is prayer, under which are also comprehended those legal washings or purifications which are necessary preparations thereunto.

Of these purifications there are two degrees, one called ghof, being a total immersion or bathing of the body in water; and the other called madu (by the Persians, abdef), which is the washing of their faces, hands, and feet, after a certain manner. The first is required in some extraordinary cases only, as after having lain with a woman, or being polluted by emission of seed, or by approaching a dead body; women also being obliged to it after their courses or childbirth. The latter is the ordinary ablution in common cases, and before prayer, and must necessarily be used by every person before he can enter upon that duty. It is performed with certain formal ceremonies, which have been described by some writers, but much easier apprehended by seeing them done, than by the brief description.

That his followers might be more punctual in this duty, Mahomet is said to have declared, that the practice of religion is founded on cleanliness, which is the one half of the faith, and the key of prayer, without which it will not be heard by God. That these expressions may be the better understood, al Ghazali reckons four degrees of purification; of which the first is the cleansing of the body from all pollution, filth, and excrements; the second, the cleansing of the members of the
the body from all wickednesses and unjust actions; the third, the cleansing the heart from all blamable inclinations and odious vices; and the fourth, the purging a man's secret thoughts from all affections which may divert their attendance on God; adding, that the body is but as the outward shell, in respect to the heart, which is the kernel.

Circumcision, though it be not so much as once mentioned in the Koran, is yet held by the Mahometans to be an ancient divine institution, confirmed by the religion of Islam, and though not so absolutely necessary but that it may be dispensed with in some cases, yet highly proper and expedient. The Arabs used this rite for many ages before Mahomet, having probably learned it from Ishmael, though not only his descendants, but the Hamyarites and other tribes practiced the same. The Ishmaelites, we are told, used to circumcise their children, not on the eighth day, as is the custom of the Jews, but when about 12 or 13 years old, at which age their father underwent that operation; and the Mahometans imitate them so far as not to circumcise children before they may be able at least distinctly to pronounce that profession of their faith, "There is no God but God, Mahomet is the Apostle of God;" but pitch on what age they please for the purpose, between 6 and 16, or thereabouts.

Prayer was by Mahomet thought so necessary a duty, that he used to call it the pillar of religion, and the key of paradise; and when the Thaksites, who dwelt at Tayef, sending in the ninth year of the Hegira, to make their submission to the prophet, after the keeping of their favourite idol had been denied them, begged at last, that they might be dispensed with as to their faying of their appointed prayers, he answered, "There could be no good in that religion wherein was no prayer."

That so important a duty, therefore, might not be neglected, Mahomet obliged his followers to pray five times every 24 hours, at certain stated times; viz.,
1. In the morning before sun-set: 2. When noon is past, and the inn begins to decline from the meridian: 3. In the afternoon before sun-set: 4. In the evening, after sun-set: and before day be light in: and, 5. After the day is shut in and before the first watch of the night. For this institution he pretended to have received the divine command from the throne of God himself, when he took his night-journey to heaven; and the observance of the stated times of prayer is frequently infituted in the Koran, though they be not particularly preferred therein. Accordingly, at the aforesaid times, of which public notice is given by the Muehdhins, or Criurs, from the steeples of their mosques (for they use no bells), every conscientious Moslem prepares himself for prayer, which he performs either in the mosque or any other places provided it be clean, after a preferred form, and with a certain number of prayers or ejaculations (which the more scrupulous count by a string of beads), and using certain postures of worship; all which have been particularly set down and described, though with some few mistakes, by other writers, and ought not to be a brigned, unless in some special cafes, as on a journey, or preparing for battle, &c.

For the regular performance of the duty of prayer among the Mahometans, besides the particulars above-mentioned, it is also requisite that they turn their faces, while they pray, towards the temple of Mecca; the quarter where the same is situated, being, for that reason, pointed out within their mosques by a niche, which they call al Mebrab; and without by the situation of the doors opening into the galleries of the steeples: there are also tables calculated for the ready finding out their Keblah, or part towards which they ought to pray, in places where they have no other direction.

2. Alms are of two sorts, legal and voluntary. The legal alms are of indispensible obligation, being commanded by the law, which directs and determines both the portion which is to be given, and of what things it ought to be given; but the voluntary alms are left to every one's liberty, to give more or less, as he shall see fit. The former kind of alms some think to be properly called zacat, and the latter sadakat; though this name is also frequently given to the legal alms. They are called zacat, either because they increase a man's store by drawing down a blessing thereon, and produce in his soul the virtue of liberality; or because they purify the remaining part of one's substance from pollution, and the soul from the filth of avarice; and sadakat, because they are a proof of a man's sincerity in the worship of God. Some writers have called the legal alms tithe, but improperly, since in some cases they fall short, and in others exceed that proportion.

3. Fasting is a duty of so great moment, that Mahomet used to say it was the gate of religion, and that the odour of the mouth of him who fasteth is more grateful to God than that of musk; and al Ghazalli reckons fasting one fourth part of the faith. According to the Mahometan divines, there are three degrees of fasting:
1. The refraining the belly and other parts of the body from satisfying their lusts: 2. The refraining the ears, eyes, tongue, hands, feet, and other members, from sin; and, 3. The fasting of the heart from worldly cares, and refraining the thought from every thing besides God.

The Mahometans are obliged by the express command of the Koran, to fast the whole month of Ramadan, from the time the new moon first appears, till the appearance of the next new moon; during which time they must abstain from eating, drinking, and women, from day-break till night or sun-set. And this injunction they observe so strictly, that, while they fast, they suffer nothing to enter their mouths, or other parts of their body, esteeming the fast broken and null, if they smell perfumes, take a glass of water, or use any purposefully swallow their Spit; some being so cautious, that they will not open their mouths to speak, lest they should breathe the air too freely: the fast is also deemed void, if a man kis or touch a woman, or if he vomit designedly. But after sun-set they are allowed to refresh themselves, and to eat and drink, and enjoy the company of their wives till day-break; though the more rigid begin the fast again at midnight. This fast is extremely rigorous and mortifying when the month of Ramadan happens to fall in summer (for the Arabian year being lunar, each month runs through all the different seasons in the course of 33 years), the length and heat of the days making the observance of it much more difficult and uneasy than in winter.
The reason given why the month of Ramadan was pitched on for this purpose is, that on that month the Koran was sent down from heaven. Some pretend, that Abraham, Moses, and Jesus, received their respective revelations in the same month.

4. The pilgrimage to Mecca is so necessary a point of practice, that, according to a tradition of Mahomet, he who dies without performing it may as well die a Jew or a Christian; and the same is expressly commanded in the Koran.

The temple of Mecca stands in the midst of the city, and is honoured with the title of Al-Hadj or Al-i-tharr, i.e. the sacred or inviolable temple. What is principally reverenced in this place, and gives sanctity to the whole, is a figure stone building, called the Kaaba; (see that article).

To this temple every Mahometan, who has health and means sufficient, ought, once at least in his life, to go on pilgrimage; nor are women excused from the performance of this duty. The pilgrims meet at different places near Mecca, according to the different parts from whence they come, during the months of Shawal and Dhu’l-Ka’da; being obliged to be there by the beginning of Dhu’l-Hijja; which month, as its name imports, is peculiarly set apart for the celebration of this solemnity.

At the place abovementioned the pilgrims properly commence; such as the men put on the ihram or sacred habit, which consists only of two woollen wrappers, one wrapped about their middle to cover their privities, and the other thrown over their shoulders, having their heads bare, and a kind of slippers which cover neither the heel nor the instep, and so enter the sacred territory in their way to Mecca. While they have this habit on, they must neither hunt nor fowl, (though they are allowed to fish); which precept is so punctually observed, that they will not kill even a fowl or fera if they find them on their bodies: there are some noxious animals, however, which they have permission to kill during the pilgrimage, as kites, ravens, corrobions, mice, and dogs given to bite.

During the pilgrimage, it behoves a man to have a constant guard over his words and actions; to avoid all quarrelling or ill-language, all converse with women, and all obscene discourse; and to apply his whole attention to the good work he is engaged in.

The pilgrims, being arrived at Mecca, immediately visit the temple, and then enter on the performances of the perjured ceremonies, which consist chiefly in going in procession round the Caaba, in running between the mounts Safa and Merwa, in making the station on mount Ararat, and slaying the victims, and having their heads in the valley of Mina.

In compassing the Caaba, which they do seven times, beginning at the corner where the black stone is fixed, they use a short quick pace, the three first times they go round it, and a grave ordinary pace the four last; which, it is said, was ordered by Mahomet, that his followers might show themselves strong and active to cut off the hopes of the infidels, who gave out that the immoderate heats of Medina had rendered them weak. But the aforesaid quick pace they are not obliged to use every time they perform this piece of devotion, but only at some particular times.

So often as they pass by the black stone, they either kiss it, or touch it with their hand and kiss that.

The running between Safa and Merwa is also performed partly with a slow pace, and partly running; for they walk gravely till they come to a place between two pillars; and there they run, and afterwards walk again; sometimes looking back, and sometimes stopping, like one who had lost something, to represent Hagar seeking water for her son; for the ceremony is said to be as ancient as her time.

On the ninth of Dhul-Hijja, after morning prayer, the pilgrims leave the valley of Mina, whichever they come the day before; and proceed in a tumultuous and rushing manner, to mount Arafat, where they stay to perform their devotions till fun-fest: then they go to Mozdalifa, an oratory between Arafat and Mina; and there spend the night in prayer and reading the Koran. The next morning by day break they visit Al-Majer al-Kara, or the sacred monument: and, departing thence before fun-fist, haste by Batu-Mohalfer to the valley of Mina, where they throw seven stones at three marks or pillars, in imitation of Abraham, who, meeting the devil in that place, and being by him disturbed in his devotion, or tempted to disobedience when he was going to sacrifice his son, was commanded by God to drive him away by throwing stones at him; though others pretend this rite to be as old as Adam, who also put the devil to flight in the same place, and by the same means.

This ceremony being over, on the same day, the tenth of Dhu’l-Hijja, the pilgrims fly their victims in the said valley of Mina; of which they and their friends eat part, and the rest is given to the poor. These victims must be either sheep, goats, kine, or camels; males, if of either of the two former kinds; and females if of either of the latter; and of an age. The sacrifices being over, they have their heads and cut their nails, burying them in the same place; after which the pilgrimage is looked on as completed: though they again visit the Caaba, to take their leave of that sacred building.

The rapid success which attended the propagation of this new religion was owing to causes that are plain and evident, and must remove, or rather prevent, our surprise, when they are attentively considered. The terror of Mahomet’s arms, and the repeated victories which were gained by him and his succours, were no doubt, the irresistible arguments that persuaded such multitudes to embrace his religion and submit to his dominion. Besides, his law was artfully and marvellously adapted to the corrupt nature of man; and, in a more particular manner, to the manners and opinions of the eastern nations, and the vices to which they were naturally addicted: for the articles of faith which it proposed were few in number, and extremely simple; and the duties it required were neither many nor difficult, nor such as were incompatible with the empire of appetites and passions. It is to be observed farther, that the gross ignorance, under which the Arabians, Syrians, Persians, and the greatest part of the eastern nations, laboured at this time, rendered many an easy prey to the artifice and eloquence of this bold adventurer. To these causes of the progress of Mahometism, we may add the bitter diffentions and cruel
...cruel animosities that reigned among the Christian sects, particularly the Greeks, Nestorians, Lutynchi-ans, and Monophysites: disputes that filled a great part of the sixth with carnage, assassinations, and other detestable crimes, under the very name of Christianity odious to many. We might add here, that the Monophysites and Nestorians, fully of recollection against the Greeks, from whom they had suffered the bitterest and most injurious treatment, assisted the Arabians in the conquest of several provinces, into which, of consequence, the religion of Mahomet was afterwards introduced. Other causes of the sudden progress of that religion will naturally occur to such as consider attentively its spirit and genius, and the state of the world at this time.

MAHOMETANS, those who believe in the religion and divine mission of Mahomet. See MAHOMET, MAHOMETANISM, and AL CORAH.

MAAHATTI. See MAHATTA.

MAHWAH, or MAWE, in botany; an East Indian tree, so called by the natives of Bahar and the neighbouring countries, but of which the Sanscrit name is Madhuna or Madhumuna. According to Liut. C. Hamilton, by whom a very particular account of this tree is given in the *Aristic Researches*, it is of the chief of the polyandria-monogynia of Linnaeus, but of a genus not described by him. The calyx is monophyllous, quadrifid, half divided, and imbricated in its divided part; the two opposite and outer parts covering partially the two opposite and inner. The corolla is monopetalous, having an inflated tube for its lower part, of near an inch long, thick, flabby, and of a cream colour: from this arise nine small leaves, as it were, like petals from a calyx, that are imbricated and twined, one over the other, from right to left, clasping the lower part of the style in a point; by which they seem to prove, in some respect, like a forceps, to detach the whole corolla at the lesson of its dropping. There are no filaments; but the anther, which and in number most commonly twenty-six, long, fimbrious, and spear-headed, are inserted in rows, on the inside and upper part of the tube of the corolla. The style is long, round, and tapering, and projects about an inch beyond the corolla; it is divided by a tube with a thick pericarpium, bilocular, containing two seeds or kernels covered with a dark brown skin: there are often, however, three of these, in three separate divisions. The flowers rise in bunches, from the extremities of the smaller branches: and have each a pedicle of about an inch and a half long; these are mostly turned downwards, whence the corollas more easily drop off.

The tree, when fully grown, is about the size of a common Mango tree, with a bulky head and oval leaves a little pointed; its roots spreading horizontally, are thick but little in the earth: the trunk, which is often of a considerable thickness, lies felled to any great height, without giving off branches; it is, however, not uncommon to see it shoot up clear to the length of eight or ten feet; the wood itself is moderately hard, fine grained, and of a reddish colour. By incision the tree affords a resinous gum from the bark.

The flowers are of a nature very extraordinary, differing essentially (says Mr. Hamilton) from those of any other plant with which I am acquainted, as they have not, in any respect, the usual appearance of such, but rather resemble *berries*; and, like many others, had long conceived them to be the fruit of the Mahwah. The tree drops its leaves in the month of February, and early in March the flowers begin to come out in clusters of thirty, forty, or fifty, from the extremity of every small branch; and, from this period till the latter end of April, as the flowers come to maturity (for they never open or expand), they continue falling off, with their anthers, in the mornings, a little after sun-rise; when they are gathered; and afterwards dried by an exposure of a few days in the sun: when thus prepared, they very much resemble a dried grape, both in taste and flavour. Immediately after the flowers drop off, fresh shoots are made for the new leaves, which soon make their appearance, coming presently to their full growth.

The fruit (properly so called) is of two sorts in shape; the one resembling a small walnut, the other somewhat larger and pointed: it is ripe towards the middle of May, and continues dripping from the tree till the whole fall, which is generally about the beginning or towards the middle of June. The outer covering, or pericarpium, which is of a soft texture, commonly bursts in the fall, so that the seeds are very easily squeezed out of it: the seeds are somewhat of the shape but longer than an olive. These seeds are ripe with a thick oil, of the consistence of butter or ghee, which is obtained by expression.

From this description it may easily be conceived, that the Mahwah tree and its productions are of singular and general use, especially in our dry and barren countries, which, from the nature of their situation, are not so well calculated for producing, in plenty or perfection the other necessaries of life.

The corolla or flowers, after being dried as before described, are eaten by the natives raw or dressed with their curries; and, when even simply boiled with rice, they afford a strengthening and wholesome nourishment. They are indeed, our author tells us, often applied to a lees laudable purpose; for being fermented, they yield by distillation a strong spirit, which the people here call so very cheap, that for one *pice* (about a half penny) may be purchased no less than a *cutchaser* (above a pint English) with which any man may get completely drunk. Their flowers make an article of trade; being exported from this country to Patna and elsewhere in no considerable quantities.

The oil yielded by the fruit, as before mentioned, resembles ghee so much, that, being cheaper, the natives often mix it with that commodity. They use it the same as ghee in their victuals, and in the composition of some sorts of sweetmeats; and burn it in their lamps. It is also regarded as a salutary remedy, applied exteriorly to wounds and all cutaneous eruptions. It is at first of the consistence of common oil, but soon coagulates after being kept for some time, it acquires a bitterish taste and rank smell, which renders it somewhat less agreeable as an article of food: but this is an inconvenience which, by the oil being properly clarified and prepared at first, might be perhaps avoided. This oil is also exported both in its adulterated and original state to Patna and other parts of the low country.

The author does not know any purpose to which the
...some time or other, of which, indeed, no one can have remarked, one single tree in its infant state. The tree, as hath been already observed, will grow almost anywhere: it ought to be sown about the beginning of the rains, either in beds (to be afterwards transplanted) or at about thirty or forty feet distance, in the ground designed for it. It is said that in seven years the trees will give flowers and fruit, and in ten, they will yield about half of their produce in their kaboolat or agreements. For it and its produce is very useful in the countries, and a knowledge of its uses (continues our author), which first led me to inquire into the nature of this tree, from which the bulk of the people derive their subsistence, and whatever they might not increase it within any great space of time, would probably diminish its produce in the fruit and flower; but where it was sufficiently cultivated, the lofs in those could be but little felt.

The tree, as it is said, though it does not refuse a rich soil, will grow in any barren ground, even amongst stones and gravel, where there is the least appearance of a soil; and it seems to destroy all the smaller trees and broomwood about it. It does not require much moisture, seeming to produce nearly as well in the driest as in most favourable years, and in every situation; and is therefore admirably fitted for the convenience of the inhabitants of these hilly countries, where they are often sufficient to float it down. The tree, as it is said, will grow almost anywhere: it ought to be sown about the beginning of the rains, either in beds (to be afterwards transplanted) or at about thirty or forty feet distance, in the ground designed for it. It is said that in seven years the trees will give flowers and fruit, and in ten, they will yield about half of their produce in their kaboolat or agreements. For it and its produce is very useful in the countries, and a knowledge of its uses (continues our author), which first led me to inquire into the nature of this tree, from which the bulk of the people derive their subsistence, and whatever they might not increase it within any great space of time, would probably diminish its produce in the fruit and flower; but where it was sufficiently cultivated, the loss in those could be but little felt.

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Yet, notwithstanding its utility, and the immense quantity of ground that it even so well adapted to the growth of it, both here and in the neighbouring provinces of Catak, Pachet, Rotas, &c. (greatest part of which, indeed, seems fit for no other useful production) I have myself never observed (says our author), nor can I find any of my acquaintance who ever have remarked, one single tree in its infant state. We can see, everywhere, full grown trees in abundant abundance; but never meeting with any young plants, both I and all whom I have spoken to on the subject, are at some loss to conceive how they should have come here: neither can the country people themselves, of whom I have inquired, give any rational account of this; although it appears pretty evident that numbers of them must have been cultivated some time or other, every village having many of them growing about it. This is a circumstance which sufficiently marks the true character of the lower order of natives in their most simple industry and sloth; owing chiefly, perhaps, to the ignorance and idleness of those Rajas, Zemindars, and other landholders, and their total inattention to the welfare of those deserted wretches from whom they derive their consequence and power. Of their base indifference to the interests of those whom they thus affect to hold beneath their regard, many striking instances occurred to me in the course of my enquiries upon this very subject; and it was not long ago that, asking some questions concerning the mahwah of a Zemindar in this neighbourhood, he answered, that it was the food of the poor people, and how should be know any thing about it?

It was this strange neglect of the culture of it, and a knowledge of its uses, which first led me to inquire into the nature of this tree, from which the bulk of the people derive their subsistence, and whatever they might not increase it within any great space of time, would probably diminish its produce in the fruit and flower; but where it was sufficiently cultivated, the loss in those could be but little felt.

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M A I  [ 4 6 8 ]

supposing the product of each tree to be only half a rupee, there would be four rupees of annual value on a begah of ground; half of which going to the proprietor, it would thus give a far better rent than the generality of the best grounds in these parts; and the labourer would have a produce, without any other trouble than that of sowing the seed, and fencing the ground whilst the trees were young; and that of annually gathering the flowers and preparing the oil when they arrive at their proper size; and they would probably begin to give a produce within less than 10 years after the sowing.

As this tree will yield nearly its usual quantity of fruits and flowers in seacons when, for want of rain, every other crop fails; if thus cultivated, it would afford the inhabitants a sure and certain resource, under the most dreadful, and what has hitherto been to them the most destructive of all calamities, famine. It is well known, that the rice and other sorts of grain, which form the chief part of their subsistence, require a considerable degree of moisture to bring them to perfection; an unusually dry season destroys the harvest in those articles, and reduces the Ryots in general to the utmost misery; a predicament into which they could hardly fall, even in the severest dearness of grain, whilst they had plenty of the flowers and fruit of the mahwash to depend upon.

M A I A, (fab. hist.), the daughter of Atlas and Pleiœa. She was the mother of Mercury by Jupiter. She was one of the Pleiades, the most luminous of the seven sisters; (see Pleiœae.) Also a surname of Cybele.

MAIDEN, an instrument for beheading criminals.

Of the use and form of this instrument Mr Pennant gives the following account: "It seems to have been confined to the limits of the forest of Hardwick, or the 18 towns and hamlets within its precincts. The time when this custom took place is unknown; whether Earl Warren, lord of this forest, might have established it among the sanguinary laws then in use against the invaders of the hunting rights, or whether it might not take place after the woollen manufactures at Halifax began to gain strength, is uncertain. The last is very probable; for the wild country around the town was inhabited by a lawless set, whose depredations on the clothiers might soon inflame his efforts of infant industry. For the protection of trade, and for the greater terror of offenders by speedy execution, this custom seems to have been established, so as at last to receive the force of law, which was, 'That if a felon be taken within the liberty of the forest of Hardwick, with goods stolen out, or within the said precincts, either hand-habend, back-berand, or confessed, to the value of thirteen-pence halfpenny, he shall, after three market-days or meeting-days within the town of Halifax, next after such his apprehension, and being condemned, be taken to the gibbet, and there have his head cut off from his body.'

"The offender had always a fair trial; for as soon as he was taken, he was brought to the lord's bailiff at Halifax: he was then expoined on the three markets (which here were held thrice in a week), placed in a rocks, with the goods stolen on his back, or, if the thief of the cattle kind, they were placed by him; and this was done both to strike terror into others, and to produce new informations against him. The bailiff then summoned four freeholders of each town within the forest to form a jury. The felon and procurers were brought face to face; the goods, the cow or horfe, or whatsoever was stolen, produced. If he was found guilty, he was remanded to prifon, had a week's time allowed for preparation, and then was conveyed to this spot, where his head was struck off by this machine. I should have premised that if the criminal, either after apprehension, or in the way to execution, could escape out of the limits of the forest (par, being close to the town), the bailiff had no farther power over him; but if he should be caught within the precincts at any time after, he was immediately executed on his former sentence.

"This privilege was very freely used during the reign of Elizabeth: the records before that time were lost. Twenty-five suffered in her reign, and at least twelve from 1623 to 1650; after which I believe the privilege was no more exerted.

"This machine of death is now destroyed; but I saw one of the same kind in a room under the parliment house at Edinburgh, where it was introduced by the regent Morton, who took a model of it as he passed through Halifax, and at length suffered by it himself. It is in form of a painter's cafe, and about ten feet high: at four feet from the bottom is a cross bar, on which the felon lays his head, which is kept down by another placed above. In the inner edges of the frame are grooves; in these is placed a sharp ax, with a vaft weight of lead, supported at the very summit with a peg; to that peg is fastened a chord, which the executioner cutting, the ax falls, and does the affair effectually, without suffering the unhappy criminal to undergo a repetition of strokes, as has been the cafe in the common method. I must add, that if the sufferer is condemned for stealing a horse or a cow, the firing is tied to the beard, which on being whipped, pulls out the peg, and becomes the executioner."

MAIDEN is also the name of a machine first used in Yorkshire, and since introduced into other places, for washing of linen; consistting of a tub 19 inches high, and 27 in diameter at the top, in which the linen is put, with hot water and soap, to which is adapted a cover, fitting it very closely, and fastened to the tub by two wedges; through a hole in the middle of the cover passes an upright piece of wood, kept at a proper height by a peg above, and furnished with two handles, by which it is turned backward and forward to the lower end of this upright piece is fastened a round piece of wood, in which are fixed several pieces, like cogs of a wheel. The operation of this machine is to make the linen pafs and repafs quick through the water.

MAIDEN-Rent, in old writers, a noble paid by the tenants of some manors on their marriage. This was faid to be given to the lord for his omitting the custom of marchets, whereby he was to have the first night's lodging with his tenant's wife; but it seems more probably to have been a fine for a licence to marry a daughter.

MAIDENHEAD, a town of Berks, 26 miles from London, with a stone bridge over the Thames.
Maidenhead. It is governed by a high-steward, a mayor, a steward, and 10 aldermen, out of which last two bridgegelders are chosen every year. Here is a goal both for debtors and felons. The town stands partly in the parish of Bray and partly in that of Cookham; and here is a chapel peculiar to the corporation, the minifter whereof is chosen by the inhabitants, and not obliged to attend the bishop's visitation. Here are several almshouses and charities. This town, now so considerable, did not begin to flourish till, by the building of its bridge, travellers were brought this way, who before used a ferry at that called Babham's End, two miles north of it. The bridge-pier is maintained by the corporation, for which they are allowed the tolls both over and under it. The bridge-pier divides Berks from Bucks. There is a great trade here in malt, meal, and timber, which they carry in their barges to London. As this is the great thoroughfare from thence to Bath, Bristol, and other south-west parts of England, the adjacent wood or thicket has been noted for many robberies. The market here is on Wednesdays and Fridays, and here are three fairs; and here are frequent horse-races.

MAIDSTONE, a town of Kent, in England, 36 miles from London, seated on the river Medway, a branch of which runs through it. It is a corporation, and sends two members to parliament. Its chief trade, besides linen-thread which it makes to great perfection, is in hops; of which there are great plenty of plantations about the town, as well as orchards of cherries. The tide flows quite up to the town, and brings up barges, &c. of 50 or 60 tons. It has a fine stone bridge. One of the public goals for the county is kept in this town; and the custody of weights and measures, renewed by the standard of King Henry VII. was committed to it by parliament, as being in the centre of Kent; for which reason the knights of the shire are always elected, and the courts of justice always held here, and generally the assizes. The archbishop of Canterbury is constant parson of this parish, which is his peculiar, and served by his curate. Here are four charity schools, in which are above 100 boys and girls, who are visited once a week and catechised by the minister. This is such a plentiful county, and the lands hereabouts are so rich, that London is supplied with more commodities from hence than from any market-town in England, particularly with the large bullocks that come from the Weald of Kent, which begins but six miles off; with timber, wheat, and great quantities of hops, apples, and cherries; with a sort of paving-stone, eight or ten inches square, that is exceeding durable; and with the fine white sand for glafs-houses and flateries. There are so many gentlemen's seats within 10 miles, that it is rare to find a town of so much trade and business so full of gentility and good company. The market here, which is the best in the county, is on Thursday; it has another on the second Tuesday of every month, granted them by George II. in 1751; and fairs on February 15th, May 15th, June 20th (called Garlic Fair), and October 17th. Here was a college or hospital, erected by Archbishop Boniface; and a charity, by Archbishop Thomas Arundel, which is now the free school.

MAIENNÉ, a considerable, handsome, and populous town in France, with the title of a duchy; Maignan seated on a river of the same name, in W. Long. o. 35. N. Lat. 48. 18.

MAIGNAN (Emanuel), a religious minij, and one of the greatest philosophers of his age, was born of an ancient and noble family at Thoulouze in 1601. Since he became a complete mathematician without the assistance of a teacher, and filled the professor's chair at Rome in 1636, where, at the expense of Cardinal Spada, he published his book De Perspettiva Horaria. He returned to Thoulouze in 1650, and was created provincial: the king, who in 1660 entertained himself with the machines and curiosities in his cell, made him offers by Cardinal Mazarine, to draw him to Paris; but he humbly desired to spend the remainder of his days in a cloyster. He published a course of philosophy, 4 vols 8vo, at Thoulouze; to the second edition of which he added two treatises, one against the vortices of Descartes, and the other on the speaking trumpet invented by Sir Samuel Morland. He is said to have studied even in his sleep, his dreams being employed in theorems, the demonstrations of which would awaken him with joy. He died in 1676.

MAJESTY, a title given to kings, which frequently serves as a term of distinction. The word feems composed of the two Latin words, major "greater," and status "state." The emperor is called Sacred Majesty, Imperial Majesty, and Cæsarean Majesty: The king of Hungary is called His Apostolic Majesty. The king of Spain is termed His most Catholic Majesty; and the king of Portugal, His most Faithful Majesty. The king of France used to be called His most Christian Majesty; and when he treated with the emperor, the word Sacred was added: Lately plain King of the French.

—With respect to other kings, the name of the kingdom is added; as His Britannic Majesty, His Polish Majesty, &c. Formerly princes were more sparing in giving titles, and more modest in claiming them: before the reign of Charles V. the king of Spain had only the title of Highness; and before that of Hen. VIII. the kings of England were only addressed under the titles of Graes and Highness.

Under the Roman republic, the title Majesty (majestas) belonged to the whole body of the people, and to the principal magistrates; so that to diminish or wound the majesty of the commonwealth, was to want in respect to the state or to its ministers. But the power afterwards falling into the hands of a single person, the appellation of Majesty was transferred to the emperor and the imperial family. Pliny compliments Trajan on his being contended with the title of Cæsareus, and speaks very invidiously of those who affected that of Majesty. And yet this last seems to be the most modest and just title that can be attributed to sovereigns, since it signifies nothing more than the royalty or sovereign power.

MAI INDUCTIO, an ancient custom for the priest and people of country-villages to go in procession to some adjoining wood on a May day morning; and return in a kind of triumph, with a May-pole, garlands, flowers, and other tokens of the spring. This May-game, or rejoicing on the coming of the spring, was for a long time observed, and still is in some parts of England; but there was thought
MAIL, or Maille, in old writers, a small kind of money. Silver half-pence were likewise termed maillet, 9 Hen. V. By indeniture in the mint, a pound weight of old silver filver was to be coined in 360 brillings or pennies, or 720 maili or half-pennies, or 1440 farthings. Hence the word mail was derived, which is now vulgarly used in Scotland to signify an annual rent.

MAIL, or Maille, on ship-board, a square machine composed of a number of rings interwoven net-work, and used for rubbing the loose hemp which remains on lines or white cordage after it is made.

Mail is likewise used for the leather bag wherein letters are carried by the post.

Mail-Coach. See Coach.


Mail (Black). See Black-Mail.

MAILLA (Joseph Marie de Moyriac de), a learned Jesuit, was born in the castle of Maillac in the Bugey, and appointed a missionary to China, whither he went in 1703. At the age of 28 he had acquired so great skill in the characters, arts, sciences, mythology, and ancient books of the Chinese, as to astonish even the learned. He was greatly beloved and esteemed by the emperor Kox-hi, who died in 1722. He, together with other missionaries, was employed by that prince to draw a chart of China and China Tartary, which was engraved in France in the year 1723. He drew likewise particular charts of some of the provinces of this vast empire; with which the emperor was so pleased, that he settled the author at his court. The great annals of China were also translated into French by Father Mailla, and his manuscript was transmitted to France in 1737. This work was published in 12 volumes quarto, under the inspection of M. Grolier, and is the first complete history of that extensive empire. The style, which was full of hyperbole and bombaft, has been revised by the editor, and the speeches which extended to too great a length, and had too much fancies in them, have been omitted. Father Mailla, after having resided 45 years in China, died at Pekin on the 28th of June 1748, in the 79th year of his age. Kiu-lung the reigning emperor paid the expenses of his funeral. He was a man of a lively and gentle character, capable of the most pernicious labour and the most extraiting activity.

MAILLIAT (Benoit de), descended from a noble family in Lorraine, was born in 1659, and appointed, at the age of 33, conful general for Egypt. He fulfilled this office for 16 years with great ability, supported the king's authority against the janizaries, and greatly extended the trade of France into that part of Africa. As a recompence for his services, the king bestowed upon him the confuhip of Leghorn, which is the first and most considerable confuhip in his gift. Being at last appointed in 1715 to visit the sea-ports in the Levant and on the coast of Turkey, he was so successful in the execution of his commission, that he obtained permission to retire with a considerable pension. He settled at Marfelles; where he died in 1738, in the 79th year of his age. He was a man of a lively imagination, and gentle manners; in society he was very amiable, and he possessed the strictest probity. He was fond of praise, and very anxious about the reputation of genius. During the whole of his life he paid particular attention to the study of natural history; and his principal object was to become acquainted with the origin of our globe. On this important subject he left some curious observations, which have been published in odavv under the title of Telliamed, written backwards. The editor Abbé Mafcrier has given to this work the form of a dialogue. An Indian philosopher is introduced as explaining to a French missionary his opinion concerning the nature of the globe, and the origin of mankind: and, which is very incredible, he supposes it to have come out of the waters, and makes an abode uninhabitable by man the birthplace of the human race. His great object is to prove, that all frata of which this globe is composed, even to the tops of the highest mountains, have come from the bottom of the waters, that they are the work of the sea, which continually retires to allow them gradually to appear. Telliamed dedicated his book to the illustrious Cyrano de Bergerac, author of the imaginary "Travels to the fun and moon." In the humorous epistle which is addressed to him, the Indian philosopher informs us that these dialogues are nothing but a collection of dreams and fancies. He cannot be accused of having broken his word; but he may well be reproached with not having written them in the same style with this letter to Cyrus, and with not having displayed equal liveliness and humour. A subject the most extravagant is handled in the gravef manner, and his ridiculous opinion is delivered with all the serious air of a philo­ sopher. Of the six dialogues which compose the work, the four first contain many curious observations truly philosophical and important: in the other two we find nothing but conjectures, fancies, and fables, sometimes amusing, but always absurd. To Mailla we are indebted for "A decription of Egypt," collected from his memoirs by the editor of Telliamed, 1743, 40, orin 2 vols 12mo.

MAIM, MAIHEM, or MIAIHEM, in law, a wound by which a person lofs the use of a member that might have given a defence to him; as when a bone is broken, a foot, hand, or other member cut off, or an eye put out; though the cutting off an ear or nose, or breaking the hinder-teeth, was formerly held to be no main. A main by castration was anciently punished by death, and other mains with loss of member for member; but afterwards they were only punished by fine and imprisonment. It is now enacted by the statute 21 & 23 Car. II. that if any perfon, from malice afore-
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MAINGRE, manneupio, is a writ directed to the sheriff (either generally, when any man is imprisoned for a bailable offence, and bail hath been retumed; or specially, when the offence or cause of commitment is not properly bailable by law), commanding him to take forseties for the prisoner’s appearance, usually called mainpennors, and to set him at large. Mainpennors differ from bail, that a man’s bond is commonly named false imprisonment. See false imprisonment.

Mainenence, in law, bears a near relation to barretory; being an obficious intermedium in a suit that no way belongs to one, by maintaining or affilling either; party with money or otherwise, to prosecute or defend it: a practice that was greatly encouraged by the first introduction of use. This is an offence against public justice, as it keeps alive strength and contention, and prevents the remedial processes of the law into an engine of oppression. And therefore, by the Roman law, it was a specie of the crimen falsi, to enter into the confederacy, or to do any service to support another’s law-suit, by money, witticises, or patronage. A man may, however, maintain the suit of his near kinman, servany, or poor neighbour, out of charity and compassion, with impunity. Otherwise the punishment by common law is fine and imprisonment; and by the statute 32 Hen. VIII. c. 9, a forfeiture of 10l.

MAINEENON (Madame de), a French lady of extraordinary fortune, descended from an ancient family, and whose proper name was Francesco Dainbigue, was born in 1635. Her parents by misfortunes being unable to support her, she fell to the care of her mother’s relations; to escape such state of dependance, she was induced to marry, that famous old buffoon the Abbé Scarron, who subsisted himself only on a pension allowed him by the court for his wit and parts. She lived with him many years, which Voltaire makes no scruple to call the happiest years of her life; but when he died in 1660, she found herself as indigent as she was before her marriage. Her friends indeed endeavored to get her husband’s pension continued to her, and presented so many petitions to the king about it, all beginning with the widow Scarron most humbly...
Major. prays your majesty’s, &c.” that he was quite weary of them; and has been heard to exclaim, “Must I always be pestered with the widow Scarron?” At last, however, through the recommendation of Madame de Montespan, he settled a much larger pension on her, with a genteel apology for making her wait so long; and afterwards made choice of her to take care of the education of the young duke of Maine, his son by Madame de Montespan. The letters she wrote on this occasion charmed the king, and were the origin of her advancement; her personal merit effected all the rest. He bought her the lands of Maintenon, the only refuge, and afterwards made choice of her always to prefer with the widow Scarron before and after supper, and carefully avoided her appearance in all the military evolutions, as he is obliged by his post to instruct others, &c.

Tsau-Major, the third officer in order in a garrison, and next to the deputy-governor. He should understand fortification, and has a particular charge of the guards, rounds, patrols, and sentinels.

Brigade-Major, is a particular officer appointed for that purpose only in camp: he goes every day to head-quarters to receive orders from the adjutant-general; there they write exactly whatever is dictated to them: from thence they go and give the orders, at the place appointed for that purpose, to the different majors or adjutants of the regiments which compose that brigade, and regulate with them the number of officers and men which each are to furnish for the duty of the army; taking care to keep an exact roster, that one may not give more than another; and that each march in their turn: in short, the major of brigade is charged with the particular detail in his own brigade, in much the same way as the adjutant-general is charged with the general detail of the duty of the army. He sends every morning to the adjutant-general an exact return, by battalion and company, of the men of his brigade musting at the retreat, or a report expressing that none are absent: he also mentions the officers absent with or without leave.

As all orders pass through the hands of the majors of brigade, they have infinite occasions of making known their talents and exactness.

Major of Artillery, is also the next officer to the lieutenant-colonel. His post is very laborious, as the whole detail of the corps particularly rests with him; and for this reason all the non-commissioned officers are subordinate to him, as his title of sergeant-major imports; in this quality they must render him an exact account of everything which comes to their knowledge, either regarding the duty or wants of the artillery and soldiers. He should possess a perfect knowledge of the power of artillery, together with all its evolutions. In the field he goes daily to receive orders from the brigade-major, and communicates them with the parole to his superiors, and then dictates them to the adjutant. He should be a very good mathematician, and be well acquainted with every thing belonging to the train of artillery, &c.

Major of Engineers, commonly in Britain called Sub-director, should be very well skilled in military architecture, fortification, gunnery, and mining. He should know how to fortify in the field, to attack and defend all forts of posts, and to conduct the works in a siege, &c. See Engineer.

Ad-Major, is on foundry occasions appointed to act as major, who has a pre-eminence above others of the same denomination. The horse and foot-guards have their adjutants, or second and third majors.

Sergeant-Majors, is a non-commissioned officer, of great merit and capacity, subordinate to the adjutant as he is to the major. See Sergeant.

Drums-Major, is not only the first drummer in the regiment
MAJOR, in logic, is understood of the first proposition of a syllogism. It is called major, because it has a more extensive syllogism than the minor proposition, as containing the principal term. See LOGIC.

MAJOR and MINOR, in music, are applied to concords which differ from each other by a semi-tone. See CONCORD.

MAJOR and MAJOR is the difference between the fifth and fourth; and major-femi-tone the difference between the major fourth and the third. The major tone surpasses the minor by a comma.

MAJOR-DOMO, an Italian term, frequently used to signify a steward or master of the household. The title major-domo was formerly given in the courts of princes to three different kinds of officers. 1. To him who took care of what related to the prince's table, or eating; otherwise called eleuther, praefectus mensae, arcitricius, dapifer, and principes aquorum. - 2. Major-domo was also applied to the stewards of the household. - 3. The title of major-domo was also given to the chief minister, or him to whom the prince deputed the administration of his affairs, foreign and domestic, relating to war as well as peace. Influenes of major-domos in the two first tenons are frequent in the English, French and Norman affairs.

MAJOR (John), a scholastic divine and historian, was born at Haddington, in the province of East Lothian in Scotland. It appears from some passages in his writings, that he resided a while both at Oxford and Cambridge. He went to Paris in 1493, and studied in the college of St Barbe, under the famous John Boulay. Thence he removed to that of Montacute, where he began to study divinity under the celebrated Staudon. In the year 1498, he was entered of the college of Navarre. In 1505, he was created doctor in divinity; returned to Scotland in 1519, and taught theology during several years in the university of St Andrew's. But at length, being disaffected with the quarrels of his countrymen, he went back to Paris, and resumed his lectures in the college of Montacute, where he had several pupils, who afterwards became men of great eminence. About the year 1530, he returned once more to Scotland, and was chosen professor of theology at St Andrew's of which he afterwards became provost; and there died in 1547, aged 73. His logical treatises form one immense folio; his commentary on Aristotle's Physics makes another; and his theological works amount to several volumes of the same size. These maestros of crude and useful disquisition were the admiration of his cotemporaries.

Majors, work, least prized in his own age, was to make him know to postlarity. His book De Cibus Secernens, was first published at Paris by Rados in the year 1521. He rejects in it some of the fictious of former historians; and would have had greater merit if he had rejected none. He intermingles the history of England with that of Scotland; and has incurred the cenure of the partial writers, for giving an authority to the authors of the former nation, which he refuses to those of his own. But, Caxton, and Froissard, were exceedingly useful to him. What does the greatest honour to this author is, the freedom with which he has conferred the capacity and indulgence of ecclesiastics, and the strain of ridicule with which he treats the pope's supremacy. The style in which he wrote does not deserve commendation. Bishop Spottiswood calls it Sobonic and Barbarous.

MAJORCA, an island of the Mediterranean, lying between Yvia on the west and Minorca on the east. These three islands were anciently called Baleares, supposed to be from the skill of their inhabitants in flogging, for which they were very remarkable; originally they belonged to the Carthaginians; but during the wars of that people with the Romans, they seem to have regained their liberty. In 122 B.C. they were subdued by Metellus the Roman confult, who treated the inhabitants with such cruelty, that out of 30,000 he scarce left 1000 alive. He then built two cities on Majorca; one called Palma, now Majorca, to the east; the other to the west, named Polentia, now no longer in being. The island continued subject to the Romans, and to the nations who over-ran the western part of the empire; for many ages. At last it was subdued by the Moors about the year 800. By them the island was put in a much better condition than it ever was before or since. The Moors being very industrious, and also populous, surrounded the whole coast with fortifications, that is, with a kind of towers and lines between them; cultivated every spot in the island that was not either rock or sand; and had no fewer than 15 great towns, whereas now there are not above three. Neither was it all difficult for the Moorish monarch to bring into the field an army much superior in number to the inhabitants that are now upon it, taking in all ranks, sexes, and ages. In 1229, the island was subdued by the king of Arragon, who established in it a new kingdom, being to that of Arragon, which was again destroyed in 1241 by the fame monarch; and ever since, the island has been subject to Spain, and has entirely lost its importance. It is about 60 miles long, and 45 broad. The air is clear and temperate, and, by its situation, the heat in summer is so qualified by the breezes, that it is by far the most pleasant of all the islands in the Mediterranean. There are some mountains: but the country is generally flat, and of such an excellent soil, that it produces great quantities of corn as good in its kind as any in Europe. Oil, wine, and salt, are very plentiful, as also black cattle and sheep; but deer, rabbits, and wild-fowl, abound so much, that they alone are sufficient for the subsistence of the inhabitants. There are no rivers, but a great many springs and wells, as well as several good harbours. The inhabitants are robust, active, and good seamen.
MAIRAN (Jean-Jacques d'Ortous de), descended from a noble family at Beliers, was born in that city in 1678, and died at Paris of a defluxion of the lungs on the 20th of February 1771, at the age of 93. He was one of the most illustrious members of the academy of sciences and of the French academy. Being long connected with the former society, he, in the year 1741, succeeded Fontenelle in the office of secretary. This station he filled with the most distinguished success till the year 1744; and, like his predecessor, poifoned the faculty of placing the most abstract subjects in the clearest light; a talent which is very rare, but which appears conspicuous in all his works. The chief of them are, 1. *Dissertation sur la Cieae*, the last edition of which was printed in 1749, 12mo. This excellent little tract has been translated into German and Italian. 2. *Dissertation sur la cause de la lumiere des Phosphores*, 1771, 12mo. 3. *Traite historique de physique de l'Aurore Borale*, first published in 1739, and afterwards much enlarged and printed in 4to in 1754. The system embraced by the author is liable to be controverted; but the book displays great taste and erudition. 4. *Lettre au Père Pireau*, contenant diverses questions sur la Chine, 12mo. This is a very curious work, and is full of that philosophical spirit which characterizes the author's other publications. 5. A great number of papers in the memoirs of the academy of sciences (since 1719), of which he published some volumes. 6. Several Dissertations on particular subjects, which form only small pamphlets. 7. *The Eligos of the Academicians of the Academy of Thieves*, which died in 1741, 1742, 1743, and 1747. Without imitating Fontenelle, the author obtained almost equal excellence by his talent of discriminating characters, appreciating their worth, and giving them their due share of praise, without at the same time concealing their defects.

Mairan's reputation extended itself into foreign countries. He was a member of the imperial academy at Petersburg, of the royal academy of London, of the institution at Bologna, of the royal societies of Edinburgh and Upsal, &c. The gentleness and sweetness of his manners made him be considered as a perfect model of the social virtues. He possessed that amiable politeness, that agreeable gaiety, and that ready readiness, which never fail to procure love and esteem. But we must add, says M. Saverien, that every thing had a reference to himself; self-love and a regard to his own reputation were the motives of all his actions. He was deeply affected with cenfure or applause, and yet he had many friends. Uniting much gentleness of disposition to an ingenious and agreeable expression of countenance, he poifoned the art of infinuating himself into the good graces of others, so as to have the way to elevation and success. He was honoured with particular marks of regard by the duke of Orleans the regent, who bequeathed to him his watch in his will. The prince of Conti loaded him with favours: and the chancellor Dagueldan, observing in him great originality and ingenuity of thought, appointed him president of the *Journal des Savans*; a station which he filled very much to the satisfaction of the public and of the learned. The private and selfish views imputed to him by M. Saverien never made him deficient in what was due to the strictest probity. An expression of his is remembered, which could have proceeded only from sentiment; "An honest man (said he) is one whole blood is refreshed with the recital of a good action." He was ready to die for others. One day he happened to be in company with a gentleman of the gown, and to differ with him in opinion upon some point which had no more connection with jurisprudence than with geometry. "Sir (said the magistrate, who supposed that a learned man was a perfect idiot out of his own sphere), we are not now talking of Euclid or Archimedes"—"No, nor of Cujas nor Bartholomé!" replied the academican.

MAIRE (Straght ex le), a passage to Cape Horn, situated between Terra del Fuego and Staten Island; which, being discovered by le Maire, obtained his name. It is now, however, less made use of than formerly, ships going round Staten Island as well as Terra del Fuego.

MAISTRE (Lucas Isaac le), better known by the name of Sacy, was born at Paris in 1613. His genius very early discovered itself. After an excellent course of study under the direction of the abbot of Saint Cyran, he was raised to the priesthood in 1648, and soon after was chosen, on account of his virtues, to be director of the religious of Port Royal des Champs. As this monastery bore the reputation of Jansenism, their enemies were furnished with a pretence for persecuting them. In 1661 the director was obliged to conceal himself; and in 1666 he was committed to the Bastille. During his confinement he composed the book *Figures de la Bible*; in which, according to the Molinists, allusions are made to the sufferings endured by the Jansenists. If we may believe a Jesuit writer, the gentlemen of Port Royal and those who opposed their errors are represented in the 92d figure, the former by David, the latter by Saul. Rehoom in the 16th figure, Jezebel in the 13th, Athauesker in the 148th and 150th, and Darius in the 160, in the opinion of this author, represent Louis XIV. The writer of these anecdotes, of which we do not answer for the authenticity, adds, that when Sacy wished to reproach his persecutors, he always did it by means of the holy fathers. If this is the key to those enigmatical portraits and allusions, which it is pretended are to be found in that book, certain we are it was not discovered by the spirit of charity. Besides, it is not certain that Sacy was the author of that book; for it is much more probable that
that it was composed by Nicholas Fontaine his fellow prisoner.

To Sacy's confinement the public are indebted for a French translation of the Bible. This work was finished in 1668, the evening before the feast of All Saints; on which day he recovered his liberty; after an imprisonment of two years and a half. He was presented to the king and the minister; and all the favour he asked from them was, that they would lend several times a-year to examine the state of the prisoners in the Buffle. Le Maistre continued at Paris till 1675, when he retired to Port-Royal, which he was obliged to leave in 1679. He went to settle at Pompone, where he died January 4th 1684, at the age of 71.

From him we have 1. La Traduction de la Bible, with explanations of the spiritual and literal meaning taken from the fathers, the greater part of which was done by du Poët, Hure, and Tourneux. This is the best French translation which has yet appeared, and the most esteemed edition is that of Paris in 32 volumes 8vo, 1652 and following years. The author translated the New Testament three times, because the first style of it appeared too much laboured and too refined, and the second edition in 32 parts 8vo, was published at Brussels inavoins 12mo. The best editions of this version have been published at Bruxells in 1700, 3 vols 40t; at Amsterdam, under the name of Paris, 1711, 8 vols 12mo; at Paris 1713, in 2 vols 40t, and in 1715, with notes and a concordance, 4 vols folio. 2. Une Traduction des Psaumes selon l'Hebrew & la Vulgate, in 12mo. 3. Une Version des Hymnes de St Chrysostome sur St Matthieu, in 3 vols 8vo. 4. La Traduction de l'Imitation de Jésus Christ (sous le nom de Beufr, prêtre de Saint-Va), Paris 1653, 8vo. 5. Celle de Phédrpe, 12mo. (sous le nom de St Aubin). 6. De trois Comédies de Terence, in 12mo. Des Lettres de Bongars (sous le nom de Briancoule). 8. Du Fôme de St Prophés sur les ingrates, in 12mo. en vers & en prose. 9. Les Entamitudes de Amanoch des Sibylles, 1654, 12mo. reprinted in 1733. In 1653 there appeared a print representing the overthrow of Janenfim anathemized by the two powers, and the confusion of the disciples of the bishop of Ypres, who are going to seek refuge with the Calvinists. The monks of Port-Royal were greatly provoked at this print, and Sacy thought that he would lower its reputation by means of his Entamitures, which Racine has ridiculed in one of his letters. It is indeed very strange, that men of taste and piety should write satires to the injury of one another. 10. Heures de Port-Royal, in 12mo. 11. Lettres de Püté, Paris 1650, 2 vols 8vo.

MAITLAND (John), Lord Thirlstane, chancellor of Scotland, was the second son of Sir Richard. He was born in the year 1527, educated in Scotland, and was afterwards sent to France to study the laws. On his return to his native country, he commenced advocate; in which profession his abilities became eminently conspicuous. In 1567, his father resigned the privy-seal in his favour. This office he kept till 1570: when, for his loyalty to the queen he lost the seal, and it was given to George Buchanan. He was made a senator of the college of justice; or lord of session, in 1581; secretary of state in 1584; and lord high chancellor in 1586. The chancellor's power and influence created him many enemies among the Scottish nobility, who made several attempts to destroy him, but without success. In 1589, he attended the king's
Maittaire, on his voyage to Norway, where his bride, the princess of Denmark, was detained by contrary wind. The marriage was immediately conunnated; and they returned with the queen to Copenhagen, where they spent the ensuing winter. During their residence in Denmark, the chancellor became intimately acquainted with the celebrated Tycho Brahe. In 1590 he was created Lord Maitland of Thirlshane. Thirlshane died the end of 1593, the chancellor incurred the queen's displeasure for refusing to relinquish his lordship of Maitland, which she claimed as being a part of Dunfermline. He absented himself for some time from court, but was at length restored to favour, and died of a lingering illness in the year 1595, much regretted by the king. He bears a high character both for talents and integrity among all historians. Melville, who writes the Memoirs, Mr. Pinkerton observes, was his personal enemy, so must not receive much credit in his censures of him. Besides his Scotch poetry is the Maitland Collection, he wrote several Latin epigrams, &c. to be found in the Declarator Scotica, vol. ii. The chancellor's writer, was born in 1668. Dr South, canon of Rochester, took the 1695 to himself, in a Letter to the right reverend, &c. “An Essay against Christianity, &c. By a Lover of Mankind,” 8vo.; the improved second edition, as the title has it superseded the 1725. In 1733, His name not having been printed in the title-page, it

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it being equal to all the former volumes. The whole work, when properly bound, consists, ad libitum, of either five volumes or of nine.

(1) The awkwardness of this title has induced many collectors to dispose of their first volume, as thinking it superseded by the second edition; but this is by no means the case: the volume of 1719 being equally necessary to complete the set, as that of 1733, which is a revision of all the former volumes. The whole work, when properly bound, consists, ad libitum, of either five volumes or nine.
it is not so generally known that he was editor of Plutarch's *Apophthegmata*, 1741, 4to. The last publication of Mr Maittaire was a volume of poems in 1740, 1742, under the title of *Semita, five Poetica aliquot in argumentis variis generis testimonia*. Mr Maittaire died in 1747, aged 79. His valuable library, which had been 50 years collecting, was sold by auction by Meills, Cock and Langford, at the close of the same year, and the beginning of the following, taking up in all 44 nights. Mr Maittaire, it may be added, was patronized by the first earl of Oxford, both before and after that gentleman's elevation to the peerage, and continued a favourite with his son the second earl. He was also Latin tutor to Mr Stanhope, the earl of Chesterfield's favourite son.

MALAYE, or INDIAN CORN. See ZEA.

MAKI. See LEMUR.

MALABAR, the name given to a great part of the west coast of the peninsula, on this side of the Ganges, from the kingdom of Baglala to Cape Comorin, or only from the north extremity of the kingdom of Cashmier to the same cape. It is bounded by the mountains of Balligatt on the east; by Decan on the north; and on the west and south is washed by the Indian sea.

MALACA (anc. geog.), surnamed Federatorum by Pliny; a maritime town of Boeotia: A Carthaginian colony assigned to Strabo; so called from Malach, signifying "salt;" a place noted for pickled or salted meat. Now Malaga, a port town of Granada in Spain. W. Long. 4° 45'. N. Lat. 36° 40'.

MALACCA, the most southwardly part of the great peninsula beyond the Ganges, is about 600 miles in length, and contains a kingdom of the same name. It is bounded by the Kingdom of Siam on the north; by the bay of Siam and the Indian ocean on the east; and by the straits of Malacca, which separate it from the island of Sumatra, on the south-west. This country is more fertile than any other in the East Indies; and comprehends the towns and kingdoms of Patan, Pahor, Igoho, Peri, Oudeh, Borkelin, Ligor; and to the north the town and kingdom of Tanaffery, where the Portuguese formerly carried on a great trade. This last either does or did belong to the king of Siam. The people of Malacca are in general subject to the Dutch, who possess all the strong places on the coast, and compel them to trade on their own terms, excluding all other nations of Europe from having any commerce with the natives.

The Malays are governed by feudal laws. A chief, who has the title of king or sultan, illus his commands to his great vassals, who have other vassals in subjection to them in a similar manner. A small part of the nation live independent, under the title of sultanei or noble, and sell their services to those who pay them fees; while the body of the nation is composed of slaves, and in perpetual servitude.

The generality of these people are restless, fond of navigation, war, plunder, emigrations, colonies, despicable enterprises, adventures, and gallantry. They talk inedily of their honour and their bravery; whilst they are universally confedered by those with whom they have intercourse, as the most treacherous, ferocious people on earth. This ferocity, which the Malays qualify under the name of courage, is so well known to the European companies who have settlements in the Indies, that they have universally agreed in prohibiting the captains of their ships who may put into the Malayan islands, from taking on board any men from that nation, except in the greatest distress, and then on no account to exceed two or three. It is not in the least uncommon for a handful of these horrid savages suddenly to embark, attack a vessel by surprise, massacre the people, and make themselves master of her. Malay batteaux, with 24 or 30 men, have been known to board European ships of 30 or 40 guns, in order to take possession of them, and murder with their poignards great part of the crew. Those who are not slaves go always armed; they would think themselves disgraced if they went abroad without their poignards, which they call or. As their lives are a perpetual round of agitation and tumult, they cannot endure the long flowing garments in use among the other Asiatics. Their habits are exactly adapted to their shapes, and loaded with a multitude of buttons, which fasten them close to their bodies.

The country is in general very fertile. It abounds with odoriferous woods, such as the aloes, the sandal, and the Cassia. The ground is covered with flowers of the greatest fragrance, of which there is a perpetual succession throughout the year. There are abundance of mines of the most precious metals said to be richer even than those of Brazil, or Peru, and in some places mines of diamonds. The sea also abounds with excellent fish, together with ambergris, pearls, and those delicate bird-nefts so much in request in China, formed in the rocks with the spawn of fishes and the foam of the sea, by a species of small-sized swallow peculiar to those seas. These are of such an exquisitely flavour, that the Chinese for a long time purchased them for their weight in gold, and sell them at an excessive price. See Birds Nefts.

Notwithstanding all this plenty, however, the Malays are miserable. The culture of the lands, abandoned to slaves, is fallen into contempt. These wretched labourers, dragged incessantly from their native employments by their relentless masters, who delight in war and maritime enterprises, have never time or resolution to give the necessary attention to the labouring of their grounds; of consequence the lands for the most part are uncultivated, and produce no kind of grain for the subsistence of the inhabitants. The figo tree indeed supplies in part the defect of grain. It is a species of the palm-tree, which grows naturally in the woods to the height of about 20 or 30 feet; its circumference being sometimes from five to six. Its ligneous bark is about an inch in thickness, and covers a multitude of long fibres, which being interwoven one with another envelope a mass of a gummy kind of meal. As soon as this tree is ripe, a white dust, which transpires through the pores of the leaves, and adheres to the extremities, indicates that the trees are in a state of maturity. The Malays then cut them down near the root, divide them into several sections, which they split into quarters; they then scoop out the mass of mealy substance, which is enveloped by and adheres to the fibres; they dilute it in pure water, and then pass it through a straining bag of fine cloth, in order to separate it from the fibres. When this paste has lost...
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parts of its moisture by evaporation, the Malays throw it into a kind of earthen vessel of different shapes, where they allow it to dry and harden. The paste is wholesome nourishing food, and prefers for many years.

MALAGRA, the capital of the country of the same name, is situated in a flat country close to the sea. The walls and fortifications are founded on a solid rock, and are carried up to a great height; the lower part of them is washed by the sea at every tide, and on the land-side is a wide canal or ditch, cut from the sea to the river, which makes it an island. In 1641 it was taken from the Portuguese by the Dutch, since which time it has continued in their possession. In this city there are a great many broad streets; but they are very badly paved. The houses are tolerably well built, and some of them have gardens behind or on one side. The inhabitants consist of a few Dutch, many Malayans, Moors, Chinese, and other Indians, who are kept in awe by a fortress, which is separated from the city by a river, and by good walls and bastions, as well as by strong gates, and a draw-bridge that is on the eastern side. The city is well situated for trade and navigation. E. Long. 102. 2. N. Lat. 21º 12'.

MALACHI, or the prophecy of MALACHI, a canonical book of the Old Testament, and the last of the 12 lesser prophets. Malachi prophesied about 300 years before Christ, reproving the Jews for their wickedness after their return from Babylon, charging them with rebellion, fornication, adultery, profaneness, and insincerity; and condemning the priests for being scandalously careless in their ministration: at the same time not forgetting to encourage the pious few, who, in that corrupt age, maintained their integrity. This prophet distinctly points at the Messiah, who was suddenly to come to his temple, and to be introduced by Elijah the prophet, that is, by John the Baptist, who came in the spirit and power of Elias, or Elijah.

MALACIA, in medicine, is a languishing disorder incident to pregnant women, in which they long sometimes for one kind of food and sometimes for another, and eat it with extraordinary greediness.

MALACOPTERYGEOUS, among ichthyologists, an appellation given to such fishes as have the rays of their fins bony, but not pointed or sharp at the extremities like those of arcanthopterygous fishes.

MALACOSTOMOUS FISHES, those deficient of teeth in the jaws, called in English feather-mouthed, as the tench, carp, bream, &c.

MALAGA, an ancient, rich, and strong town of Spain, in the kingdom of Granada, with two castles, a bishop's see, and a good harbour, which renders it a place of considerable commerce. The advantage of this commerce, according to M. Bourgoanne, is entirely in favour of Spain, but almost without any to its navigation; of 842 vessels which arrived at this port in 1742, from almost every commercial nation, scarcely 100 were Spanish, even reckoning the ships of war which anchored there. The English, who are in possession of the greatest part of the trade, carry thither woollens and great quantities of small ware; the Dutch carry spices, cutlery ware, laces, ribbons, thread, &c. These nations, those of the north, and Italy, export to the amount of two millions and a half of pistreis in wines, fruits, sumach, pickled anchovies, oil, &c. and all they carry thither amounts only to above a million and a half. The balance would be still more advantageous for Malaga if the silk and wool of the kingdom of Grenada were exported from this port; but these are employed in the country where they are produced. The streets of Malaga are narrow, but there are some good squares; and the cathedral church is superb building, said to be as large as St Paul's. The only other building of note is the bishop's palace; which is a large edifice, but looks insignificant from its being situated near the other. Its prelate enjoys a revenue of L. 16,000 Sterling. Malaga is seated on the Mediterranean sea, at the foot of a craggy mountain. E. Long. 4. 56. N. Lat. 6. 51º.

MALAGRIDA (Gabriel), an Italian Jesuit, was chosen by the general of the order to conduct missions into Portugal. To great ease and fluency of speech, for which he was indebted to enthusiasm, he added the most ardent zeal for the interest of the society to which he belonged. He soon became the fashionable director; and every one, small or great, placed himself under his conduct. He was respected as a saint, and confounded as an oracle. When a conspiracy was formed by the duke d'Aveiro against the king of Portugal, it is affected by the enemies of the society, that three Jesuits, among whom was Malagrida, were consulted concerning the measure. They add (what is very improbable), that it was decided by these caulis, that it was only a venial crime to kill a king who persecuted the saints. At that time the king of Portugal, spurred on by a minister who had no favour for the Jesuits, openly declared himself against them, and soon after banished them from his kingdom. Only three of them were apprehended, Malagrida, Alexander, and Mathos, who were accused of having approved his murder. But either the trial could not be proceeded in without the consent of the pope, which was not granted, or no proof could be got sufficient to condemn Malagrida; and therefore the king was obliged to deliver him to the inquisition, as being suspected of having formerly advanced some rash propositions which bordered on heresy. Two publications which he acknowledged, and which give the fullest indications of complete infidelity, were the foundation of these suspicions. The one was written in Latin, and intitled Tractatus de vita et imperio A. christian; the other in Portuguese, under the title of the Life of St Anne, composed with the assistance of the blessed Virgin Mary and her most holy Son. They are full of extravagance and absurdity. This enfant pretended to have the gift of miracles. He confessed before the judges of the Inquisition, that God himself had declared him his ambassador, apostle, and prophet; that he was united to God by a perpetual union; and that the Virgin Mary, with the consent of Jesus Christ and of the whole Trinity, had declared him to be her son. In short, he confessed, as is pretended, that he felt in the prison, at the age of 72, some emotions very uncommon at that period of life, which at first gave him great uneasiness, but that it had been revealed to him by God that these emotions were only the natural effect of an involuntary agitation, wherein there was the same
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MALDEN, a town of Essex, 37 miles from London, situated on an eminence at the confluence of the Chelmer and Pant or Black-water, where they enter the sea. It was the first Roman colony in Britain, and the seat of the old British kings. It was besieged, plundered, and burnt by Queen Boadicea; but the Romans repaired it. It was again ruined by the Danes, but rebuilt by the Saxons. It is a populous corporation, governed by two bailiffs, six aldermen, 18 headboroughs or capital burgesses, a town clerk, recorder, and above 400 commonly and burghesses, who have all a vote for its members of parliament. It has a convenient haven on an arm of the sea for vessels of 400 tons; and drives a good trade in coal, iron, corn, and deals. It formerly had three, now only two, parish-churches. Here is a large library for the use of the minister and the clergy of the neighbouring parishes, who generally reside here on account of the wholesome climate of the air, where their churches are. Here is a grammar-school, a small-church, school, and a workhouse where the poor weave flax cloth. The custom of Borough English is kept up here. It has a market on Saturdays, and a fair on the 18th of September. A little beyond it begins Blackwater-bay, famous for the Walfleet oysters. The channel called Malden-water is navigable to the town. King Edward the elder (of the Saxon race) refided here whilst he built Witham and Hertford castles. On the west side of the town are the remains of a camp.

MALALEUCA, the Capri tree: A genus of the polyandria order, belonging to the polyandria class of plants. There is but one species, viz. the leucocephala, native of the East Indies and South-Sea islands. Mr Forster relates that lenccondores were found in the island of New Caledonia: they were black at the root, but had a bark perfectly white and smooth, with long narrow leaves like our willows. The leaves are extremely fragrant and aromatic; and Rumphius tells us, that from them the natives of the Moluccas make the oil called capri. The oil is comminced as a nervous medicine, and as being useful in some cardinals. The dose is for 5 or 6 drops in some convenient cup.

MALDIVIA ISLANDS, a cluster of small islands in the Indian ocean, 500 miles south-west of the continent of the island of Ceylon. They are about 1000 in number, and are very small; extending from the second degree of south latitude to the seventh degree north latitude. They are generally black low lands, surrounded by rocks and sands. The natives are of the same complexion with the Arabsians, profess the Mahometan religion, and are subject to one sovereign. The channels between the islands are very narrow, and some of them are fordable. They produce neither rice, corn, nor herbage; but the natives live upon coconuts and other fruits, roots, and fish. They have little or nothing to barter with, unless the shells called cowry, or blackwater's teeth, with which they abound; and these serve instead of small coin in many parts of India.

MALDONAT (John), a Spanish Jesuit born in 1534, was accused of heresy, and of procuring a fraudulent will in seducing the president de St. Andre at Paris to bequeath his estate to the Jesuits. Peter Gondi acquitted him of the first charge, and the parliament of Paris of the other. He retired after these troubles to Bourges, but went to Rome by order of pope Gregory XIII. to take care of the publication of the Septuagint; and there, fulfilling his commentary on the gospels in 1582, he died in the beginning of the following year. He wrote, besides, Commentaries on Jeremiah, Baruch, Ezekiel, and Daniel; a treatise on the sacraments, on grace, on original sin; and several other pieces printed at Paris in 1677, in folio. His style is clear, lively, and easy. He does not servilely follow the scholastic divines; but is pretty free, and sometimes singular in his sentiments.

MALE, among zoologists, that sex of animals which has the parts of generation situated externally. See SEX and GENERATION.

The term male has also, from some similitude to that sex in animals, been applied to several inanimate things; thus we say a male flower, a male screw, &c. See Male and Female.

MALEBRANCHE (Nicholas), an eminent French metaphysician, the son of Nicholas Malebranche, secretary to the French king, was born in 1638, and admitted into the congregation of the J esuits. He at first applied himself to the study of languages and history; but afterwards meeting with Des Cartes's Treatise on Man, he gave himself up entirely to the study of philosophy. In 1699, he was admitted an honorary member of the Royal Academy of Sciences at Paris. Notwithstanding he was of a delicate constitution, he enjoyed a pretty good state of health till his death, which happened in 1715, at the age of 77. Peter Malebranche read little, but thought a great deal. He despised that kind of philosophy which consists only in knowing the opinions of other men, since a person may know the history of other men's thoughts without thinking himself. He could never...
read ten verses together without difficulty. He meditated
with his windows shut, in order to keep out the
lights, which he found to be a disturbance to him. His
conversation turned upon the same subjects as his books;
but was mixed with so much modesty and deference to
the judgment of others, that it was extremely and
universally admired. His books are famous: particular-
ly his Recherche de la Verité, i.e. "Search after
truth;" his design in which is to bring to the light
in which we are daily
walking, and to prefer" a method for discovering
the truth, which he does, by starting the notion of
seeing all things in God. And hence he is led to
think and speak merely of human knowledge, either
as it lies in written books, or in the book of nature,
compared with that light which displays itself from
the ideal world; and by attending to which, with
prudence; and to prescribe a method for discover-
ing the light which difplays itself from
the natural
language:

MALICE, in ethics and law, is a formed
design of doing mischief to another; it differs from hatred.
In murder, it is malice makes the crime; and it a
man, having a malicious intent to kill another, in the
execution of his malice kills a per son not intended,
the malice shall be connected to his person, and he
shall be adjudged a murderer. The words ex malitia
praeconsiderata are necessary to an indictment of murder,
and this malitia praecognita, or malice propensi,
may be either express or implied in law. Express
malice is, when one, with a sedate, deliberate mind
and formed design, kills another; which formed
design is evidenced by external circumstances discover-
ing that intention; as lying in wait, antecedent me-
cenades, former grudges, and concerted schemes to do
him some bodily harm. Besides, where no malice is
expressed, the law will imply it; as where a man wil-
fully poisons another, in such a deliberate act the law
presumes malice, though no particular enmity can
be proved. And if a man kills another suddenly, with-
out any or without a considerable provocation, the
law implies malice; for no person, unless of an aban-
doned heart, would be guilty of such an act upon a
flight or no apparent caufe.

MALIGNANT, among physicians, a term ap-
plied to diseases of a very dangerous nature, and gen-
erally infectious; such are the dysentery, hospital-fever,
&c. in their worst stages.

Malignity among physicians signifies much the same
with contagion. See Contagion.

MALLOCH, in ornithology. See Anas.

MALLEABLE, a property of metals whereby
they are capable of being extended under the ham-
mer.

MALLENDERS, in farriery. See there § xxxiv.

MALLEOLI, in the ancient art of war, were
bundles of combustible materials, set on fire to give
light in the night, or to annoy the enemy; when
they were employed for the latter purpose they were
flung out of a bow, or fixed to a javelin, and thus
thrown into the enemies engines, flings, &c. in order
to burn them. Pitch was always a principal ingre-
dient in the composition. The malleoli had also the
name of pyrobolis.

MALT or MALLOW, (David) an English
poet, but a Scot man by birth, was born in that
country about 1700. By the penury of his parents
he was compelled to be janitor of the high school at
Edinburgh; but he surmounted the disadvantage
of his birth and fortune; for when the Duke of
Montrose applied to the college of Edinburgh for a
master to educate his sons, Malloch was recommended.
When his pupils went abroad, they were ingratitude to
his
MALLET (Edme) was born at Melun in 1713, and enjoyed a curacy in the neighborhood of his native place till 1734, when he went to Paris to be professor of theology in the college of Navarre, of which he was admitted a doctor. Boyer, the late bishop of Mirepoix, was at first much prejudiced against him; but baring afterwards undeceived, he conferred upon him the fee of Verdun as a reward for his doctrine and morals. Janfennin had been imputed to him by his enemies with his prelate; and the Gazette which went by the name of Eclefoisillues, accused him of impurity. Either of these imputations was equally undervalued by the Abbé Mallet: as a Christian, he was grieved at the disputes of the French Church; and, as a philo-

sopher, he was astonished that the government had not, from the very beginning of those delicious imputed silence on both parties. He died at Paris in 1755, at the age of 42.

The principal of his works are,
1. *Principes pour la lecture des édits*, 1745, 12mo.

In Mallet's works on the poets, Orators, and the Belles Lettres, his object is no more than to explain with accuracy and precision the rules of the great masters, and to support them by examples from authors ancient and modern. The style of his different writings, to which his mind bore a great resemblance, was neat, easy, and unaffected. But what must render his memory estimable, was his attachment to his friends, his candour, moderation, gentleness, and modesty. He was employed to write the theological and belle-lettres articles in the *Encyclopédie*; and whatever he wrote in that dictionary was in general well composed. Abbé Mallet was preparing two important works when the world was deprived of him by death. The first was *Une Histoire générale des Guerres depuis le commencement de la Monarchie de France jusqu'à l'Hisloire du Gouve de Trente*, which he intended to set in opposition to that of Father Paul translated by Esther le Courayer.

MALLET, a large kind of hammer made of wood; much used by artificers who work with a chisel, as sculptors, masons, and stone-cutters, whose mall is ordinarily round; and by carpenters, joiners, &c. who use it square. There are several sorts of mallets used for different purposes on ship-board. The calking mallet is chiefly employed to drive the oaken into the seams of a ship, where the edges of the planks are joined to each other in the sides, deck, or bottom. The head of this mallet is long and cylindrical, being hooped with iron to prevent it from splitting in the exercise of calking. There is also the serving mallet, used in serving the rigging, by binding the spun-yarn more firmly about it than could possibly be done by hand, which is performed in the following manner: the spun-yarn being previously rolled up in a large ball or clue, two or three turns of it are pulled about the rope, and about the body of the mallet, which for a P
this purpose is finished with a round channel in its surface, that conforms to the convexity of the rope intended to be ferred. The turns of the spun-yarn being finished round the mallet, so as to confine it firmly to the rope, which is extended above the deck, one man paffes the ball continually about the rope, whilst the other, at the same time, winds on the spun-yarn by means of the mallet, whole handle acting as a leverfrains every turn about the rope as firm as poiffible.

MALLEVILLE (Claude de), a French poet, born at Paris, was one of the first members of the French academy, and gained a prize from Voiture and other ingenious men. He became secretary to M. de Baffompierre, to whom he performed important services while he was in prison; and with the rewards he received for him he purchased the place of secretary to the king. He was likewise secretary to the French academy, and died in 1647. He wrote sonnets, stanzas, elegies, epigrams, songs, madrigals, and a paraphrase on some of the Psalms. His sonnets are most excellen.

MALICOLLO, one of the new Hebrides islands in the Pacific, and the most considerable of all next to Espirito Santo. It is 18 leagues long from south-east to north-west; its greatest breadth, which is at the south-east end, is eight leagues; the north-west end is two-thirds its breadth, and narrower in the middle one-third. This contraction is occasioned by a wide and deep bay on the south-west side. It appears to be very fertile, and well inhabited; the land on the sea coast is rather low, and lies with a greater hope from the hills which are in the middle of the island; lat. 16 deg. 28. min. north; 167 deg. 36. min. east. On inquiring of the natives the name of this island, they were answer'd that it was Malicollo, which has a near resemblance to Malicolo, the name which Quiros received for it 160 years before. He did not indeed visit the island, but had his intelligence from the natives.

The south coast, which was most attentively examin'd by captain Cook, is luxuriously clothed with wood and other vegetables, from the sea-shore to the very summits of the hills. To the north-west, the country is less woody, but more agreeably interferted by lawns, some of which appeared to be cultivated. The vegetable productions of this country seemed to be in great variety; cocoa nuts, bread-fruit, bananas, sugar-canes, yams, eddoes, and turmeric: but captain Cook thought the fruits here not so good as at the Society and Friendly Isles. Hogs, and common poultry, are the domestic animals; and as the frequent squeaking of pigs was heard in the woods, it was concluded that the former are in considerable numbers here. A brace of Tabebelian puppies was given them, with a view to flock the country with this species of animal: these they received with strong signs of satisfaction.

The woods appeared to be inhabited by many species of birds. Here was caught a shark, which measured nine feet in length, on which the ship's company feasted with great relish: this shark, when cut open, was found to have the bony point of an arrow sticking in its head, having been shot quite through the skull. The wound was healed so perfectly, that not the smallest vestige of it appeared on the outside: a piece of the wood still remaining sticking to the bony point, as well as a few fibres with which it had been tied on; but both the wood and the fibres were so rotten, as to crumble into dust at the touch. Two large redfish fillets of the sea bream kind were likewise caught, on which most of the officers and some of the petty officers dined the next day. The night following every one who had eaten of them was feiz'd with violent pains in the head and bones, attended with a burning heat all over the skin, and numbness in the joints; even such hogs and dogs as had partaken of these fish gave strong symptoms of being poisoned: one hog, who had eaten of the g-r-bage, swelled to a great size, and died at night: several dogs were affected in the same manner; they groaned most piteously, had violent reachings, and could hardly drag their limbs along. These fish were suppos'd to have been of the same fort with those which Quiros mentions to have produced similar effects on board his ship, and which he calls peregos, which is the Spanish name for the sea-bream. Perhaps these fish are not always poisonous; but, like many species of the coast and island birds, may acquire this quality by feeding on poisonous vegetables: which conclusion is supported by the circumstance of the intestines having been found to be more poisonous than the rest. The effects of this poison on the officers continued for near a fortnight, during which time their pains returned every night, their teeth were loofe, and their gums and palate excoriated.

The natives of Malicollo are deformed as the most ugly, ill-proportioned people imaginable, and in every respect different from the other islanders in the South Sea: they are of a very dark colour, and diminutive size; with long heads, flat faces, and monkey countenances; their hair, in general, black or brown, short and curly, but not quite so soft and woolly as that of a negro. Their beards are very strong, crisp, and bushy, and generally black and short. But what serves greatly to increase their natural deformity is a custom which they have of wearing a belt, or cord, round their waist: this rope is as thick as a man's finger; and is tied so tight round their belly, that it would be fatal to a person unaccustomed from infancy to such an unnatural ligature; for it cuts such a deep notch across the navel, that the belly seems in a manner divided, one part being above and the other below the rope. The men go quite naked, except a piece of cloth or leaf ufed as a wrapper. Most other nations invent some kind of covering from motives of shame but here a roll of cloth, continually fastened to the belt, rather displays than conceals, and is the opposite of modesty. Besides having the flat broad nose and projecting cheek-bones of a negro, and a very short forehead, many increased their natural ugliness by painting their faces and breasts with a black colour. Some few had a small cap on the head made of matted-work. They wear bracelets of white and black shells, which prefs the upper arm so closely, that they seem to have been put on when the wearer was very young; this tends, as well as the belt, to reduce the Malicollese to that hunched shape which characterizes them. The deformity of their foreheads is supposed to be artificial, as the heads of infants may be squeezed into any kind of form.
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Malicello. The first natives that were seen carried clubs in their hands, and waded into the water, carrying green boughs, the universal sign of peace. In a day or two they ventured to come within a few yards of the ship's boat, which was sent out when they dipped their hands into the sea, and gathering some water in their palms, poured it on their heads. The officers in the boat, in compliance with their example, did the same, with which the Indians appeared to be much pleased. They repeated the word \emph{tomorrow}, or \emph{tomato}, continually; which seemed to be an ejaculation among them equivalent to \emph{tagari} among the Society Islands. These greater part were now armed with bows and arrows, and a few with spears. At length they ventured near the ship, and received a few presents of Tahitian cloth, which they eagerly accepted, and handed up their arrows in exchange, some of which were pointed with wood to learn the language of the strangers, which the Indians appeared to be much valuing; for they wished to have no kind of arms. They soon became familiar, and wherever this custom prevails, the greater number of persons, who have good-humoured manners, are ready to use them in foreign countries.

The greater part of the officers in the boat, in viewing them, were somewhat surprised at the readiness of their guests to remember, and seemed to spend some time in pondering how it was possible to pronounce the sound by such means as pencils and paper. They were not only anxious in teaching, but had curiosity enough to learn the language of the strangers, which they pronounced with much accuracy as led their instructors to admire their extensive faculties and quick apprehension. Observing their organs of speech to be so flexible, they tried the most difficult sounds in the European languages, and had recourse to the compound Russian \emph{fisch}, all of which they pronounced at the first hearing without the least difficulty. They presently learned the English numerals, which they repeated rapidly on their fingers, so that what they wanted in personal beauty was amply compensated to them in acuteness of understanding. They express their admiration by hitting like a grope.

Their music is not remarkable either for harmony or variety, but seemed to be of a more lively turn than that at the Friendly-Islands. Their behaviour to their visitants was, in general, harmless, but cautious: they gave them no invitation to stay amongst them; for they seemed not to relish the proximity of such powerful people, being probably accustomed to acts of violence and outrage from their neighbours. "In some of their countenances (says Mr. Forster), we thought we could trace a mischievous, ill-natured disposition; but we might mistake jealousy for hatred."

Very few women were seen, but those few were no less ugly than the men; they were of small stature, and their heads, faces, and shoulders, were painted red. Those who were grown up, and probably married, had short pieces of a kind of cloth, or rather mats, round their waists, reaching nearly to their knees; the rest had only a string round the middle, with a wisp of straw; and the younger ones, from infancy to the age of 10 years, went stark naked, like the boys of the same age. The women were not observed to have any finery in their ears or round their necks and arms, it being fashionable in this island for the men only to adorn themselves; and wherever this custom prevails, the other sex is commonly apprised, defiled, and in a state of servility. Here the women were seen with bundles on their backs, which contained their children; the men seemed to have no kind of regard for them. None of them came off to the ship, and they generally kept at a distance when any party landed from the boat. They perforate the cartilage of the nose between the nostrils, and thrust therein a piece of white bone about an inch and a half long, which is bent like the curvature of a bow. The houres here are, like those of the other islands, rather low, and covered with palm-thatch.
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thatch. Some were inclosed or walled round with boards, and the entrance to these was by a square hole at one end.

Their weapons are bows and arrows, and a club about two feet and a half in length, made of the cau-

furia wood, commonly knobbled at one end, and well polished. This weapon they hang on their right shoul-
der, from a thick rope made of a kind of grass. It appeared to be preferred for close engagements, after

having emptied the quiver. On the left writ they wear a circular wooden plate, neat-ly covered, and joined

with straw about five inches in diameter, upon which they break the violence of the recoiling bow-string,

and preserve their arm unhurt. Their arrows are made of a fort of reed, and are sometimes armed with a long

sharp point made of the red-wood, and sometimes with a very hard point made of bone: and these points are

all covered with a substance which was supposed to be poisoned. Indeed the people themselves confirmed

these suppositions, by making signs to the gentlemen of the ship not to touch the point, and giving them to

understand that if they were pricked by them they would die; they are very careful of them themselves, and

keep them always wrapped up in a quiver. Some of these arrows are armed with two or three points each,

with small prickles on the edge to prevent the arrow from being drawn out of the wound. Repeated and

effectual trials of the virulence of this poison were made upon dogs, but they gave no signs of being hurt

by it.

Their food seems to be principally vegetables, since they apply themselves to husbandry. As hogs and

fowls are bred here, the natives, doublets, feed sometimes on pork and poultry; and as they have canoes, it

may be supposed that they draw a part of their subsi-
dence from the ocean. The greatest number of ca-

noes that were seen along-side the ship at one time did not exceed 10, or, according to Mr Forster, 14, and

no more than four or five people in each: they were small, of indifferent workmanship, and without orna-

ment; but provided with an oar.

After some slight indications of a hostile intention on the part of the natives, which they had shown in

their canoes whilst about the ship, captain Cook, with a party of marines in two boats, landed in the face of

400 or 500 Indians who were assembled on the shore. Tho' they were all armed with bows and arrows, clubs

and spears, they made not the least opposition; on the contrary, seeing the captain advance alone, unarmed,

with only a green branch in his hand, one of them, who seemed to be a chief, giving his bow and arrows to

another, met him in the water, bearing also a green branch. When they met, the branches were exchanged

and the chief led the captain by the hand up to the crowd, to whom he immediately distributed pre-

sents; in the mean time the marines were landed, and drawn up upon the beach. The captain then made

signs that he wanted wood, and they by signs gave him permission to cut down the trees. A small pig

was presently brought, and presented to the captain, who in return gave the bearer a piece of cloth. It

was expected from this intercourse, that an exchange of provisions for various articles of merchandise would

take place: but these expectations proved fallacious; no more pigs were procured, and only about half a dozen

cocoa-nuts, and a small quantity of fresh water. As

these islanders were possess'd of hogs as well as fowls,

their backwardness to part with either might be owing to the little estimation in which they held such articles

as were tendered in barter; for they set no value on any nails or any other kind of iron-tools, and held all the
g-w-gaws of finery equally cheap. They would now and then exchange an arrow for a piece of cloth, but

very seldom part with a bow. After fending on board what wood had been cut, the party all embarked, and

the natives dispersed. When the ship was about to leave this island, captain Cook gives the following relation: "When the natives saw us under sail, they came off in canoes, making exchanges with more confidence than before, and giving such extraordinary proofs of their honesty as surprized us. As the ship at first had fresh way thro' the water, several of the canoes dropped alternately after they had received goods, and before they had time to deliver theirs in return: instead of taking advantage of this, as our friends at the Society-islands would have done, they used their utmost efforts to get up with us, and deliver what they had already been paid for. One man in particular followed us a considerable time, and did not reach us till it was calm, and the thing was forgotten. As soon as he came along-side, he held up the article, which several on board were ready to buy: but he refused to part with it till he saw the person to whom he had before sold it; and to him he gave it. The person not knowing the man again; offered him something in return: which he refused; and showing him what had been given before, at length made him sensible of the nice sense of honour which had actuated this Indian."

MALLOw, a manor, and also a borough town in the county of Cork, and province of Munster in Ire-

land, above 118 miles from Dublin. It was incorporated

by charter in 1688, and sends two members to parliament. It is pleasantly situated on the north bank of

the Blackwater, over which there is an excellent stone-bridge. Here is also a good church, a mar-

ket house, and barracks for a troop of horse. Not far distant is a fine spring of a moderately tepid wa-

ter, which bursts out of the bottom of a fine limestone rock, and approaches the nearsest in all its qualities to

the hot-well waters of Bristol of any that has been yet discovered in this kingdom, which brings a report

good company there: frequently in the summer months, and has caused it to be called the Irish Bath.

Mallow is a poor town, and has five fairs.

MALLOw, in botany. See Malva.

Marsh-Mallow. See Althaea.

Indian-Mallow. See Sida.

MALNSBURY, a town of Wiltshire, in England, 95 miles from London. It stands on a hill, with six

bridges over the river Avon at the bottom; with which, and a brook that runs into it, it is in a manner en-

camped. It formerly had walls and a castle, which were pulled down to enlarge the abbey, which was the

biggest in Wiltshire, and its abbots far in parliament.

The Saxon King Athelstan granted the town large immunities, and was buried under the high altar of

the church, and his monument still remains in the nave of.
MALO. See William.

MALO (St) a sea-port town of France, situated in the province of Brittany, situated in the latitude of 48 degrees 38 minutes north, and 1 degree 57 minutes to the west. The town stands upon a rock called the island of St Aaron, surrounded by the sea at high water, which is now joined to the continent, by means of a fort of caufey or dike, near a mile long, called the Silon, which has been often damaged by storms, and was almost quite ruined in the year 1729. At the end of this caufey next the town is a castle, flanked with large towers, a good ditch, and a large bastion. The city nearly covers the whole surface of the island, and is of an oblong form, surrounded with a strong rampart, on which there is a number of cannon. There is always in it a good garrison. The cathedral-church is dedicated to St Vincent, and stands in the square of the same name, as do also the town-house and the episcopal palace. There are some other buildings in the place, but few remarkable; and as to the streets, except two or three, they are all very narrow. There being no springs of fresh water in St Malo, the inhabitants are at great pains to convey the rain which falls on the roofs of their houses into cisterns; and of this they have enough for all family uses. There is only one parish-church in the town, though it contains between 9,000 and 10,000 inhabitants; but there are several convents of monks and nuns, and a general hospital. The two entrances into the harbour are defended by several forts, such as that of the Conchal; of the great and the little bay; the forts of Île Rebour, Siezembre, Roncelet; the castle of Latte, and Fort-Royal. These are several little isles near the harbour, the most considerable whereof is that of St Seizembre, which is near a quarter of a league in circumference, and serves as many outworks to the fortifications of the city, and are useful as bulwarks, by breaking the violence of the waves, which otherwise would beat with great force against the walls of the city. At the end of the caufey next the continent stands the suburb of St Servant, large and well built. Here the merchants have their houses and store-houses. Here is the dock-yard; and a secure harbour is formed by the river Rance, where ships of great burthen can ride at anchor very near the houses. The harbour is one of the best in the kingdom, and most frequented by merchant-ships; but it is of very difficult and dangerous access on account of the rocks which surround it. The town of St Malo is exceedingly well situated for trade; and accordingly, in this respect, it has exceeded beyond most towns in France. It maintains a trade with England, Holland, and Spain.

The commerce of Spain is of all the most considerable, and most profitable to the inhabitants of St Malo, the ships of the Malouins being frequently employed as regifter ships by the Spaniards, to carry out the rich cargoes to Peru and Mexico, and bring home treasure and plate from America. The inhabitants of St Malo carry on also a considerable trade in dry and salted cod to Newfoundland. They tend to this fishery a good many vessels from 200 to 300 tons burden, with salt for the fish, and provisions for subsisting the crews. They carry their fish to Italy, Spain, and home to Bourdeaux and Bayonne, and bring home the returns in fruits, soap, oil, &c. which are disposed of to great advantage at Nantz. St Malo is the capital of the bishopric of that name, which is of considerable extent; and the soil about it produces most kinds of grain and fruits in great abundance. The most remarkable towns in the district and diocese of St Malo, are St Servant, Cancalle, Chauteauf, Dinan, Tintinia, Combourg, Montfort, Brest, Guer, Plouermel, Joffelin, &c.

MALOUIN (Paul-Jacques), born at Caen in 1701, was professor of medicine in the royal college of Paris, physiocrat in ordinary to the queen, and a member of the Royal Society of London, and of the Academy of Sciences of Paris. These stations were a proper reward for his very extensive information in medicine and chemistry; and his amiable and steady character procured him many friends and protectors. He was a very unassuming man, like so many modern physicians, who put little fruit in medicine; and was greatly displeased to hear any ill spoken of his profession. He observed one day to a young man who took this liberty, that all great men had respected medicine: Ah! said the young fellow, you must at least except from the ill one Molieres. But then, instantly replied the doctor, you see he is dead. He is said to have believed the certainty of his art as firmly as a mathematician does that of geometry. Having prescribed a great many medicines for a celebrated man of letters, who followed his directions exactly, and was cured, Malouin eagerly embraced him, saying, Teas deserves to be sick. As he valued the rules of medicine still more on his own account than on that of others, he observed, with the latter part of his life, a very severe regimen. He strictly practised, the preservative part of medicine, which is much more certain in its effects than the restorative. To this regimen,
Men Malouin was indebted, for what many philosophers have defined in vain, a healthy old age and an easy death. He was a stranger to the infirmities of age; and died at Paris of an apoplexy, the 3d of January 1778, in the 77th year of his age. By his will he left a legacy to the faculty of medicine, upon condition of their holding a public meeting every year for the purpose of giving the public an account of his labours and discoveries. Malouin was economical, but at the same time very disinterested. After two years of very lucrative practice, he left Paris and went to Versailles, where he saw few patients, observing that he had retired to the courts. His principal works are, 1. Traite de Chine, 1734, 12mo. 2. Chine medicinale, 2 vols 12mo, 1755: a book full of curious observations, and written in a chaste and well adapted style. He had the character of a laborious chemist, and he was a well informed and even distinguished one for the age in which he lived; but his knowledge of chemistry, it must be confessed, was very imperfect, compared with the state of the science in the present age, in which it has assumed a new face, that probably will not be the last. 3. Some of the Arts in the collection published by the academy of sciences on the arts and professions. A circumstance which happened at a meeting of the academy, does as much honour to his heart, as any of his works do to his understanding. A new treatise on the art of baking, wherein some of Malouin's ideas were combated, was read by M. Parmentier before his fellows, among whom was the old doctor. The young academician, who knew how easily self-love is hurt, was afraid to meet his looks; but no sooner was the reading finished, than Malouin went up to him, and embracing him, "receive my respects (said he), you have seen farther into the subject than I did." 4. He was likewise the author of the chemical articles in the Encyclopædia.

Of the same family was Charles Malouin, who graduated as a doctor of medicine in the university of Caen, and died in 1718 in the flower of his age. He published a treatise on Solids and Fluids, Paris 1718, 12mo.

MALPAS, a town of Cheshire, 166 miles from London. It stands on a high hill, not far from the river Dee, on the borders of Shropshire; has a grammar-school, and an hospital, and had formerly a castle. It is called in Latin Mala Platea. i.e. "ill streeter," and was, for the same reason, by the Normans, called Mal Pas; but its three streets, of which it chiefly consists, are now well paved; and here is a benefice rich enough to support two rectors, who officiate alternately in its fleture church. It has a good market on Mondays, and three fairs in the year.

MALPIGH (Marcellus), an eminent Italian physi-ician and anatomist in the 17th century. He studied under Magré and Mariano. The duke of Tuscany invited him to Pisa, to be professor of phisic there, in this city he contracted an intimate acquaintance with Borelli, to whom he acribed all the discoveries he had made. He went back to Bologna, the air of Pisa not agreeing with him. Cardinal Antonio Pignatelli, who had known him while he was legate, at Bologna, being chosen pope in 1691, under the name of Innocent XII, immediately sent for him to Rome, and ap-pointed him his physician. But this did not hinder Malpighia, from pursuing his studies, and perfecting his works, which have immortalized his memory. He died in 1674; and his works, with his life written by himself prefixed, were first collected and printed at London, in four, in 1667.

MALPLAQUET, a village of the Netherlands, in Hainault, famous for a most bloody battle fought here on the 11th of September 1709, between the French under old marquis Villars, and the allies commanded by prince Eugene and the duke of Marlborough. The French army amounted to 120,000 men; and were posted behind the woods of La Marte and Tanters, in the neighbourhood of Malplaquet. They had fortified their position in such a manner with lines, hedges, and trees laid across, that they seemed to be quite inaccessible. In this situation they expected certain victory: and even the common soldiers were so eager to engage, that they flung away the bread which had been just given them, though they had taken no sustenance for a whole day before. The allied army began the attack early in the morning, being favoured by a thick fog. The chief fury of their impulsion was made upon the left of the enemy; and with such suc­cess, that notwithstanding their lines and barricades, the French were in less than an hour driven from their entrenchments. But on the enemy's right the combat was sustained with much greater obstinacy. The Dutch, who carried on the attack, drove them from their first line; but were repulsed from the second with great slaughter. The prince of Orange, who headed that attack, perished in his efforts with incredible perseverance.
M A L T

severance and intrepidity, though two horses had been killed under him, and the greater part of his officers slain and disabled. At last, however, the French were obliged to yield up the field of battle; but not till after having fold a dear bought victory. Villars, being dangerously wounded, they made an excellent retreat under the conduct of Boudiers, and took post near Gneufay and Valenciennes. The conquerors took possession of the field of battle, on which above 20,000 of their beef troops lay dead. The loss of the French, it is said, did not exceed 8000; and marshal Villars confidently asserted, that if he had not been disabled, he would have gained an undoubted victory.

MALT denotes barley cured, or prepared to fit it for making a potable liquor, under the denomination of beer or ale. See BREWING.

MALT-Liquors have different names as well as different virtues, properties and uses, both from the different manners of preparing or brewing the liquors themselves; whence they are divided into beer and ale, strong and small, new and old.

Malt drinks are either pale or brown, as the malt is more or less dried on the kiln; that is, the flendereft dried, tinging the liquor pale, or lea; whereas that higher dried, and as it were roasted, makes it of a higher colour. A mixture of both these makes an amber colour; whence several of these liquors take their name.

Now, it is certain, the pale malt has most of the natural grain in it, and is therefore the most nourishing; but, for the same reason, it requires a stronger constitution to digest it. Those who drink much of it, are usually fat and sleek in their bloom, but are often cut off by sudden fevers: or, if they avoid this, they fall early into a debauch. The brown malt makes a drink much less viifid, and fitter to pass the fievemost of the body; but, it very strong, it may lead on to the fame inconveniences with the pale; though a single debouch wears oft much more easily in the brown.

Dr. Quincy observes, that the beet pale malt liquors are thole brewed with hard waters, as thole of springs and wells, because the mineral particles, wherewith these waters are impregnated, help to prevent the cohefions of thole drawn from the grain, and enable them to pass the proper secretions the better; as the viifid particles of the grain do likewise defend thole from doing the mischief they might otherwise occasion. But fower waters beft suit to draw out the fubftance of high-dried malts, which retain many inert particles in their contexture, and are therefore beft loft in a smooth vehicle.

For the differences in the preparation of malt liquors, they chiefly confift in the use of hops, as in beer; or in the more sparing use of them, as in ale.

The difference made by hops is beft discovered from the nature and quality of the hops themselves; these are known to be a suble grateful bitter; in their composition, therefore, with this liquor, they add something of an alkaline nature, i.e., particles that are sublime, active, and rigid. By which means, the ropy viifid parts of the malt are more divided and fabilized: and are therefore not only rendered more easy of digestion and secretion in the body, but also, while in the liquor, they prevent it from running into such cohefions as would make itropy, vivid, and furious.

For want of this, in unhopped drinks, that clammy sweetness, which they retain after working, soon turns them acid and unfit for use; which happens sooner or later in proportion to the strength they receive from the malt, and the comminution that has undergone by fermentation.

It is a common opinion, that ale is more diuretic than beer; that is, liquor lefts hopped more than that with a greater quantity of hops in it: which may hold in some constitutions, because ale being more smooth, softening, and relaxing, where urine is to be promoted by enlarging the passage, as in thin, dry constitutions, this is the most likely to effect it. But, where the promoting of urine is to be done by attenuating and breaking the juices, and rendering them more fluid, it is certainly best answered by those drinks which are well hopped.

As to the dispute, whether or no hops tend to breed the stone; it is too long to enter upon here. Quincy is of opinion, there is but little reason for the affirmative side of the question; and in the general, makes no Jeremiah to say, that, for one constitution damaged by beer, there are numbers spoiled by ale. This last manifestly fouls the glands, fluids the vesfels with slime and viifidity, makes the body unwieldy and corpulent, and paves the way for cachexies, jaundice, atrophies, and at last incurable dropitts. The urinary passages, also, which it is supposed to clear, will, in time, be filled by it with fough and matter of as ill consequence as gravel.

The different strengths of malt liquors also make their effects different. The stronger they are, the more viifid parts they carry into the blood; and though the spirituous parts make these imperceptible at first: yet when those are evaporated, which will be in a few hours, the other will be feftly felt by pains in the head, nauseousness at the stomack, and latitude or littlefefts to motion. This thole are the most feftible of those who have experienced the extremes of drinking these liquors and wines, for a debouch of wine they find much sooner worn off, and they are much more lively and brisk afterwards, than after fudding malt liquors, whose viifid remains will be long before they be shaken off.

Malt liquors therefore are, in general, the more wholesome for being small: i.e. of such a fhrength as is liable to carry a small degree of warmth into the stomack, but not to great as to prevent their being proper diluters of the necessary food. Indeed, in robust people, or those who labour hard, the viifidities of the drink may be broken into convenient nourishment; but in persons of another habit and way of living, they serve rather to promote obstructions and ill humour.

The age of malt liquors is the laft thing by which they are rendered more or less wholesome. Age seems to do nearly the fame thing as hops; for those liquors which are longest kept are certainly the least viifid; age breaking the viifid parts, and by degrees rendering them smaller, and fitter for secretion.
But this is always determined according to their strength; in proportion to which, they will sooner or latter come to their full perfection as well as be just for the fermentation to be reformed and comminuted as far as they are capable, then it is that they are best; and, beyond this, they will be continually on the decay, till the finer spirits are entirely escaped, and the remainder becomes vapid and four.

**Malt-Distillery.** This is an extensive article of trade, and by which very large fortunes are made. The art is to convert fermented malt liquors into a clear inflammable spirit, which may be either fold for use in the common state of a proof strength, that is, the same strength with French brandy; or is rectified into that purer spirit usually sold under the name of spirit of wine, or made into compound cordial waters, by being distilled again from herbs and other ingredients.

See **Brewing and Wash.**

To brew with malt in the most advantageous manner, it is necessary, 1. That the subject be well prepared; 2. That the water be suitable and duly applied; and, 3. That some certain additions be used, or alterations made, according to the season of the year, and the intention of the operator; and by a proper regulation in these respects, all the fermentable parts of the subject will thus be brought into the tincture, and become fit for fermentation.

The due preparation of the subject consists in its being sufficiently malted or well ground. When the grain is not sufficiently malted, it is apt to prove hard, so that the water can have but very little power to dissolve its substance; and if it be too much malted, a part of the fermentable matter is lost in that operation. The harder and more flinty the malt is, the finer it ought to be ground; and in all cases, when intended for distillation, it is advisable to reduce it to a kind of finer or coarser meal. When the malt is thus ground, it is found by experience that great part of the time, trouble, and expense of the brewing is saved by it, and yet as large a quantity of spirit will be produced; for thus the whole substance of the malt remains mixed among the tincture, and be fermented and distilled among it. This is a particular that very well deserves the attention of the malt distiller, as that trade is at present carried on, for the dispatch of the business, and the quantity of spirit procured, is more attended to than the purity or perfection of it.

The secret of this matter depends upon the thoroughly mixing or briskly agitating and throwing the meal about, first in cold and then in hot water; and repeating this agitation after the fermentation is over, when the thick turbid wash being immediately committed to the still already hot and dewy with working, there is no danger of burning, unless by accident, even without the farther trouble of straining, which in this case is found needless, though the quantity be so very large, provided that requisite care and cleanliness be used; and thus the business of brewing and fermenting may very commodiously be performed together, and reduced to one single operation. Whatever water is made choice of, it must stand in a hot flat upon the prepared malt, especially if a clear tincture be desired, but a known and very great inconveniency attends its being applied too hot, or too near to a state of boiling, or even reeling with regard to the hand. To save time in this case, and to prevent the malt running into lumps and cloths, the best way is to put a certain measured quantity of cold water to the malt first; the malt is then to be stirred very well with this, so as to form a sort of thin uniform paste or pudding; after which the remaining quantity of water required may be added in a state of boiling, without the least danger of making what, in the distillers language, is called a *puddin.*

In this manner the due and necessary degree of heat in the water, for the extracing all the virtues of the malt, may be hit upon very expeditiously, and with a great deal of exactness, as the heat of boiling water is a fixed standard which may be let down to any degree by a proportionate mixture of cold water, due allowances being made for the season of the year, and for the temperature of the air.

The little obvious improvement, added to the method just above hinted for the reducing brewing and fermentation to one operation, will render it practicable to very considerable advantage, and the spirit improved in quality as well as quantity.

A much more profitable method than that usually practised for the fermenting malt for distillation, in order to get its spirit, is the following: take ten pounds of malt reduced to a fine meal, and three pounds of common wheat-meal; add to these two gallons of cold water, and stir them well together, then add five gallons of water, boiling hot, and stir altogether again. Let the whole stand two hours, and then stir it again; and when grown cold, add to it two ounces of solid yeast, and let it by loosely covered in a warmish place to ferment.

This is the Dutch method of preparing what they call the wash for malt spirit, whereby they save much trouble and procure a large quantity of spirit; thus commodiously reducing the two businesses of brewing and fermenting to one single operation. In England the method is to draw and malt for spirit as they ordinarily do for beer, only instead of boiling the malt, they pump it into large coolers, and afterwards run it into their fermenting backs, to be there fermented with yeast. Thus they bellows twice as much labour as is necessary, and lose a large quantity of their spirit by leaving the gross bottoms out of the still for fear of burning.

All simple spirits may be considered in the three different states of low wines, proof spirit, and alcohol, the intermediate degrees of strength being of least general use; and they are to be judged of only according as they approach to or recede from these. Low wines at a medium contain a sixth part of pure inflammable spirit, five times as much water as spirit necessarily arising in the operation with a boiling heat. Proof goods contain about one half of the same totally inflammable spirit; and alcohol entirely consists of it.

Malt low-wines, prepared in the common way, are exceedingly natrious; they have, however, a natural visvinit, or pungent agreeable acidity, which would render the spirit agreeable to the palate were it not for the large quantity of the grous oil of the malt that abounds in it. When this oil is detained in some measure
out this previous caution, the odious taste of the malt oil will be distinguished among all the other flavours of the ingredients.

Malt spirit, when it has once been reduced to the true form of an alcohol, is afterwards more fit for allious internal diseases than even French brandy; it being after this purification a more uniform, hungry, talefles, and impenetrable spirit, than any other spirits which we esteem to much finer.

A pure spirit being thus procured, should be kept carefully in vessels of glass or stone, well stoppered, to prevent the evaporation of any of its volatile part. If preserved in casks, it is apt to impregnate it very strongly with the wood. The quantity of pure alcohol obtainable from a certain quantity of malt, differs according to the goodness of the subject, the manner of the operation, the season of the year, and the fineness of the workmen; according to which variations, a quarter of malt will afford from eight to nine to thirteen or fourteen quarts of alcohol. This should encourage the malt distiller to be careful and diligent in his business, as so very large a part of his profit depends wholly on the well conducting his processes. After every operation in this business, there remains a quantity of spirits, which in their own coarse state ought never to be admitted into the pure spirit; these are to be lived together, and large quantities of them at once wrought into alcohol. It is easy to reduce these to such a state that they will serve for lamp-spirits. This disagreeable flavour being corrected by the addition of aromatics during the distillations, the reducing them into a perfect and pure alcohol is practicable, but without such difficulties as render it scarce worth the trader’s while. One way of doing it is by distilling them from water into water, and that with a very slow fire. By this means a pure alcohol may be made out of the sourest faints.

The malt distiller always gives his spirit a single rectification per feast, in order to purify it a little, and make it up proof; but in that state it is not to be reckoned fit for internal uses, but serves to be distilled into geneva and other ordinary compound strong waters for the vulgar.

The Dutch, who carry on a great trade with malt spirit, never give it any farther rectification than this; and it is on this account, that the malt spirit of England is in general so much more in esteem. The Dutch method is only to distil the wafte into low wines, and then to full proof spirit; they then directly make it into geneva, or else fend it as it is to Germany, Guinea, and the East-Indies; for the Dutch have little notion of their rectifications. Their spirit is by this means rendered very foul and coarse, and is rendered yet more nauseous by the immoderate use they make of rye-meal. Malt spirit, in its unrectified state, is usually found to have the common bubble proof, as the malt distiller knows that it will not be marketable without it.

The whole matter requisite to this is, that it have a considerable portion of the gross oil of the malt well broke and mixed along with it; this gives the rectifier a great deal of trouble he will have the spirit fine; but in the general run of the business, the rectifier does not take out this oil, but breaks it finer, and mixes it faster in by alkaline salts, and disguises its
Malt.

The spirit lost in these processes the variability it had when it came out of the hands of the malt distiller, and is in all respects worse, except in the disagree of a mixed flavour.

The alkaline salts used by the rectifier destroying the natural variability of the spirit, it is necessary to add an extractive acid in order to give it a new one. The acid they generally use is the spiritus nitri dulcis, and the common way of using it is mixing it to the talem with the rectified spirit: this gives our malt spirit, when well rectified, a flavour somewhat like that of French brandy, but this soon flies off; and the better method is to add a proper quantity of Glazer's strong spirit of niter to the spirit in the fill. The liquor in this comes over impregnated with it, and the acid being more intimately mixed, the flavour is retained.

Mill Bruise, or Bruising mill. It has been found by repeated experiments, that bruising malt is a more advantageous method than the old one of grinding and flowing. By bruising, there is not only less waste, but the malt is also better fitted for giving out all its virtues. It has lately, therefore, become a practice to squeeze malt between rollers, by means of a proper apparatus, of which various contrivances have been invented. As the best contrivance of this sort is said to be the bruising-mill of Mr. Whinlaw, we have given a figure of it on Plate CCLXXXII. where AAA is the frame; B, the large cylinder or roller; C, a small one; D, the hopper; E, the shoe; F, the frame that supports the hopper; G, a fly-wheel; H, the windlass. To use this engine, it is directed to screw the large roller up to the small one, and not to feed too fast from the shoe, which is regulated by pins that have strings fixed to them. It is evident that when two smooth surfaces are opposed to each other at a distance which can be regulated at pleasure, neither grain nor any other similar substance can pass between them without being bruised. This being the principle on which the bruising-mill acts, the mealily substance, which is the essential part of malt, is entirely removed from the skin or hull which contains it, and all the virtues of the malt are with ease extracted by the water in a manner superior to that is effected when the grain is only cut by grinding. The operation is at the same time so expeditiously performed that two men can with ease bruise a bushel of malt in a minute. — By the same engine may also be bruised oats and beans for horses. A great part of the corn given these animals it is well known, is twalked whole, and after pailes through them in the same flate; in which case, they cannot receive any nourishment from the grains that are unbroken: but when bruised in this engine, it eases mastication; and every grain being prepared for nutrition, a much less quantity of coarse be found to be sufficient. For bruising beans the two regulating screws must be unscrewed a little; and the fly-wheel requires to be then set in motion with the hand, on account that the rollers are then a little space apart, and will not turn each other before the beans come between them.

Malt-Tax. is the sum of 750,000l. raised every year by parliament since 1697, by a duty of 6d. on the bushel of malt, and a proportionable sum on certain liquors, such as cider and perry, which might otherwise prevent the consumption of malt. This is the management of the commissioners of the excise; and is indeed itself no less than the annual excise. In 1763, an additional perpetual excise of 3d. per bushel was laid upon malt; and in 1765, a proportional excise was laid upon cider and perry, but new-modelled 1766. See Excise.

MALTA, a celebrated island of the Mediterranean situated between the 15th and 16th degrees of east longitude, and between the 35th and 36 degrees of north latitude. It is about 19 or 20 leagues in length, nine or ten in breadth, and 90 in circumference. Anciently it was called Melita; and is supposed by Cluverius, from its situation and other particulars, to be the Hiperia mentioned by Homer, whence the Phœces were afterwards driven by the Phenicians, and retired into Sheria and the island of Corfu; which is the more probable, as the ancient poet places the moutain Melita in that island. He has likewise brought some probable arguments to prove, that Melita or Malta is the ancient Ógygia, in which the famed nymph Calypso, daughter of the Ocean and Thetis, received the shipwrecked Ulysses, and detained him seven years.

The most ancient possessors of Malta, of whom we have any certain account, were the Carthaginians; from whom it was taken by the Romans; and yet during the whole time that it continued under the power of the western nations, it was almost entirely barren. The soil was partly sandy and partly rocky, having fearcely any depth of earth; and withal so stony, that it was hardly capable of producing corn or any other grain except cummin, and some feeds of a similar nature. Its chief products were figs, melons, honey, cotton, and some few other fruits and commodities, which the inhabitants exchanged for corn; and in this barren state it seems to have continued till it came into the possession of the Maltefe knights. It laboured also under great scarcity of water and fuel; upon which all which accounts it was till that time but thinly inhabited, the country being only about 50 or 60 miles or other villages scattered about, and no city except the capital called also Malta, and the town and fort of St. Angelo, which defended the harbour, so that the whole number of its inhabitants did not exceed 12,000, including women and children; the greatest part of whom were very indigent.

According to an ancient tradition, Malta was first possessed by an African prince named Battal, an enemy to queen Dido, from whom it was taken by the Carthaginians, as may be judged from several Punic inscriptions to be seen on some pillars and other monuments yet standing. From the Carthaginians it passed to the Romans, who made themselves masters of it at the same time that they subdued the island of Sicily. These were driven out by the Arabs in the year 828; who were driven out of it in their turn by Roger the Norman, earl of Sicily, who took possession of it in 1190; from which time it continued under the dominion of the Sicilian princes till the time of Char. V. when it fell under his power, along with Naples and Sicily. To cover the island of Sicily from the Turks, Charles gave the island to the knights of Rhodes, since that time called knights of Malta.

The origin and history of these knights is given under—
under the article Knights of Malta and Rhodes. Here it is sufficient to observe, that in 1530, the knights of Rhodes having been expelled from that island by Solyman the Turkish sultan, and destitute of an habitation, accepted, tho' not without some reluctance on account of its barrenness, the offer made them by Charles V. of the island of Malta. The grand master having caused his two large carracks, the galleys of the order, and a good number of other transport-ships laden with great quantities of arms, ammunition, and troops, to be got ready, he and his knights embarked in theformer, with all the effects, records, and treasure belonging to the order, and the rest in the latter. In their passage they suffered very much by a violent storm; in which one of their galleys split upon a rock, and one of the carracks was run aground by the violence of the waves, after having broke her three anchors. She stuck so fast that they expected every moment to see her split in pieces; when providentially a gale of wind dispersed her without damage. This event was counted as a lucky omen, and on the 20th of October that year all the company were safely landed.

At the first landing of the Maltefe knights, they found themselves obliged to lodge in a very poor town or borough at the foot of the hill on which stands the castle of St. Angelo, and where their only habitations were fishermen's huts. The grand master, with the principal knights, took possession of the castle, where the accommodations were somewhat better; tho'these too were very mean, and out of repair. Three days after, he took possession of the city, which was formerly called Malta, but since that time has taken the name of the Notable City; and after that, of the whole island of Malta, and the neighbouring one of Gofa.

The first care of the knights, after having settled their authority through the two islands, was to provide some better accommodation for the present, and to choose a proper place where to fix their habitation. But as the island had no other defence than the old castle of St. Angelo, and was so much exposed on all sides, that it would have required greater sums than their exhausted treasury could spare to put it in a proper state of defence, the grand master was obliged to content himself with surrounding the borough aforesaid, wherein he had ordered new buildings to be reared for the present habitation of his knights, with a stout wall, to prevent its being surprized by the Turkish and Barbary corsairs. His design indeed, at this time, was not to have fixed the abode of the knights in the bare and defenceless island of Malta, but to lay in it only till he had got a sufficiant force to attempt the conquest of Modon, a town of the Morea, and which was not only a populous and opulent place, but lay very convenient for forming an attack on the island of Rhodes, their ancient habitation, and to which they were naturally attached. This, however, did not hinder his taking all proper measures for securing Malta as well as Gofa, and laying out a proper plan for securing them from attacks, in case the design on Modon should fail.

In the mean time, as superflition was then universally prevalent, the grand master, among other precious relics which they had brought from Rhodes, caused to be taken to the arm of St. Catherine to be carried in procession to the cathedral. Whilist they were on their march, one of the sentinels gave them notice, that a large Turkish merchantman was wrecked on their coast. The grand master immediately dispatched some of his knights and soldiers thither; who finding Isaac da Nocher, an excellent engineer, they were retained in the service of the order, and the latter was immediately employed in fortifying the island.

The knights were hardly settled in Malta, when the emperor, and other European potentates, endeavoured to engage them in a war with the inhabitants of Barbary, as the city of Tripoli, then held by Charles, was in great danger of falling into the hands of the infidels. The attempt on Modon, however, was first made; but it proved unsuccessfull through the base avarice of the Maltefe forces: for they had been admitted into the city, during the night began to murder and plunder the inhabitants, without waiting for the arrival of the galleys which were coming to their assistance. The consequence was, that the inhabitants armed, and a desperate battle began; in which the Maltefe, notwithstanding the utmost efforts, were obliged to retire, but not till they had loaded themselves with plunder, and carried away 800 women captives.

The grand master, looking upon this disappointment as a sign that Providence had ordained Malta to be the residence of the knights, did not renew his attempts upon Modon; but, in 1532, joined with the emperor against the Turks, and sent a great number of his galleys to join the confederate fleet under the celebrated Andrew Doria. In consequence of this aid, the undertaking proved successful; and in all probability the conquest of Modon would have been accomplished, had not the boldness discouraged by the bad success of the last attempt, openly refused to proceed, and obliged the emperor to proceed to Coran, another town belonging to the Turks. Through the valor of the Maltefe knights, this place was soon obliged to capitulate; and in a second expedition in 1533, the knights again distinguished themselves in a most eminent manner. They were quickly recalled, however, by the grand master to the defence of the island, which was now threatened with an invasion by Barbarossa, the celebrated Turkish corsair, who formed from the head of above fourscore galleys. This invasion, however, did not take place; and in 1534 the grand master Viliers de L'Isle Adam died, and was succeeded by Perio de Ponte, a native of the town of Alassia in Italy.

The new grand master, who received intelligence of his election at St. Euphemia in Calabria, very soon after received another express, giving an account of the wars which in that time raged in Tunis, and the danger that Tripoli as well as Malta was in from Barbarossa, who was by this time become master both of Algiers and Tunis, upon which he made all the haste he could to his new government. His first care was to send a strong reinforcement to Italy; after which, he dispatched an embassy to the emperor, intreating him to equip a powerful fleet against Barbarossa, without which it would be impossible for Tripoli to hold out much longer.
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By this embassy from De Ponte, and another to the same purpose from Malley Harman, the deposed king of Tunis, Charles was early prevailed on to carry his arms into Africa; in which he was assisted by a great number of the bravest knights, together with 18 brigadines of different sizes, 40 of the Maltese galleys, and their vessel called the great carrack, of itself almost equivalent to a squadron. In this expedition the knights distinguished themselves in a most eminent manner. At the siege of Gulleta, one of the knights, named Codecza, an excellent engineer, by means of a balucondage, got almost close to the great tower, which he suddenly battered with large cannon, while the great carrack, which was behind all the rest of the vessels, and by reason of its height could fire over them, did prodigious execution. A breach was soon made; and hardly was it wide enough to be scaled, when the Maltese knights jumped out of the galleys into their long-boats, and thence into the sea, with their swords in their hands, and waded through the water above their girdles, it being too shallow for boats to approach the shore. The standard-bearer of the order was the first that jumped into the water, and led the rest to the attack; they claiming every where the pot of honour. They marched with the greatest resolution through the most terrible firing and showers of all kinds of missile weapons; and, having gained the shore, quickly ascended the breach, on the top of which they planted their great standard. A great number lost their lives, and scarce one came off unwounded; but the emperor did them the justice to own, that the taking the place was chiefly owing to the valour of the Maltese knights.

The city of Tunis was soon taken after the fortress of Gulleta; on the surrender of which, the emperor, defigning to return into Europe, took his left hand on board the great carrack; where he was magnificently entertained, and belated on the surviving knights the greatest encomiums, and marks of his esteem and gratitude to the owner. These he accompanied with considerable presents and with two new grants. By the first, they were allowed to import corn and other provisions from Sicily, without paying duty; and by the second, the emperor engaged, that none of the order should enjoy any of the estates or revenues, due to the Maltese knights, throughout all his dominions, unless they were lawfully authorized by the grand-master and his council; or till the originals had been examined and registered by himself, or such ministers as he should appoint for that purpose. The fleet then set sail for Malta; where, on their arrival, they received the news of the grand-master’s death, who was succeeded by Didier de Tuon de St. Jalle, a native of Provence, and then grand prior of Tholouse, where he resided at the time of his election.

The present grand master was a man of great conduct and bravery, which he had formerly shown at the siege of Rhodes; and the situation of affairs at this time required a person of experience. The Turkish corsairs, quite tired out with the dreadful havoc made among them by Botigella, grand prior of Pisa, who, seldom quitted the sea, and never failed out without finding some of them, or making considerable prizes, had agreed to enter into a strong confederacy, either to surprize the city of Tripoli, where his retreat was, or, if that failed, to lay siege to it by sea and land; in either of which attempts, they were sure of all the assistance of Barbarossa and Hayradin, then lord of Toglora. This last had undertaken the command and conduct of the whole enterprise; but the governor being informed of the design, prepared to give him a warm reception. Hayradin came thither with his whole force in the dead of the night, and began to scale the walls in those places where he reckoned them to be most defenceless. They soon appeared at the foot of them, than the garrison, which had been kept up in arms, poured down such streams of wild-fire, boiling oil, melted lead, &c. and threw such volleys of stones, while the great and small guns to annoy the thoe that stood farthest off, that great numbers of them were destroyed. They perilled in the attack, however, with great fury and vigour, till Hayradin, who was foremost in one of the escalades, was knocked down by a musket-shot from the top of his ladder. He fell into the ditch; and was taken up almost dead; upon which his troops instantly dispersed themselves, and abandoned the enterprise. The governor of Tripoli, however, judging that this would not be the last visit of the kind which in all probability he would receive, immediately dispatched an express to Malta, with proposals for fortifying the city, and demolishing a strong tower on that coast named Alead, which was held by a Turkish corsair. His advice being approved of, the commander Botigella, now general of the galleys, was immediately dispatched with a sufficient force; who, having landed his men at Tripoli, immediately marched, with them and a body of Arab mercenaries towards Alead; and without staying to open the trenches or any other covering than his gables, levelld his artillery against it. Hayradin being informed of this, came with his Turks to its defence; but was intercepted by a strong detachment of Maltese knights at the head of the hired Arabs, and repulsed with loss; so that all he could do was to convey about 50 or 60 Turks into the place, and to annoy the Christians with some flight skirmishes. Botigella, perceiving that his cannon did not make such quick dispatch as he wished, sent some of his galleys; under the shelter of which he quickly sprang a mine, which brought down part of the wall, and buried most of the corsairs under it; upon which the rest, seeing the Maltese knights mount the breach sword-in-hand, immediately threw down their arms. The tower was then razed to the ground; after which Botigella marched to a town called Malthe; whence he drove Hayradin, who had entrenched himself in it, and gave the plunder to the Arabs. In his return he attacked and took a large Turkish galley, the cargo of which was valued at 160,000 crowns, and had on board 200 persons; so that he landed in triumph, and was received with the loud acclamations of the whole order, who came to meet him on his arrival. Soon after the grand master fell sick and died; and was succeeded by John de Homenes.

The Maltese still continued to behave with their usual valour against the Turks; but, through the negligence of Charles V, almost all the places held by the Christians on the African coast were reduced by the infidels, and the valor exerted by the Maltese served only to destroy great numbers of them. At last the emperor’s affairs in Africa were totally ruined by his.
The emperor, indeed, it is thought that the emperor himself could not have escaped, had not the Maltese knights repulsed the Turks, who had attacked even the Imperial quarters. They pursued them even to the gates of the city, and were in hopes of entering it with them; but the governor having caused the gates to be shut before the Turks had all got in, the knights were disappointed. When the Spanish troops disembarked, the Maltese were also of great service in repulsing the enemy; and indeed behaved on both occasions with so much valour and intrepidity, that the rest of the allies could not sufficiently admire them. The misfortune, however, was, that the losses they suffered both of men and ships, especially by some of their best commanders, more than counterbalanced the glory they had gained. The emperor, before they parted, gave them the most ample testimony of his satisfaction and gratitude, as far as words and encomiums could go; after which the Maltese commander set sail, with the small remains of the knights, in three shattered vessels, and arrived safely at the port of Malta about the end of November 1548.

While the Maltese were employed in this unfortunate expedition, the island was so terribly annoyed by the Turk and other corsairs, that the port was in some measure blocked up by them; whilst the coasts, both here and at Goza, lay exposed to frequent inroads and depredations, and often to the loss of their inhabitants. This obliged the Maltese admiral Simeoni to refit his galleys with all possible expedition, and again put to sea in quest of these enemies. In this enterprise he succeeded so well, that he sent home a great number of the corsair captains in chains. Being obliged to put in at the port of Tripoli, the governor informed him, that he had just received an express from the king of Tunis, acquainting him that Barbarossa was making the most pressing complaints to the Porte against the Maltese knights, whilst his lieutenant Morat Haga was making great preparations at Tachora for the siege of Tripoli, which he doubted not would be followed by that of Tunis; the king having become more afeid of the Turks and Mauars according to his alliance with the emperor; after whose late defeat a great number of towns in that kingdom had revolted from him, and a much greater number of his subjects had put themselves under the protection of the Aligern monarch, who was expected shortly from Constantinople at the head of a powerful fleet.

On the receipt of these unwelcome news, an embassage was sent to the emperor, in order to persuade him to cause the fortifications of Tripoli to be repaired; but without success. All that could be obtained was fair words and promises; the consequence of which was, that the Maltese made most violent and almost incredible exertions against their enemies; till at last Soliman resolved to expel the knights from Malta, as he had before done from Rhodes. To this he was chiefly instigated by Dragut, an old experienced corsair, who had obtained the command of his fleet after the death of Barbarossa. The siege was accordingly commenced in 1551; but by a stratagem, the Turkish commander was induced to depart. However, he reduced the castle of Goza and the city of Tripoli. Nothing happened of great consequence from that time till the year 1564. When fresh complaints being made to Soliman, he proposed, in a grand council, where most of his officers attended, to expel the knights altogether. This design was strenuously opposed by Halil, one of Dragut's most experienced captains, who offered the most solid reasons against it; but being overruled by the rest, an expedition against Malta was resolved upon. One of the sultan's first cares was to send some spies, in the disguise of fishermen, to take a full view of the island, which found means to bring him an exact plan of it, with all its fortifications, havens, and galleys, as well as of the inhabitants, &c. whilst he was hastening his armaments against it. By this time, as the Maltese had very little reason to doubt that the Turkish armaments were designed against their island, the viceroy of Sicily, Don Garcia, was ordered by his master to take it in his way to the castle of Goleta, in order to consult with the grand master about the necessary means for opposing such a formidable power. The grand-master acquainted him that, in case of an attack upon Malta, he should want both men and corn; upon which the viceroy engaged to supply him with both on his return to Sicily; in pledge of which he left one of his sons with him, who was afterwards admitted into the order. He was no sooner departed, than the grand master summoned all the knights of the order, dispersed through several parts of Europe to repair to him. Thosé that were in Italy raised a body of 2000 foot, to which the viceroy of Sicily added two companies of Spanish forces. All the galleys of the order were employed in transporting their troops, together with all manner of provisions and ammunition into the island; and the knights that were in it, in distributing, disciplining, and exercising their new levies, as well as the Maltese militia, against the siege. Thus the grand-master found himself strengthened by the arrival of 600 knights, all of whom brought with them retinues of stout good servants, fit to assist in the defence of the island; whilst those who, by reason of age, sickness, or other impediments could not to repair to him, told their most valuable effects in order to assist him with their purses. The pope on his part, contented himself with sending a supply of 10,000 crowns; and the king of Spain ordered his viceroy Don Garcia to raise an army of 20,000 men, to be ready to fall thither as soon as called for. The grand-master employed the remainder of his time in visiting all the forts, magistrates, arsenals, &c. and aligning to each tongue their several posts, and making all necessary preparations, till the Ottoman fleet appeared in sight on the 18th of May 1565. It consisted of 159 The siege large galleys and galleons, carrying on board 30,000 commissariat, forces, janizaries and slaves, besides the slaves at the city, our, accompanied by a considerable number of other vessels, laden with artillery, ammunition, and other necessaries for a siege. The whole armament was commanded by Mustapha Balha, an old experienced officer, aged about 85 years, and an old favourite and confident of the sultan; of a haughty cruel temper, who made it a merit to violate his word, and to use all manner of violence against the Christians, especially against the Maltese. This formidable army landed at some distance from Il Borge, and soon afterwards spread themselves over the country; setting fire to the villages,
Defperate villages, putting the peasantry to the sword, and carrying off such of the cattle as, notwithstanding the orders of the grand-master, had not been secured within the forts and towns.

While the Turks were thus employed, La Valette (the grand master) sent out De Copier, marshal of the order, with 200 horse and 600 foot, to watch their motions. De Copier, an officer of great experience, executed his commission with so much prudence and vigour, that by falling on unexpectedly on detached parties, he cut off 1500 Turks with the loss of only 80 men.

The Turkish general held a council of war as soon as all his troops were landed, to assist him in resolving where he should begin his attack. Piali, the Turkish admiral, in a council of war, was of opinion that they ought not to enter upon action till Dragut should arrive. But Mustapha having received information of the king of Spain’s preparations, thought something ought to be done instantly for the safety of the fleet; which lay at present in a creek, where it was exposed to the violence of the east wind, and might be attacked with great advantage by the Spaniards. On this account he was of opinion, that they should immediately lay siege to a fort called St. Elmo, which stood on a neck of land near Il Borgo, having the principal harbour on one side of it, and on the other another harbour large enough to contain the whole fleet in safety. This proposal was approved by a majority of the council, and Mustapha proceeded without delay to carry it into execution.

La Valette did not expect that a place which was neither strong nor large enough to admit a numerous garrison could be defended long against so great a force as was employed to reduce it; but he thought it necessary that the siege of this fort should be prolonged as much as possible, in order to give the viceroy of Sicily time to come to his relief. With this view, he resolved to throw himself into St. Elmo, with a select body of troops; and he was preparing to set out, when the whole body of knightly renouned with such earnest importunity against his leaving the town, that he at last consented to suffer the reinforcement, which he had prepared, to be conducted to the fort by a knight called De Medraen, upon whose conduct and intrepidity he could rely with the most assured confidence.

Not long after De Medraen’s arrival in the fort, the garrison made vigorous sally, in which they drove the enemy from their entrenchments, and put a number of them to the sword. But the rest soon recovered from their surprize; and having returned to the charge, they compelled the Christians to retire. In this encounter, the vigorous efforts of the Janizaries were favoured by the wind, which blew the smoke of the guns upon the fort, and covered the besieged with a thick cloud, through which it was impossible to discern the operations of the enemy. This incident the Turks had the prudence of mind to improve to very great advantage. They feized, unperceived, upon the counterart; made a lodgment there with beams, woolfacks, and gabions; and raised a battery upon it with incredible expedition. After the smoke was dispersed, the besieged beheld what had been done with much astonishment; and they were the more contiguous, as the fortification which the Turks had raised upon the counterart, overtopped a ravelin which lay near it, in which the besieged could no longer appear with safety. They resolved, however, to defend this ravelin as long as possible, whatever it should cost them.

In the mean time Dragut, and another noted Corfac named Ulechiali, arrived with 20 galleys; having, besides slaves and seamen, 2500 troops on board. This reinforcement, and the presence of Dragut, added fresh vigour to the operations of the siege. This gallant Corfac exposed himself, on all occasions, with the utmost intrepidity; spent whole days in the trenches; and besides his other extraordinary talents, he was particularly skilful in the management of artillery, he caused some new batteries to be raised in more advantageous situations than had hitherto been made choice of; and kept up a continual fire both on the ravelin abovementioned and a cavalier that covered the fort, and was one of its principal defences.

This cavalier soon became the only defence which could prevent the besiegers from coming up to the very foot of the wall. Some Turkish engineers having approached the ravelin at day-break, to observe the effects of their artillery, they perceived a gun-port so low, that one of them, when mounted on the shoulders of another, looked into it, and saw the Christian soldiers lying on the ground asleep. Of this they gave immediate information to the troops; who, advancing as quickly and silently as possible, and clapping ladders to the gun-hole, got up into the ravelin, and cut most of the Christians to pieces.

Between this ravelin and the cavalier lay the ditch, over which the besiegers had thrown a temporary bridge of planks leading up to the cavalier. The Turks, perceiving this, leaped instantly upon the bridge, and attempted to make themselves masters of the cavalier, as they already were of the ravelin. But the garrison was now alarmed; the bravest of the knights hastened from different quarters to the post of danger; and, after an obstinate engagement, they compelled the Turks to retire into the ravelin. There, observing another way of reaching the cavalier by a path from the bottom of the ditch, they threw themselves down without dread or hesitation; and having ascended by this path to the other side, they renewed their attack with greater fury than ever. The combat lasted from sun-rise till noon, when the knights at last proved victorious. About 20 knights and 100 soldiers were killed; and near 3000 of the enemy.

As the ravelin was open on the side towards the fort, the besieged pointed some cannon against it, and made great havoc among the infidels. But Mustapha, sensible of the value of the acquisition he had made, poured in fresh soldiers without number, and the pioneers coming forward with wool-facks, planks, and gabions, put the troops at length in safety, and made a lodgment in the ravelin, of which the garrison were never afterwards able to dispossess them.

The grand-master’s concern on account of this difficulty was greatly augmented, by considering, that it could not have happened so soon without some negligence on the part of the garrison. He sent them, however, an immediate reinforcement; and both the siege
The knights desire permission to leave the fort, but are refused.

The contents and style of this letter affected the knights in the most sensible manner, and rooted within them that delicate sense of honour by which the order had been so long and so eminently distinguished. They resolved without hesitation to remain in the fort till every man should perish, rather than deliver it to the new garrison or abandon it to the enemy. And they went in a body to the governor, and intreated him to inform the grand-master of their repentance, and to join with them in praying that they might be suffered to wipe out the remembrance of their fault by their future conduct.

The grand-master suffered himself at last to be overcome, and henceforth the garrison dismissing all thoughts of their own safety, were intent on nothing but how to prolong their defence.

The grand-master sent them every night fresh troops to supply the place of the killed and wounded; and invention kept them well furnished with provisions, ammunition, of burning hoops. Of these last he had invented a particular kind, which consisted of hoops of wood, covered with wool, and steeped in boiling oil and other inflammable liquors, mixed with nitre and gunpowder. To these machines they set fire, and threw them flaming in the midst of the enemy when they were crowded together at an assault. It happened often that two or three of the Turks were hooked together and scorched to death, and the utmost confusion was produced wherever they were thrown.

The besieged stood much in need of this, and every other instrument of mischief that could be devised, for their
In spite of the most vigorous opposition the Turks had cast a bridge over the ditch, and begun to sap and undermine the walls. From the 17th of June to the 14th of July, not a single day passed without some encounter; and Mufapha had frequently attempted to scale the wall of the fort, but had been as often repulsed with the loss of some of the bravest of his troops.

Ahmed at having been detained so long before a place of such inconsiderable strength, he resolved to make one great decisive effort; and to bring to the assault as many of his forces as the situation of the place would permit him to employ. He had already made several breaches; but in order to secure the success of the assault which he now intended, he kept his batteries playing all the 15th without intermission, till the wall on that side where he designed his attack was almost level with the rock. On the 16th, the fleet was drawn up before the walls, as near the fort as the depth of the water would allow. Four thousand musketeers and archers were stationed in the trenches; and the rest of the troops, upon a signal given, advanced to the breach. The garrison was prepared to receive them; the breach was lined with several ranks of soldiers, having the knights interposed among them at certain distances. The Turks attempted often to break through this determined band, and to overpower them with their numbers; but their numbers served only to augment the loss which they sustained. Every shot from the fort did execution. The artillery made dreadful havoc among them; and the burning hoops were employed with astonishing success. The novelty of these machines, and the shrieks of those who were caught in them, added greatly to the terror which they inspired; and made it impossible for the Turkish officers to keep their men firm and steady in pursuing the advantages which, bad they preserved their ranks, their numbers must have infallibly acquired.

At length Mufapha, after having continued the assault for more than six hours, without gaining a single inch of ground on the besieged, gave orders for founding a retreat. In this attack the garrison lost about 20 knights and 300 soldiers; but this loss was immediately supplied by a reinforcement from the town; and Mufapha was at last convinced, that, unless the communication between the fort and the town were cut off, it would be impossible to bring the siege of the former to a period, while any troops remained in the other parts of the island. By the advice of Dragut, he resolved to extend his trenches and batteries on the side next the town, till they should reach to that part of the sea, or great harbour, where those supplies were landed which the grand-master daily furnished to the garrison. This undertaking he knew must be attended with the utmost difficulty, because all the space between his entrenchments, and the point to which it was necessary to extend them, lay exposed to the artillery both of fort St Elmo and St Angelo. In viewing the ground, a Scagia, in whom he put confidence, was killed by his side; and which was still a more irreparable loss, Dragut received a mortal wound, of which he died in a few days. This did not, however, discourage Mufapha from pursuing his design. By employing his troops and pioneers at the work day and night without intermission, he at length carried it into execution. Then having planted batteries along the shore, and filled his trenches with musketeers, it was impossible for any boat to pass from the town to the fort without the most eminent danger of either being sunk or intercepted.

After this precaution he resumed with fresh vigour his attempts to take the fort by storm. On the 21st he made four different assaults: all of which the garrison withstood; and, in repulsing so many thousand brave and well-disciplined troops, displayed a degree of prowess and fortitude which almost exceeds belief, and is beyond the power of description. But this heroic garrison was now exceedingly reduced in numbers; and there was the longest reason to apprehend, that, in one assault more, they must inevitably be overpowered, unless reinforcements were sent them from the town. Of their desperate situation they gave intelligence to the grand-master by one who swam across the harbour in the night. The boats were instantly filled with knights and other soldiers, who generously resolved to devote themselves to certain destruction for the general safety, and the preservation of the fort. They set off from the town with as much alacrity as if they had entertained the most sanguine hopes of victory; but they found the Turks everywhere where so much upon their guards, and the lines so strongly defended, that, after several fruitless attempts to land, they were at last obliged to return, depressed with sorrow for the fate of their brave companions.

The garrison, now despairing of relief, gave themselves up for lost; but instead of either capitulating or attempting to escape, they prepared for death, and passed the night in prayer and in receiving the sacrament; after which they embraced one another tenderly, and then repaired to their respective corps; while each of the wounded as had been disabled from walking, were, at their own earnest desire, carried to the side of the breach, where they waited, without dismay, for the approach of the Turkish army.

Early in the morning of the 23rd of July, the Turks advanced to the assault with loud shouts, as to certain victory, which they believed so small a handful of men as now remained in the fort would not dare to dispute with them. In this expectation they were disappointed. The garrison being resolved on death, and despising danger, were more than men, and exerted a degree of prowess and valour that filled their enemies with amazement. The combat lasted upwards of four hours, till not only every knight but every soldier had cut off, except two or three who had saved themselves the garrison by swimming. The Turkish colours were then planted on the ramparts; and the fleet entered the harbour, which the fort commanded, in a kind of triumph. When Mufapha took a view of the fort, and examined its size and fortifications, he could not refrain from saying, "What will not the father coft us (meaning the town), when the son, who so small, has coft so many thousands of our bravest troops?" But this reflection, far from exciting his admiration of that heroic fortitude which he had found so difficult to overcome, served only to inspire him with a brutal fury. He ordered all such of the garrison as were found lying on the breach alive to be ript open, and their hearts cut off.
hearts torn out: and, as an insult on the knights and their religion, he caused their dead bodies to be searched for, and large gashes to be made in them, in the form of a cross; after which he tied them on planks, and threw them into the sea, to be carried by the wind and tide to the town or fort St Angelo.

The grand-master was at first melted into tears at this shocking spectacle; but his grief was soon converted into indignation and revenge; and these passions betrayed him into an action unworthy of the exalted character which he bore. In order to teach the bâsha, as he pretended, to make war with less barbarity, he caused all the Turks whom he had taken prisoners to be massacred; and then putting their heads into the form of a cross; after which he tied them on planks, and threw them into the sea, to be carried by the wind and tide to the town or fort St Angelo.

The bâsha, whether from an opinion of his valour, or an intention to make him learn at his own expense the folly of his presumption, readily complied with his request; and, having added 6,000 men to his Algerines, he promised to support him with the rest of his army.

Hafcem divided his forces with Candelissa, an old corfair, his lieutenant; to whom he committed the attack by sea, whilst he reserved that on the land-side to himself.

Candelissa having put his troops on board of the boats, set out with drums beating, and hautboys and other musical instruments playing, preceded by a boat filled with Mahometan priests, some of whom were employed in offering prayers to heaven for his success, or in singing hymns; while others had books in their hands, out of which they read imprecautions against the Christians. Candelissa attempted first to break down the escado which had been formed to obstruct his landing; but finding it much stronger than he expected, and that, while he was employed in demolishing it, his troops must suffer greatly from the enemy’s fire, he thought it would be easier to make a descent on that part of the shore which the grand-master had strengthened with entrenchments. At this important post, the Christian troops were commanded by an ancient knight of the name of Guimeran. This experienced officer reserved his fire till the Turks had advanced within a little distance of the shore, when, by a single discharge, he killed about 400 men. This did not prevent the rest from approaching. Candelissa pushed forward while the Christians were loading their canons, and landed at the head of his Algerines. But Guimeran having reserved some cannon charged with grape-shot, did dreadful execution among them after they had landed, and many of them began to fly to their boats; which Candelissa observing, he commanded the boats to be put off a little distance from the shore. His troops, perceiving then that they must either die or conquer, took courage from despair, and advanced boldly to the intrenchment, with ladders for scaling it in one hand and their sabres in the other. The combatants on both sides displayed the most intrepid valor. Great numbers fell, and the ditch was choked with blood, and with the bodies of the dead and wounded. The Turks at last, after an engagement of five hours, reached the top of the entrenchment,
men, and there planted their ensigns. The knights, hung with shame on account of their retreat, returned with redoubled ardour. But they would probably have been overpowered by the superior number of the enemy, had not the grand-master sent them a feammable reinforcement, under the admiral de Giou and the chevalier de Quincy; who fell upon the Algerines and Turks with a degree of fury that struck terror into Candelisca himself, who was noted for his intrepidity. Having ordered the boats to be brought nearer the shore he was among the first who fled. His braves fought desperately for some time after he had left them; but were at length thrown down from the intrenchments, and compelled to fly to their boats with the utmost precipitation. The Christians pursued them and the batteries continued firing on them without intermission. Many of the boats were sunk; the water was covered with dead bodies, mangled limbs, shields, and helmets. Of the 4000 who had been sent on this enterprise scarcely 500 remained, and many of these were dangerously wounded.

Having fallen by several forts, the Mufapha, enraged by the loss, not only sent a letter to the Janifers, which still remained, that they ought not to overlook the parapet, but that the garrison and inhabitants should retire into the castle of St. Angelo. But the grand-master received this proposal with horror and indignation. "This would be in effect (said he) to deliver the whole island into the hands of the infidels. Fort St. Michael, which has been so gallantly defended, and which is preserved by its communication with the town would thus be soon reduced to the necessity of surrendering. There is no room in the castle of St. Angelo, for the inhabitants and troops; nor, if there were room, is there water in that fort for so great a number." It was then proposed, that at least the relics of the fanatics and the ornaments of the churches should be carried into the castle; and the knights earnestly treated the grand-master to retire into it himself, assuring him that they would conduct the defence with the utmost vigour and vigilance. "No, my brethren (he replied), what you propose as to the sacred things would serve only to intimidate the soldiers. We must conceal our apprehensions. It is here we must either die or conquer. And is it possible that I, at the age of 71, can end my life honours as in fighting, together with my friends and brethren, against the implacable enemies of our holy faith? He then told them what he thought proper to be done, and proceeded infallibly to put into execution. Having called all the soldiers from St. Angelo, except a few who were necessary for managing the artillery, he employed them with consummate prudence and indefatigable vigour, the Turks were baffled in every attempt, and repulsed with slaughter. Mufapha flattered himself once with the most fanciful hopes of success on his part, from a machine invented by his principal engineer, in the form of a huge cauld, bound strongly with iron hoops, and filled with gunpowder, nails, chains, bullets, and other instruments of death. After setting fire to a train which was fastened to this machine, it was thrown, by the force of an engine, upon a ravelin that was the principal defence of the fort. But the garrison, undismayed, found means before it caught fire, to cast it out again into the midst of the assailants. In a moment afterwards it burst with dreadful fury and filled the Turks with consternation. The knights then fell upon them sword-in-hand; and taking advantage of their confusion, killed many of them, and put the rest to flight.

Piali had, on some occasion, still more reason than Mufapha to entertain the hopes of victory, although the town was much stronger than the fort and La Valette commanded there in person. By his batteries he had demolished all the out-works of the place, and had made an immense breach in the wall. While his troops were engaged in a furious assault, that engrossed the whole attention of the besieged from morning till night, he employed a great number of pioneers in raising a cavalier or platform of earth and stones, close by the breach, and so high as to overlook the parapet. Night, in the mean time came on, and prevented him from carrying any further this great advantage; but he doubted not that the next day he should be able to make himself master of the place.

As soon as he had drawn off his forces, a council of the grand-master presided the knights to the fortresses which still remained should be blown up; and that the garrison and inhabitants should retire into the castle of St. Angelo. But the grand-master received this proposal with horror and indignation. "This would be in effect (said he) to deliver the whole island into the hands of the infidels. Fort St. Michael, which has been so gallantly defended, and which is preserved by its communication with the town would thus be soon reduced to the necessity of surrendering. There is no room in the castle of St. Angelo, for the inhabitants and troops; nor, if there were room, is there water in that fort for so great a number." It was then proposed, that at least the relics of the fanatics and the ornaments of the churches should be carried into the castle; and the knights earnestly treated the grand-master to retire into it himself, assuring him that they would conduct the defence with the utmost vigour and vigilance. "No, my brethren (he replied), what you propose as to the sacred things would serve only to intimidate the soldiers. We must conceal our apprehensions. It is here we must either die or conquer. And is it possible that I, at the age of 71, can end my life honourably as in fighting, together with my friends and brethren, against the implacable enemies of our holy faith? He then told them what he thought proper to be done, and proceeded infallibly to put into execution. Having called all the soldiers from St. Angelo, except a few who were necessary for managing the artillery, he employed them with consummate prudence and indefatigable vigour, the Turks were baffled in every attempt, and repulsed with slaughter. Mufapha flattered himself once with the most fanciful hopes of success on his part, from a machine invented by his principal engineer, in the form of a huge cauld, bound strongly with iron hoops, and filled with gunpowder, nails, chains, bullets, and other instruments of death. After setting fire to a train which was fastened to this machine, it was thrown, by the force of an engine, upon a ravelin that was the principal defence of the fort. But the garrison, undismayed, found means before it caught fire, to cast it out again into the midst of the assailants. In a moment afterwards it burst with dreadful fury and filled the Turks with consternation. The knights then fell upon them sword-in-hand; and taking advantage of their confusion, killed many of them, and put the rest to flight.
The grand-master had now greater confidence than ever of being able to hold out till the Spaniards should come to his relief. In consequence of the assurances given by Philip and the Sicilian viceroy, he had, long before this time, entertained the hopes of their arrival; and had often earnestly solicited the viceroy to hasten his departure from Melilla. The conduct of this nobleman was long exceedingly mysterious. The patience of the knights was worn out by his delays; and they, and many others, suspected that the real motive of his conduct was the dread of encountering with an admiral of so considerable reputation as Piali. But it afterwards appeared that the viceroy had acted agreeably to his instructions from the court of Spain. For although Philip was, for the reasons above mentioned, sincerely interested in the preservation of the knights, and had amased them with the most flattering promises of assistance; yet he seems from the first to have resolved not to expose himself to danger on that account, and to avoid if possible a general engagement.

A generous and grateful prince would have acted very differently towards an ally so deserving of his support; and if either generosity or gratitude had been the leading principle of Philip's conduct, it is probable he would, on this occasion, have regarded the knights as his own subjects; and have thought it no less incumbent on him to exert himself in their defence, than if they had acknowledged him as their sovereign.

But Philip was affected by their danger only so far as it threatened the tranquillity of his own dominions. He had resolved to interpose in their behalf, rather than to suffer them to be overpowered; but he appears to have been very little touched with their calamities, and to have intended to leave them to themselves, as long as there was any prospect of their being able to make resistance; by doing which he considered, that he would not only preserve his own strength entire, but might afterwards engage with the Turks when they were exhausted by the operations of the siege. Philip adhered inflexibly to this plan, notwithstanding the grand-master's repeated importunities, much longer than was consistent with his own selfish views. For, without a degree of fortitude and perseverance on the part of the garrison, and a degree of wisdom, vigilance, and magnanimity on that of the grand-master, infinitely higher than there could be reason to expect, it must have been impossible for such a handful of men to have withstood, for so long a time, so great a force, and such mighty efforts, as were employed to reduce them. Even the death of the grand-master alone, whose person was exposed to perpetual danger, would have proved fatal to the knights, long before Philip sent orders to his viceroy to give them any effectual support; and in this case, as his own dominions or his fleet would have been immediately attacked, he would probably have had little reason to be satisfied with the timid and ungenerous counsels which he pursued.

Whatever judgment may be formed on this head, the viceroy did not think himself at liberty to yield to the repeated applications of the grand-master, till the operations of the siege began to relax, and the Turkish forces were reduced from 45,000 to 15,000 or 16,000; of whom many were worn out with the fatigue which they had undergone, and others rendered unfit for action by a bloody-flux, which for several weeks had raged among them.

In this situation of affairs, when it was probable that the knights would, without assistance, have compelled the Turks to raise the siege, the viceroy let the grand-master know, that he had now received such instructions from the king, as put it in his power to show his attachment to the order; that he was not indeed permitted to attack the Turkish fleet; but that he would immediately bring him a strong body of troops, whose commanders (as he himself must return to Sicily) were to be entirely subject to the grand-master's authority till the enemy should be expelled.

The viceroy, Altho' the viceroy suspected of interposing upon the Turks to raise the siege, he received a necessary delays, at length fulfilled his promise; and on the 7th of September landed 6000 men, under Don Alvaro de Sandc and Alcancio della Corna, in that part of the island which lay at the greatest distance from the Turks; after which, he immediately carried back the fleet to Sicily.

In the mean time, intelligence being brought to Multapha that the Spaniards were landed, and marching towards him, he was thrown into the most dreadful consternation. Sensible that his soldiers were much disheartened by their ill successes, he imagined that he was about to be attacked by a superior army, consisting of the bravest and best disciplined troops in Spain. Without waiting for information of their number, he The Turks forewarned the siege, drew his garrison out of Saint the Elmo, and leaving all his heavy cannon behind him, siege in •

The Turks were prepared for the battle, and embarked his troops with as much precipitation as if the Spaniards with superior forces had been in sight. He had scarcely got on board when a defterer arrived from the Spanish camp, and informed him, that with 15,000 or 16,000 men, he had died before an army that did not exceed 6000, having no general at their head, and commanded by officers who were independent of one another. The bafha was overwhelmed with shame and vexation by this intelligence, and would have immediately disembarked; but this, he knew, he durst not attempt without consulting Piali, Habem, and his other principal officers.

While he was deliberating upon this, he grand-master improved to the best advantage the leisure that was afforded him. He employed all the inhabitants, men, women, and children, as well as the soldiers, filling up the enemy's trenches, and demolishing their works; and put a garrison without delay into St Elmo; in which the Turks now beheld from their ships the standard.
This demonstration to Mustapha how much new labour awaited him in a case he should return to the siege; but being enraged against himself on account of the precipitancy of his retreat, and disquieted at the thoughts of the reception which he had reason to expect from Solymans, he wished to atone for his imprudence, and to wipe off the reproach in which it had involved him, by victory or death. Piali, who, from his jealousy of the shah's credit with the sultan, was not loth for the failure of his enterprise, represented in a council of war convened on this occasion, that as the troops were much dispirited and worn out, it would be exposing them to certain destruction, either to lead them against the enemy, or to resume the operations of the siege. But a majority of the council were of a different opinion; and it was resolved to land the forces again without delay.

The Turkish soldiers complained bitterly of this unexpected resolution, and obeyed the orders to disembark with the greatest reluctance. Their officers were obliged to employ threats with force and force with others. At length the number intended was put on shore, and Mustapha set out at their head in search of the enemy.

The grand-master had not neglected to give early notice of their march to the Spanish commanders, who had entrenched their little army on a steep hill, which the Turks would have found almost inaccessible; and it was the opinion of some of the principal officers, that they should avail themselves of the advantage of their situation, and stand on their defence. But this proposal was rejected with disdain by the bold adventurers. De Sande, and the greatest part of the Spanish officers; and the troops were led out of their encampment, to meet the enemy in the open field. This conduct, more fortunate perhaps than prudent, contributed to increase the dejection of the Turkish soldiery, and to facilitate their defeat. Having been dragged against their inclination to the field of battle, and being attacked by the Spaniards with great fury, both in front and flank, they fiercely fought, but, being struck with a sudden panic, fled with the utmost precipitation.

Mustapha, confounded and enraged, by this pusillanimous behaviour of his troops, was hurried along by the violent tide of the fugitives. He fell twice from his horse, and would have been taken prisoner if his officers had not rescued him. The Spaniards pursued briskly till they came to the sea-shore. There Piali had his boats ready to receive the Turks, and a number of ballista, filled with musketeers drawn up to favour their escape. Without this precaution, they must all have perished; and, even not withstanding the protection which it afforded them, the number of their killed amounted to 2000 men, while the victors lost only 13 or 14 at most.

Such, after four months continuance, was the conclusion of the siege of Malta, which will be for ever memorable on account of that extraordinary display of the most generous and heroic valour by which the knights, so few in number, were enabled to baffle the most vigorous efforts which could be made to subdue them by the most powerful monarch in the world. The news of their deliverance gave universal joy to the Christian powers; and the name of the grand-master excited every where the highest admiration and applause. Congratulations were sent him from every quarter; and in many states public rejoicings were celebrated on account of his success.

With this siege is concluded every thing of importance in the history of Malta. The power of the Turks, which this time was so much circumscribed, that they ceased to be formidable to the Christian nations, and the knights of Malta had no longer an opportunity of exercising their valour as formerly. They have remained ever since in quiet possession of their island, of which the best description we have met with is that given by Mr Brydone.

"The approach of the island (says he) is very fine. Description although the shore is rather low and rocky. It is every- where made inaccessible to an enemy by an infinite number of fortifications. The rock, in many places, has been sloped into the form of a glacis, with strong parapets and entrenchments running behind it. On getting ashore we found ourselves in a new world indeed. The streets (of Valetta) crowded with well-dressed people, who have all the appearance of health and affluence; and we were conducted by the English consul to an inn, which had more the appearance of a palace.

"After dinner we went to visit the principal villas of the island; particularly those of the grand-master and the general of the galleys, which lie contiguous to one another. These are nothing great or magnificent; but they are admirably contrived for a hot climate, where, of all things, shade is the most desirable. The orange-groves are indeed very fine, and the fruit they bear superior to any thing of the kind in Spain or Portugal.

"The aspect of the country is far from being pleasing: the whole island is a great rock of very white free-stone; and the soil that covers this rock is, in most places, not more than five or six inches deep; yet, what is singular, we found their crop in general was exceedingly abundant. They account for it from the copious dews that fall during the spring and summer months; and pretend likewise that there is a moisture in the rock below the soil, that is of great advantage to the corn and cotton, keeping its roots perpetually moist and cool; without which singular quality, they say, they could have no crop at all, the heat of the sun being so exceedingly violent. The whole island produces corn only sufficient to supply its inhabitants for five months or little more; but the crop they mow depend upon is the cotton. They begin to sow it about the middle of May, and continue till the middle of June; and the time of reaping is in the month of October and beginning of November.

"They pretend that the cotton produced from this plant, which is sown and reaped in four months, is of a much superior quality to that of the cotton-tree. I compared them; but I cannot say I found it so: this is indeed the finest; but that of the cotton-tree is by much the strongest texture. The plant rises to the height of a foot and an half; and is covered with a number of nuts or pods full of cotton: These, when ripe, they are at great pains to cut off every morning before sun-rise; for the heat of the sun immediately
...turns the cotton yellow; which indeed we saw from those pods they have for feed.

They manufacture their cotton into a great variety of stuffs. Their flockings are exceedingly fine. Some of them, they assured us, had been sold for ten sequins a-pair. Their coverlets and blankets are esteemed all over Europe. Of these the principal manufactures are established in the little island of Gozzo, where the people are said to be more industrious than those of Malta, as they are more excluded from the world, and have fewer inducements to idleness. Here the sugar-cane is still cultivated with success, though not in any considerable quantity.

The Maltese oranges certainly deserve the character they have of being the finest in the world. The season continues for upwards of seven months, from November till the middle of June; during which time those beautiful trees are always covered with abundance of delicious fruit. Many of them are of the red kind, much superior, in my opinion, to the others, which are rather too juicy. They are procured, I am told, from the common orange-bud, ingrafted on the pomegranate stock. The juice of this fruit is as red as blood, and of a fine flavour. The greatest part of their crop is sent in presents to the different courts of Europe, and to the relations of the chevaliers.

The industry of the Maltese in cultivating their little island is inconceivable. There is not an inch of ground loft in any part of it; and where there was not soil enough, they have brought over ships and boats loaded with it from Sicily, where there is plenty, and to spare. The whole island is full of inclosures of free-fence, which give the country a very uncouth and barren aspect; and in summer reflects such a light and heat, that it is exceedingly disagreeable and offensive to the eyes. The inclosures are very small and irregular, according to the inclination of the ground. This, they say, are obliged to observe, notwithstanding the deformity it occasions; otherwise the floods, to which they are subject, would soon carry off their soil.

The island is covered over with country-houses and villages, besides seven cities, for so they term them; but there are only two, the Valetta, and Citta Vecchia, that by any means deserve that appellation. Every little village has a noble church, elegantly finished, and adorned with statues of marble: rich tapestry, and a large quantity of silver-plate.

The city of Valetta has certainly the happiest situation that can be imagined. It stands upon a peninsula between two of the finest ports in the world, which are defended by almost impregnable fortifications. That on the south side of the city is the largest. It runs about two miles into the heart of the island; and is so very deep, and surrounded by such high grounds and fortifications, that all those who affured us the largest ships of war might ride here in the most stormy weather, almost without a cable.

This beautiful haven is divided into five distinct harbours, all equally safe, and each capable of containing an immense number of shipping. The mouth of the harbour is scarcely a quarter of a mile broad, and is commanded on each side by batteries that would tear the strongest ship to pieces before she could enter. Beside this, it is flanked by a quadruple battery, one above the other, the largest of which is a fleur d'eau, or on a level with the water. These are mounted with about 80 of their heaviest artillery; so that this harbour, I think, may really be considered as impregnable; and indeed the Turks have ever found it so, and I believe ever will.

The harbour on the north side of the city, although they only use it for fishing, and as a place of quarantine, would, in any other part of the world, be considered as indefensible. It is likewise defended by very strong works; and in the centre of the bastion is an island on which they have built a castle and a laveret.

The fortifications of Malta are indeed a most stupendous work. All the boasted catacombs of Rome and Naples are a trifte to the immense excavations that have been made in this little island. The ditches of a vast size, are all cut out of the solid rock. They extend for a great many miles, and raise our astonishment to think that so small a state has ever been able to make them.

One side of the island is so completely fortified by nature, that there was nothing left for art. The rock is of a great height, and absolutely perpendicular from the sea for several miles. It is very singular, that on this side there are still the vestiges of several ancient roads, with the tracks of carriages worn deep in the rocks. These roads are now terminated by the precipice, with the seas beneath; but to a demonstration, that this island has formerly been of a much larger size than it is at present; but the convulsion that occasioned its diminution is probably much beyond the reach of any history or tradition. It has been often observed, notwithstanding the very great distance of mount Átna, that this island has generally been more or less affected by its eruptions; and they think it probable, that on some of these occasions a great part of it may have been shaken into the sea.

One half of mount Átna is clearly discovered from Malta. They reckon the distance near 200 Italian miles. And the people of Malta affirm, that, in great eruptions of the mountain, their whole island is illuminated, and from the reflection in the water there appears a great track of fire all the way from Malta to Sicily. The thundering of the mountain is likewise distinctly heard.

We made an expedition through the island in coaches drawn by one mule each; the only kind of vehicle the island affords. The catacombs, not far from the ancient city of Malta, are a great work; they are said to extend for 15 miles under ground. Many piety, they assure us, have been lost in them by advancing too far; the prodigious number of branches making it next to impossible to find the way out again. The great source of water that supplies the city of Valetta takes its rise near to this place; and there is an aqueduct composed of some thousand arches, that conveys it from thence to the city. The whole of this immense work was finished at the private expense of one of the grand-masters.

Not far from the old city there is a small church dedicated to St Paul; and just by the church a miraculous statue of the saint, with a viper on his hand, supposed to be placed on the very spot where the house floor...
They into the fire without being hurt by it; at which time, they tell of it being true, it is well entitled to it all. It is exceedingly damp, and produces (I believe by a kind of petrifaction from the water) a whitish kind of stone, which, they allure us, when reduced to powder, is a sovereign remedy in many diseases, and saves the lives of thousands every year. There is not a house in the island that is not provided with it; and they tell us there are many boxes of it sent annually, not only to Sicily and Italy, but likewise to the Levant, and to the East Indies; and (what is considered as a daily standing miracle) notwithstanding this perpetual consumption, it has never been exhausted, nor even sensibly diminished; the fact always taking care to supply them with a fresh quantity the day following. I talked some of it, and believe it is a very harmless thing. It tastes like exceeding bad magnesia, and, I believe, has pretty much the same effects. They give about a teaspoonful of it to children in the small-pox and in fevers. It produces a copious sweat about an hour after, and, they say, never fails to be of service. It is likewise esteemed a certainty against the bite of all venomous animals. There is a very fine statue of St Paul, in the middle of this grotto, to which they ascribe great powers.

The grand-master of the knights of Malta is more absolute, and possesseth more power than most sovereign princes. His titles are, Serene Highness and Eminent; and his household attendance and court are all very princely. As he has the disposal of all lucrative offices, he makes of his councils what he pleases; besides, in all the councils that compose the jurisdiction of this little nation, he himself presides, and has two votes. He has the disposal of 21 commanderies, and one priory, every five years; and as there is always a number of expectants, he is very much courted. He is chosen by a committee of 21; which committee is nominated by the seven nations, three out of each nation. The election must be over within three days of the death of the former grand-master: and, during these three days, there is scarce a soul that flees at Malta: all is cabal and intrigue; and most of the knights are masked, to prevent their particular attachments and connections from being known: the moment the election is over, every thing returns to its former channel.

The land-force of Malta is equal to the number of men in the island fit to bear arms. They have about 500 regulars belonging to the ships of war; and 150 compose the guard of the prince. The two islands of Malta and Gozo contain about 150,000 inhabitants. The men are exceedingly robust and hardy. I have seen them row for 10 or 12 hours without intermission, and without even appearing to be fatigued. Their sea force consists of 4 galleys, 3 galions, 4 ships of 60 guns, and a frigate of 36, besides a number of the quick-falling little vessels called januariarias (literally runaways). Their galleys, galions, and fortifications, are not only well supplied with excellent artillery, but they have likewise invented a kind of ordinance of their own, unknown to all the world besides. For we found, to our no small amazement, that the rocks were not only cut into fortifications, but likewise into artillery, to defend these fortifications being hollowed out, in many places, into the form of immense mortars. The charge is laid to be about a barrel of gunpowder, over which they place a large piece of wood made exactly to fit the mouth of the chamber. On this they heap a great quantity of cannon-balls, shells, or other deadly materials; and when an enemy's ship approaches the harbour, they fire the whole into the air: and they pretend it produces a very great effect: making a shower for 200 or 300 yards round, that would sink any vessel.

Notwithstanding the supposed bigotry of the Maltese, the spirit of toleration is so strong, that a mosque has been lately built for their sworn enemies the Turks. Here the poor slaves are allowed to enjoy their religion in peace. It happened lately that some idle boys disturbed them during their service; they were immediately sent to prison, and severely punished. The police indeed is much better regulated than in the neighbouring countries, and affumations and robberies are very uncommon: the last of which crimes the grand-master punishes with the utmost severity. He is said to be much more relaxed with regard to the first.

Perhaps Malta is the only country in the world where duelling is permitted by law. As their whole establishment is originally founded on the wild and romantic principles of chivalry, they have ever found it too inconsistent with those principles to abolish duelling; but they have laid it under such restrictions as greatly to lessen its danger. There are curious enough. The duellists are obliged to decide their quarrel in one particular street of the city; and if they presume to fight anywhere else, they are liable to the rigour of the law. But, what is not less singular, but much more in their favour, they are obliged, under the most severe penalties, to put up their swords when ordered to do so by a woman, a priest, or a knight. Under these limitations, in the midst of a great city, one would imagine it almost impossible that a duel could ever end in blood; however, this is not the case: a cross is always painted opposite to the spot where a knight has been killed, in commemoration of his fall. We counted about 20 of these crosses.

About three months ago (Mr Brydone's letter is dated June 7, 1770), two knights had a dispute at a billiard-table. One of them, after giving a great deal of abusive language, added a blow; but, to the astonishment of all Malta (in whose annals there is not a similar instance), after great a provocation, he absolutely refused to fight his antagonist. The challenge was repeated, and he had time to reflect on the consequences; but still he obstinately refused to enter the lists. He was conducted to make the answer: bas or sib in the great church of St John for 45 days successively; then to be confined in a dungeon, without light, for five years; after which, he is to remain a prisoner in the castle for life.
The unfortunate young man who received this blow is likewise in disgrace, as he has not had an opportunity of wiping it out in the blood of his adversary.

The horse-races of Malta are of a very uncommon kind. They are performed without either saddle, bridle, whip, or spur; and yet the horses are made to run full speed, and to afford a great deal of diversion. They are accustomed to the ground for some weeks before; and although it is entirely over rock and pavement, there are very seldom any accidents. They have races of affes and mules performed in the same manner four times every year. The rider is only furnished with a machine like a shoemaker's awl, to prick on his courser if he is lazy.

As Malta is an epitome of all Europe, and an assemblage of all the younger brothers, who are commonly the chief, of its first families, it is probably one of the best academies for politeness in this part of the globe; besides, where every one is intitled by law as well as custom to demand satisfaction for the least breach of it, people are under a necessity of being very exact and circumspect, both with regard to their words and actions.

Knights of Malta, otherwise called Hospitallers of St. John of Jerusalem, a religious military order, whose residence is in the island of Malta, situated in the Mediterranean sea, upon the coast of Africa. The Knights of Malta, so famous for defending Christendom, had their rise as follows:

Some time before the journey of Godfrey of Bouillon into the Holy Land, some Neapolitan merchants, who traded in the Levant, obtained leave of the caliph of Egypt to build an house for those of their nation who came thither on pilgrimage, upon paying an annual tribute. Afterwards they built two churches, and received the pilgrims with great zeal and charity. This example being followed by others, they founded a church in honour of St. John, and an hospital for the sick; whence they took the name of Hospitallers. A little after Godfrey of Bouillon had taken Jerusalem, in 1099, they began to distinguish those by black habits and a cross with eight points; and, besides the ordinary, vows, they made another, which was to defend the pilgrims against the infults of the infidels. This foundation was completed in 1104, in the reign of Baldwin; and so their order became military, into which many persons of quality entered, and changed the name of hospitallers into that of knights.

When Jerusalem was taken, and the Christians lost their power in the East, the knights retired to Acre or Ptolemâis, which they defended valiantly in 1290. Then they followed the king of Cyprus, who gave them Limassol in his dominions, where they sattid till 1310. That same year they took Rhodes, under the grand-master Fouques de Villaret, a Frenchman; and next year defended it against an army of Saracens; since which the grand-masters have used these four letters, F. E. R. T. I. e. Fortitude ejae Rhodium tenui; and the order was from thence called knights of Rhodes.

In 1322, Soliman having taken Rhodes, the knights retired into Candia, and thence into Sicily. In 1330, Charles V. gave them the island of Malta, to cover his kingdom of Sicily from the Turks. In 1366, Soliman besieged Malta; but it was gallantly defended by the grand-master John de Valette Parizzo, and the Turks obliged to quit the island with great loss.

The knights consisted of eight different languages or nations, of which the English were formerly the sixth; but at present they are but seven, the English having withdrawn themselves. The first is that of Provence, whose chief is grand commissary of religion: the second, of Auvergne; whose chief is marquis of the order: the third, of France, whose chief is grand-hospitaller: the fourth, of Italy, and their chief, admiral: fifth of Arragon; and their chief, grand-conservator: the sixth, of Germany; and their chief, grand-bailiff of the order: the seventh, of Catalonia; and their chief, grand-constable. The chief of the English was grand-commander of the cavalry.

None are admitted into this order but such as are of noble birth both by father and mother's side for four generations, excepting the natural sons of kings and princes. The knights are of two sorts; those who have a right to be candidates for the dignity of grand-master, called grand-croix; and those who are only knight-affillants, who are taken from good families. They never marry; yet have continued from 1091 to the present time.

The order consists of three classes; the knights, chaplains, and servants at arms. There are also priests who officiate in the churches; friar-servants, who assist at the offices; and dons, or demi-croix, but these are not reckoned as constituent parts of the body. This division was made in 1192, by the grand-master Raymond du Puy.

The government of the order is mixed, being partly monarchical, and partly aristocratical. The grand-master is sovereign, coins money, pardons criminals, and gives the places of grand-priors, bailiffs, knights, &c. The ordinary council is composed of the grand-master and the grand-croix. Every language has several grand-priors, and every priory a certain number of commanderies.

The knights are received into this order, either by undergoing the trials prescribed by the statutes, or by dispensation. The dispensations are obtained either by the pope's brief, or by a general chapter of the order, and are granted in case of some defect as to the nobility of their pedigree, especially on the mother's side. The knights are received, either at age, under minority, or pages to the grand-master. They must be 16 years old complete before they are received: they enter into the novicat at 17, and are professed at 18. They sometimes admit infants of one year old; but the expense is about 4000 livres. The grand-master has 16 pages who serve him, from 12 to 16 years of age. The knights wear on the left-side of their cloak a cross of white waxed cloth, with eight points, which is their true badge; that of gold being only for ornament. When they go to war against the Turks, they wear a red caffock, with a great white cross before and behind, without points, which are the arms of the religion. The ordinary habit of the grand-master is a sort of a caffock of tabby-cloth, tied about with a girdle, at which hangs a great purse, to denote the charitate institution of the order. Over this he wears a velvet gown; and on the left side a white cross with eight points. His yearly revenue is 15,000 ducats. He acknowledges the kings of Spain, and both...
both the Sicilies, as his protectors; and is obliged, by his agreement with the emperor Charles V. to suppress piracy.

MALTON, a town of the north-riding of Yorkshire in England, seated on the river Derwent, over which there is a good stone-bridge. It is composed of two towns, the New and the Old; and is well inhabited, accommodated with good inns, and lends two members to parliament. W. Long, o. 30. N. Lat., 54. 8.

MALVA, the mallow: A genus of the polyandria order belonging to the monadelphía class of plants; and in the natural method ranking under the 37th order, Columnifera. The calyx is double; the exterior one triphyllous; the arilli numerous and monospermous. There are 24 species; consisting of herbaceous perennials, biennials, and annuals, for medical, economical, and ornamental uses; rising that they beautified the church and windows, and were enthusiastically adored by many in botany. Several species of malva, macerated like hemp, afford a thread superior to hemp for spinning, and which is said to make more beautiful cloths and stuffs than even flax. These species are the crifpa, Peruviana, and Maurifinia. From the former, which affords stronger and much longer fibres, cords and twine have also been made. From the malva, likewise, a new sort of paper has been fabricated by M. de l’Ile. On this invention, Meff. Lavoiffer, Sage, and Bertholler, in name of the Académie des Sciences, offer, That it is not probable the paper made by M. de l’Ile will be substituted for that made from rags, either for the purpose of printing or writing. Yet paper from the malvas may be used for these purposes, if we can judge from a volume printed on it presented to the academy. The great utility of M. de l’Ile’s invention is for furniture, which consumes a great quantity of rags; and his papers have a natural hue, much more solid than can be given by colouring matter, and this hue may serve as a ground for other drawings. M. de l’Ile should, we think, be encouraged to pursue his experiments, which we have reason to expect, may be in the end very useful: by his zeal, activity, and knowledge, he will probably contribute to render the art of making paper more perfect; in this art he is much engaged; and his attempts, which he has shown to the academy, merit its praises.

MALVERN, GREAT and LITTLE, (with the Chase and the Hills); two towns of Worcestershire, England, in which were formerly two abbeys, about three miles afunder. Since the dissolution nothing remains of the abbey of Great Malvern but the gateway of the abbey and church, now parochial. Part of it was a religious cell for hermits before the Conquest; and the greatest part, with the tower, built in the reign of William the Conqueror. Its outward appearance is very striking. It is 171 feet in length, 63 in breadth, and 63 in height. In it are ten stalls; and it is supposed to have been rebuilt in the year 1171. The nave only remains in part, the side aisles being in ruins. The windows have been beautifully enriched with painted glafs, and in it are remains of some very ancient monuments. Little Malvern stands in a cavity of the hills, which are great lofty mountains, rising like cliffs, one higher than another, for about seven miles, and divide this country from Herefordshire. There is a ditch here very much admired. On the hills are two medicinal springs, called Holy wells one good for the eyes, and the other for cancers. Henry VII. his queen, and his two sons prince Arthur and prince Henry, were so delighted with this place, that they beautified the church and windows, part of which remain, though mutilated. In the lofty south windows of the church are the historical passages of the Old Testament; and in the north windows the picture of the holy family, the nativity and circumcision of our Saviour, the adoration of the shepherds and the kings, his presentation in the temple, his baptism, fasting and temptation, his miracles, his last supper with his disciples, his prayer in the garden his passion, death, and burial, his descent into hell, his resurrection and ascension, and the coming of the Holy Ghost. The history of our Saviours passion is painted differently in the east window of the choir, at the expence of Henry VII. whose figure is therefore often represented, as is that of his queen. In the west window is a noble piece of the day of judgment, not inferior to the paintings of Michael Angelo, Malvern Chase contains 7115 acres in Worcestershire (besides 241 acres called the Prior’s Land). 519 in Herefordshire, and 103 in Gloucestershire. Malvern Hills run from north to south, the highest point 1313 feet above the surface of the Severn at Hanley, and appear to be of lime-flone and quartz. On the summit of these hills is a camp with a treble ditch, imagined to be Roman, and is situated on the Herefordshire side of the hills.

MALLEZZI (Virgilia marquis de): an Italian gentleman, born at Bologna, acquired great reputation by his learning and writings. He was well versed in polite literature, music, law, physic, and the mathematics. He served also in a distinguished post in the army of Philip IV. king of Spain, and was employed by him in some important negotiations. He died at Bologna in the year 1654, leaving several works in Spanish and Italian. Among the latter are his Discourses on the First Book of Tacitus; this work has been translated into English.

MALUS, in botany. See Pyrus.

MAMULOKES, the name of a dynasty that reigned in Egypt. See that article, n° 98.

MAMBRUN (Peter), an ingenious and learned French Jesuit, born in the diocese of Clermont, in the year 1581. He was one of the most perfect imitators of Virgil in Latin poetry, and his poems are of the same species: Thus he wrote Elogez; Georgies; or four books on the culture of the soil and the understanding; together with a heroic poem intitled Consolantur or Idolatry overthrow. He showed also great critical
MAMMOTH, or Mammoth, the name of a large animal now unknown, to which are said to have belonged those tusks, bones, and skeletons of vast magnitude, which have been frequently found in different parts of Siberia, as well in the mountains as the valleys; likewise in Russia, Germany, and North America. Many specimens of them may be seen in the Imperial cabinet at Petersburg; in the British, Dr Hunter’s, and the late Sir Ashton Lever’s museums, and in that of the Royal Society in Britain. A description of the mammoth is given by Muller in the Recueil des Voyages au Nord. “This animal, he says, is four or five yards high, and about 30 feet long. His colour is greyish. His head is very long, and his front very broad. On each side, precisely under the eyes, there are two horns which he can move and crost at pleasure. In walking he has the power of extending and contracting his body to a great degree.” Lichtenstein gives a similar account; but he is candid enough to acknowledge, that he never knew any person who had seen the mammoth alive. Mr Pennant, however, thinks it “more than probable, that it still exists in some of those remote parts of the vast new continent, impenetrated yet by Europeans. Providence (he adds) maintains and continues every created species; and we have as much assurance, that no race of animals will become more scarce while the earth remains, than the mammoth and narwhal, cold and heat, summer and winter, day and night.” The Ohio Indians have a tradition handed down from their fathers respecting those animals, “That in ancient times a herd of them came to the Big-bone Licks, and began an universal destruction of the bears, deer, elk, buffaloes, and other animals which had been created for the use of the Indians: that the Great Man above, looking down and seeing this, was so enraged that he seized his lightning, descended to the earth, feated himself upon a neighbouring mountain on a rock, on which his feet and the print of his feet are to fill be seen, and hurled his bolts among them till the whole were slaughtered, except the big bull, who protected his herdshead to the shafts, shook them off as they fell; but at length missing one, it wounded him in the side; whereon, springing round, he bounded over the Ohio, the Wabash, the Illinois, and finally over the great lakes, where he is living at this day.”

Several eminent naturalists, as Sir Hans Sloane, Gmelin, Daubenton, and Buffon, are of opinion that these prodigious bones and tusks are really the bones and tusks of elephants, and many modern philosophers have held the mammoth to be as fabulous as the centaur. The great difference in size they endeavour to account for as arising from difference in age, sex, and climate; and the cause of their being found in those northern parts of the world where elephants are no longer natives, nor can even long exist, they presume to have arisen from hence; that, in the great revolutions which have happened in the earth, the elephants, to avoid destruction, have left their native country, and dispersed themselves wherever they could find safety. Their lot has been different. Some in a longer and others in a shorter time after their death, have been transported to great distances by some vast inundations. Thoé, on the contrary, which flourished, and wandered far to the north, must necessarily have fallen.
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Mammot

fromoth fallen victims to the vigour of the climate. Others, without reaching to so great a distance, might be drowned, or perish with fatigue. In the year 1767, Dr Hunter, with the assistance of his brother-Mr J. Hunter, had an opportunity of investigating more particularly this part of natural history, and has evidently proved, that these fossil bones and tusks are not only larger than the generality of elephants, but that the tusks are more twisted, or have more of the spiral curve, than elephants teeth; and that the thigh and jaw bones differ in several respects from those of the elephant; but what put the matter beyond all dispute was the shape of the grinders, which clearly appeared to belong to a carnivorous animal, or at least to an animal of the mixed kind; and to be totally different from those of the elephant, which is well known not to be of the carnivorous, but graminivorous kind, both by the form of its grinders and by its never tasting animal food. Some have supposed these fossil bones to belong to the hippopotamus or river-horse; but there are many reasons against this supposition, as the hippopotamus is even much smaller than the elephant, and has such remarkably short legs, that its belly reaches within three or four inches of the ground.

North America seems to be the quarter where the remains in question most abound. On the Ohio, and in many parts farther north, tusks, grinders, and skeletons of unparallelled magnitude, which can admit of no comparison with any animal at present known, are found in vast numbers, some lying on the surface of the earth, and some a little below it. A Mr Stanley, taken prisoner by the Indians near the mouth of the Teniße, relates, as Mr Jefferfon informs us, that after being transferred through several tribes, from one to another, he was at length carried over the mountains west of the Mississippi to a river which runs westerly; that these bones abounded there; and that the natives described to him the animal to which they belonged as full existing in the northern parts of their country; from which description he judged it to be an elephant. Bones of the same kind have been lately found some feet below the surface of the earth, in salines opened on the North Holston, a branch of the Teniße about the latitude of 36° N. Instances are mentioned of like animal remains found in the more southern climates of both hemispheres: but Mr Jefferfon observes they are either too loosely mentioned, as to leave a doubt of the fact; so inaccurately described, as not to authorize the supposition them with the great northern bones; or so rare, as to be found a suspicion that they had been carried thither as curiosities from more southern regions. So that, on the whole, there seem to be no certain vestiges of the existence of this animal farther south than the salines last mentioned. It is remarkable (continues he) that the tusks and skeletons have been ascribed by the naturalists of Europe to the elephant, while the grinders have been given to the hippopotamus or river-horse. Yet it is acknowledged, that the tusks and skeletons are much larger than those of the elephant, and the grinders many times greater than those of the hippopotamus, and evidently differ in form. Wherever the grinders are found, there also we find the tusks and skeleton; but no skeleton of the hippopotamus nor grinders of the elephant. It will not be said that the hippopotamus and elephant came always to the same spot, the former to deposit his grinders, and the latter his tusks and skeleton. For what became of the parts not deposited there? We must agree, then, that these remains belong to each other: that they are of one and the same animal; that this was not a hippopotamus, because the hippopotamuses had no tusks nor such a frame, and because the grinders differ in their size as well as in the number and form of their points. That it was not an elephant, I think ascertained by proof equally decisive. I will not avail myself of the authority of the celebrated anatomist*, who from an examination of the form and structure of the tusks has declared they were essentially different from those of the elephant; because another anatomist†, equally celebrated, has declared on a like examination, that they are precisely the same. Between two such authorities I will suppose this circumstance equivocal. But 1. The skeleton of the mammoth (for the unknown animal has been called) betokens an animal of five or six times the cubic volume of the elephant, as M. de Buffon has admitted. 2. The grinders are five times as large; are found, and the grinding surface divided into about four or five rows of blunt points; whereas those of the elephant are broad and thin, and their grinding surface flat. 3. I have never heard an instance, and suppose there has been none, of the grinders of an elephant being found in America. 4. From the known temperature and constitution of the elephant, he could never have existed in those regions where the remains of the mammoth have been found. The elephant is a native only of the torrid zone and its vicinities; if, with the assistance of warm apartments and warm clothing, he has been preferred in life in the temperate climates of Europe, it has only been for a small portion of what would have been his natural period, and no instance of his multiplication in them has ever been known. But no bones of the mammoth, as I have before observed, have been ever found farther south than the salines of the Holston, and they have been found as far north as the Arctic circle. Thence, therefore, who are of opinion that the elephant and mammoth are the same, must believe, 1. That the elephant known to us can exist and multiply in the frozen zone; or, 2. That an internal fire may once have warmed those regions, and since abandoned them, of which, however, the globe exhibits no unequivocal indications; or, 3. That the obliquity of the ecliptic, when these elephants lived, was so great as to include within the tropics all those regions in which the bones are found; the tropics being, as is before observed, the natural limits of habitation for the elephant. But if it be admitted that this obliquity has really decreased, and we adopt the highest rate of decrease yet pretended, that is, of one minute in a century, to transfer the northern tropic to the Arctic circle, would, carry the existence of these supped elephants 250,000 years back; a period far beyond our conception of the duration of animal bones left exposed to the open air, as thence are in many instances. Besides, though these regions would then have been too severe for the felicity of the elephant. They would have had too, but one day and one night.
Man. The obliquity in the ecliptic takes general anatomy, while his nature part, tropics. which extremely different. equally arbitrary and latitude to the nigh wardly to signed, that this progression is not precisely known, though at present we may hozen fignes and thofe north to the mammoth, founding the nature feems [0 s] things of which any traces have ever Rica, and that it was the largefi: of all terrestrial pole ilelf, if land extends fo far. The centre of the fcale of animal life allowed cooling his thoughts by means of speech; and who has domination over all other creatures on the face of the globe. Animated and enlightened by a ray from the Divinity, he surpasses in dignity every material being. He spends his time in solitude than in society, and in obedience to those laws which he himself has framed.

In the Systema Nature, Man (Homo) is ranked as a distinct genus of the order Primates or "Chiefs," belonging to the Mammalia class of animals, or those which nourish their young by means of lactiferous teats or paps. Of this genus he is the only species (A), and denominated Sapiens, as being endowed with wisdom far superior to, or rather in exclusion of, all other animals. He varies, from climate, education and habits: and the following varieties, exclusive of wild men (a), are enumerated by Linnaeus.

1. Americanus. "Of copper-coloured complexion, cheerful constitution, and remarkably erect."—Their hair is black, lank, and coarse; their nostrils are wide; their features harsh, and the chin is scantily supplied with beard. Are obdurate in their tempers, free and satisfied with their condition; and are regulated in all their proceedings by traditional customs.—Paint their skin with red streaks.

2. Europeanus. "Of fair complexion, languid temperament, and brawny form."—The hair is flowing, and of various shades of brown; the eyes are mostly blue. —They are of gentle manners, acute in judgment, of quick invention, and governed by fixed laws.—Drefs in close veiments.

3. Afiaticus. "Of soory complexion, melancholic temperament, and rigid fibre."—The hair is strong, black, and lank; the eyes are dark brown. —They are of grave, haughty, and covetous manners; and are governed by opinions.—Dres in loose garments.

4. Africanus. "Of black complexion, phlegmatic

(a) In the early editions of Linnaeus, the Tragelada was added as another species; but is now more properly ranked under the genus Simia. See Simia.

(b) Hominis Ferris deforbed as walking on all-fours, as being "dumb, and covered with hair."

1. A youth found in Lithuania, in 1761, resembing a bear. 2. A youth found in Heife, in 1544, resembing wolf. 3. A youth in Ireland resembing a sheep, (Tulip. Olf. iv. p.) 4. A youth in Bamberg resembing an ox, (Camus. atri.) 5. A wild youth found in 1724 in Hanover. 6. Wild boys found in 1719 in the Pyrenees. 7. A wild girl found in 1717 in Overeyl. 8. A wild girl found in 1721 in Champagne. 9. A wild lad found near Leyden, (Boorhuawe.)—These instances of wild men and their similitudes, according to Mr Kerr, are partly to be attributed to imposture, and in part to exaggeration: Most probably (he thinks) idiots who had strayed from their friends, and who resembled the above animals only in imitating their voices.
temperament, and relaxed fibre.'—The hair is black and frizzly; the skin soft and silky; the nose flat; the lips are thick; and the female has a natural apron, and long lax breasts.—They are of crafty, indolent, and careless dispositions, and governed in their actions by caprice.—Anoint the skin with grease.

Monsters. Of these there are several varieties; the first, second of which, in the following list, are occasioned by the peculiarity of climate, while the rest are produced by artificial management. 1. Alpinis: The inhabitants of the northern mountains; they are small in stature, active and timid in their dispositions. 2. Patagoni: The Patagonians of South America; of vast size, and indolent in their manners. 3. Monstro: The Hottentots having one tseficle extripated. 4. Inbres: most of the American nations who eradicate their beards and the hair from every part of the body except the scalp. 5. Macrocephali: The Chinese who have their heads artificially forced into a conical form. 6. Plagiocephali: The Canadian Indians: who have the fore part of their heads flattened, by compression.

The following arrangement of the varieties in the human species, is offered by Dr Gmelin as more convenient than that of Linnæus.

1. White, a: (Hom. Albus.) Formed by the rules of symmetrical elegance and beauty; or at least what we consider as such.—This division includes almost all the inhabitants of Europe; those of Asia on this side of the Obly, the Caffian, Mount Imaus, and the Ganges; likewise the natives of the north of Africa, of Greenland, and the Equinoxeus.

b, Brown: (Hom. Badius.) Of a yellowish brown colour; has scanty hairs, flat features, and small eyes.

The whole inhabitants of Africa, excepting those of its more northern parts.

c, Black: (Hom. Niger.) Of black complexion; has frizzly hair, a flat nose, and thick lips.—The following is Linnæus's description of Man, as translated by Mr Kerr.

"The body, which seldom reaches six feet in height, is erect, and almost naked, having only some scattered downy hairs, except in some small spots to be afterwards noticed, and when first born is entirely naked. The head is shaped like an egg: the scalp being long, and covered with hair; the forehead broad; the top of the head; flat; and the hind head protuberant. The face is naked, having the brow or forehead flattened and quadrangular; the temples are compressed, with peaked angles pointing upwards and backwards towards the hairy scalp. The eye-brows are prominent, and covered with hairs which, shedding outwards, cover each other like tiles and between the inner extremities of the two eye-brows there is a smooth, shallow furrow or depression, in a line with the nose. The upper eye-lid is moveable, but the lower one hardly moves, and both are planted at their edges with a row of stiff recurved hairs, named eye-lashes. The eye-balls are round, having no suspending muscle as in those of most quadrupeds; the pupil, or opening of the light, is circular; and the eye has no membrana nicanitans. The upper parts of the cheeks are prominent, fohtiful, and coloured with a red blush; their outer parts flattened; the lower parts are hollowed, lax, and expandible. The nose is prominent, and compressed at the fides; its extremity or point is higher than the rest, and blunt; the nostrils are oval, open downwards; with thickened edges and are hairy on their insides. The upper lip is almost perpendicular, and is surmounted on the middle, from the division between the nostrils to the edge of the lip; the under lip is crested, thicker and more prominent than that above; both have a smooth red protuberance, surrounding the mouth at its edges. The chin is prominent, blunt, and gibbous. In males, the face all round the mouth is covered with hair, called the beard, which first appears about puberty, in patches on the chin. The teeth in both jaws may be distinguished into three orders; the forre teeth are crest, parallel, and wedge like, of the kind named incisors, or cutting teeth; they stand close to each other, and are more equal and rounder than in other animals; the tusks, called in man eye teeth and corner-teeth, of which there is only one on each side of the fore-teeth in each jaw, are a little longer than the fore-teeth, but much less so than in other animals, and they are placed close to the other teeth; the grinders, of which there are five on each side in both jaws, are blunt, and divided on their upper surface into pointed eminences; but these are not so remarkable as in other animals. The ears are placed on the sides of the head, are of an oblong rounded figure, with a semifinar bend on their anterior edges; they lie flat to the head, are naked, arched at the margin on their upper and posterior edges, and are thicker and soft at the under extremities.

"The Trunk of the body consists of the neck, breast, back, and belly. The Neck is roundish, and shorter than the head; its vertebræ, or chine bones, are not, as in most animals connected by a sphenofaryngeal ligament; the nape is hollowed; the throat, immediately below the chin, is hollowed at its upper part, and protuberant in the middle a little lower down. The Breast is somewhat flattened both before and behind; on the fore part there is a cavity or depression where it joins with the neck; the arm-pits are hollow and hairy; the pit of the stomach is flat: On the breast are two dimfnt, round protuberant mammas, or dugs, each having a cylindrical obtuse wrinkly projecting nipple, which is surrounded by a darker coloured circle called the areola. The back is flat, having protuberances on each side at the shoulder-blades, with a furrow or depression between them. The abdomen or belly is large and protuberant, with a hollow at the navel; the epigastric region, or situation of the stomach, is flat; the hypogastric regions, or sides of the belly, are protuberant; the groins flatish and hollowed. The tubes are hairy; the pelvis, or basin, is wider above, and grows narrower below. The male parts are external and loose; the penis cylindrical; the scrotum
feratum roundish, lax, and wrinkled, being divided in
the middle by a longitudinal ridge, or smooth line,
which extends along the whole perimem: The fel-
femoral parts are each, shewn; and prominent, having la-
bia, hymen, clytoris, and vulva; and, in adults,
secreting the catamenia. There is no external tail.

"The Limbs consist of arms and hands instead of
fore-legs; and of thighs, legs, and feet. The Arms
are placed at a distance from each other; they are
round, and about a foot in length from the joint of
the shoulder to the elbow; the fore-arm, or cubit,
contains two bones, and is obvaluously prominent; the
unia, which forms the principal thickmess of the mem-
ber, is round, and somewhat flattened on the inside.
The Hands are broad, flat, and rounded; convex on
the outside or back of the hand, and concave on
the inside or palm. Each hand has five fingers, one of
which, named the thumb, is shorter and thicker than
the rest, and is placed at some distance from them;
the others are near each other, and placed parallel,
the outer or little-finger, being the smallest; the second,
named index or fore-finger, and the fourth, called the
ring-finger, are next in length and in size; and the
third, or middle-finger, is the longest; the point of this
last, when the arm and hand hang down, reaches to
the middle of the thigh. The nails are rounded and
oval, being slightly arched, or convex upwards, and each
has a feimiliar whirkt mark at the root or lower extre-
mitiy.

"The lower limbs are placed close together, having
branched muscular branches and swelling fibrous hips;
the knees are obtuse, bend forwards, and have hollow
hams behind. The Legs, which are nearly of the fame
length with the thighs, are of a muscular make be-
hind, where they dwell out into what is called the
calf; they are lean, and free of flesh on the thighs or
fore-parts, and taper downwards to the ankle, which
have hard hemispherical projections on each side, na-
mcd, the ankle-bone or malleolus. The heel is thick,
prominent, and gibbous, being longer and broader
than in other animals, for giving a firm support to
the body; it joins immediately with the sole of
the foot, and is placed in the middle; the middle
of the thigh. The Legs behind. The Legs, which are nearly of the fame
brawny muscular haunches and swelling
the knees are obtuse, bend forwards, and have hollow
the {houlder to the elbow; the fore-arm, or cu-bit,
The
hind;

"Man, intended for exercising dominion over
the whole animal creation, is sent by Nature into
the world naked, forlorn, and bewailing his lot; he is then
unable to use his hands or feet, and is incapable of acqni-
Bodily health and tranquillity of mind are more to be desired
than all the riches, pomp, or glory, of a Cereus, a So-
om, or an Alexander. Health is to be preferred by
moderation, it is destroyed by abstinence, injured by
variety of delicacies, weakened by unusual things, and
strengthened by the use of proper and accustom fare.
Man, learned in the pernicious art of cookery,
is fond of many dites, rendered palatable by the inju-
rious effects of fire, and by the baneful addition of
wine. " Hunger is satisfied with a small quantity of
food, luxury demands overabundance. Imagination
requires vast supplies; while nature is contented with
a moderate quantity of ordinary food, and is bounti-
ished by superfluity: " Seneca.——"According as thou livest,
so shall thy life be enjoyed.

3. PATHOLOGICALLY.—Memento mori! The life
of man resembles a bubble ready to burst; his fate is
suspended by a hair, and is dependent on the uncertain
lapse of time. "The earth contains nothing more
 frail than man: " Homer.——" Nothing is weaker than
human life: To what dangers, and to how many dis-
 eases, is it not exposed? Hence the whole period of
a man's life is but a span: Half of it is necessarily
spent in a state resembling death; without including
the years of infancy, wherein there is no judgment;
or the period of old age, fertile in sufferings, during
which the senses are blunted, the limbs become flint,
and the faculties of sight and hearing, the powers of
walking, and the teeth, the instruments of nourish-
ment, fail before the rest of the body." Pliny.——"Thus
a considerable part of death is suffered during life;
and death pollutes all that belonged to the times
which are past. Finally, nature will speedily recall
and destroy all the beings which thou seest, and all that
thy imagination can suppose to exist hereafter; for
death calls equally upon all, whether they be good or
whether they be evil: " Seneca, ii. 59.

4. NATURALLY.—Innocis vivite, Nomen adsit J N vi, a
the prince of animated beings, who is a miracle of na-
ture,
Man

6. Morally.—Bene[fac et] littera ! Man is composed of an animated medullary substance, which prompts him to that which is right; and of a bodily frame liable to the injuries of fortune, which includes the enjoyment of pleasure. In his natural state he is foolish, wanting, an inexperienced follower of example, ambitious, profuse, dissatisfied, cunning, perversive, malicious, and covetous; by the influence of just morals he is transformed to be attentive, chaste, considerate, modest, temperate, quiet, sincere, mild, beneficent, grateful, and contented. "Sorrow, luxury, ambition, avarice, the desire of life, and anxiety for the future, are common to all animals": Pliny.

7. Theologically.—Memento Creatoris tuui ! Man the ultimate purpose of creation, and masterpiece of the works of Omnipotence, was placed on earth that he might contemplate its perfections; he was endowed with rational reason, and made capable of forming conclusions from the imprecatory of his senses, that, from a consideration of created objects, he might know their Creator as the Almighty, the Infinite, the Omniscient, the Eternal God: That we may live morally under his governing care, it is requisite that we have a thorough conviction of its existence, and must have it ever in remembrance. Other revealed matters on this subject are left to be explained by the theologians.

There are two things which lead to a knowledge of God; creation and revelation:

Augustine.—"God, therefore, may be found out by the light of nature, but is only to be known by the assent of doctrine:"

Tertullian.—"Man alone has the ineffaceable privilege of contemplating the perfections of God which the author both of nature and of revelation:"

Ibid.—"Learn that God has both ordered you to exist, and that you should study to act that part properly which is allotted for you in life:"

Perf. Sat. iii. 71.

The whole of this Encyclopædia may in some respects be accounted an analysis of Man; as comprehending his knowledge of God, of himself, and of natural and artificial objects. In the sequel of this article we shall collect into one view the most important particulars relating to himself individually, considered as a physical being, and as forming a subject of natural history.

Anatomists have employed much pains in the study of the material part of man, and of that organization which determines his place in the animal creation. From tracing and combining his different external parts; from observing that his body is in some places covered with hair; that he can walk upon his hands and feet at the same time, in the manner of quadrupeds; that, like certain animals which hold their food in their paws, he has two clavicles; that the female brings forth her young alive, and that her breasts are supplied with milk: from these circumstances we might be led to assign man a place in the class of viviparous quadrupeds. But in our opinion, such an arrangement would be defective, arbitrary, and absurd. Man is not a quadruped: Of all the animals, he alone can support himself, continually and without restraint, in an erect posture (that is, with his head and body in a vertical line upon his legs). In this majestic and dignified attitude, he can change his place, survey this earth which he inhabits, and turn his eyes towards the vault of heaven. By a noble and easy gait, he prefers...
Man.

preserves an equilibrium in the several parts of his body, and transports himself from one place to another with different degrees of celerity (c). To man alone nature has denied a covering; but till he is her masterpiece, the last work which came from the hands of the Almighty Artificer, the sovereign and the chief of animals.

(c) M. Daubenton, after a careful examination of those characters in the form of man by which he is distinguished from other animals, has reduced them to two heads. The first is the strength of the muscles of the legs, by which the body is supported in a vertical position above them; the second consists in the articulation of the head with the neck by the middle of its base.

We stand upright, bend our body, and walk, without thinking on the power by which we are supported in these several positions. This power, says M. Daubenton, resides chiefly in the muscles, which constitute the principal part of the calf of the leg. Their exertion is felt, and their motion is visible externally when we stand upright and bend our body backwards and forwards. This power is no less great when we walk even on an horizontal plane. In ascending a height, the weight of the body is more sensibly felt than in descending. All these motions are natural to man. Other animals, on the contrary, when placed on their hind legs, are either incapable of performing them at all, or do it partially, with great difficulty, and for a very short time. The gibbon, and the jocks or orang-outang, are the animals most resembling man in their construction; they can stand upright with more difficulty than other brutes; but the restraint they are under in this attitude plainly shows that it is not natural to them. The reason is, that the muscles in the back part of the leg in the gibbon and the jocks are not, as in man, sufficiently large to form a calf, and consequently not sufficiently strong to support the thighs and body in a vertical line, and to preserve them in that posture.

M. Daubenton has discovered, that the attitudes proper to man and to the animals are pointed out by the different manners in which the head is articulated with the neck. The two points, by which the offensive part of the head is connected with the first vertebra of the neck, and on which every movement of the head is made with the greatest facility, are placed at the edge of the great foramen of the occipital bone, which in man is situated near the centre of the base of the cranium, affords a passage for the medullary substance into the vertebræ, and determines the place of the articulation of the head with the neck. The body and neck being, according to the natural attitude, in a vertical direction, the head must be placed in equilibrium upon the vertebræ as upon a pivot or point of support. The face is on a vertical line, almost parallel to that of the body and neck. The jaws, which are very short compared with those of most other animals, extend very little further forwards than the forehead.

No animal has, like man, its hind legs as long as the body, neck, and head, taken together, measuring from the top of the head to the os pubis.

In the frame of the human body the principal parts are nearly the same with those of other animals; but in the connection and form of the bones, says M. Daubenton, there is as great a difference as in the attitudes proper to each. Were a man to assume the natural posture of quadrupeds, and try to walk by the help of his hands and feet, he would find himself in a very unnatural situation; he could not move his feet and head but with the greatest difficulty and pain; and let him make the exertions he pleased, he would find it impossible to maintain a steady and continued pace. The principal obstacles he would meet with would arise from the structure of the pelvis, the hands, the feet, and the head.

The plane of the great occipital foramen, which in man is almost horizontal, puts the head in a kind of equilibrium upon the neck when we stand erect in our natural attitude; but when we are in the attitude of quadrupeds, it prevents us from raising our head so as to look forwards, because the movement of the head is stopped by the protuberance of the occiput, which then approaches too near the vertebræ of the neck.

In most animals, the foramen magnum of the occipital bone is situated at the back part of the head; the jaws are very long; the occiput has no protuberance beyond the aperture, the plane of which is in a vertical direction, or inclined a little forwards or backwards; so that the head is pendant, and joined to the neck by its posterior part. This position of the head enables quadrupeds, though their bodies are in a horizontal direction, to present their muzzle forwards, and to raise it so as to reach above them, or to touch the earth with the extremity of their jaws when they bring their neck and head down to their feet. In the attitude of quadrupeds, man could touch the earth only with the fore part or the top of the head.

To these differences of structure, M. Daubenton adds, that when man is standing, his heel rests upon the earth as well as the other parts of his foot; when he walks it is the first part which touches the ground; man can stand on one foot; these are peculiarities in structure and in the manner of moving which are not to be found in other animals. We may therefore conclude that a man cannot be ranked in the class of quadrupeds. We may add, that in man the brain is much larger, and the jaws much shorter, than in any other animal. The brain, by its great extent, forms the protuberance of the occipital bone, the forehead, and all that part of the head which is above the ears. In animals, the brain is so small, that most of them have no occiput, or the front is either wanting or little raised. In animals which have large foreheads, such as the horse, the ox, the elephant, &c. they are placed as low, and even lower, than the ears. These animals likewise want the occiput, and the top of the head is of very small extent. The jaws, which form the greatest portion of the muzzle, are large in proportion to the smallness of the brain. The length of the muzzle varies in different animals: in folipeda animals it is very long; it is short in the orang-outang; and in man it does not exist at all. No beard grows on the muzzle: this part is wanting in every animal.
Man, a world in miniature, the centre which connects the universe together. The form of his body, the organs whereof are constructed in such a manner as to produce a much greater effect than those of other animals, announces his power. Every thing demonstrates the excellence of his nature, and the immense distance placed by the bounty of the Creator between man and beast. Man is a reasonable being; brute animals are deprived of that noble faculty. The weakest and most stupid of the human race is able to manage the most sagacious quadruped: he commands it, and makes it subservient to his use. The operations of brutes are purely the effect of mechanical impulse, and continue always the same; human works are varied without end and infinitely diversified in the manner of execution. The soul of man is free, independent, and immortal. He is fitted for the study of science, and the cultivation of art; he has the exclusive privilege of examining every thing which has existence, and of holding communication with his fellow-creatures by language, by particular motions of the body, and by marks and characters mutually agreed upon. Hence arises that physical pre-eminence which he enjoys over all animals; and hence that power which he exercises over the elements, and (to speak) over nature itself. Man, therefore, is unequaled in his kind; but the individuals thereof differ greatly from one another in figure, stature, colour, manners, and dispositions. The globe which man inhabits is covered with the productions of his industry and the works of his hands: it is his labour, in short, which gives a value to the whole terrestrial mass.

The history of man is an object of attention highly interesting, whether we consider him in the different periods of his life, or take a view of the varieties of the species, or examine the wonderful organization of his frame. We shall, therefore, attempt to give a short sketch of him in the different points of view; referring occasionally to other parts of the work for more particular details.

"Nothing (says M. Buffon) exhibits such a striking picture of our weaknesses, as the condition of an infant immediately after birth. Ineapable of employing its organs, it needs assistance of every kind. In the first moments of our existence, we present an image of pain and misery, and are more weak and helpless than the young of any other animal. At birth, the infant passes from one element to another: When it leaves the gentle warmth of the tranquil fluid by which it was constantly surrounded in the womb of the mother, it becomes exposed to the impregnations of the air, and instantly feels the effects of that active element. The air acting upon the olfactory nerves, and upon the organs of respiration, produces a shock something like freezing, by which the breath is expanded, and the air admitted into the lungs. In the mean time, the agitation of the diaphragm prolific upon the viscera of the abdomen, and the excretions are thus for the first time discharged from the intestines, and the urine from the bladder. The air dilates the vessels of the lungs, and after being rarefied to a certain degree, is expelled by the firing the dilated fibres reacliing upon this rarefied fluid. The infant now respires; and articulates sounds, or cries. [For the condition of the fetus in utero, see ANATOMY, No. 110; and for the nature and importance of respiration, see No. 118.]

Most animals are blind for some days after birth. Infants open their eyes to the light the moment they come into the world; but they are dull, fixed, and commonly blue. The new born child cannot distinguish objects, because he is incapable of fixing his eyes upon them. The organ of vision is yet imperfect; the cornea is wrinkled; and perhaps the retina is too soft for receiving the images of external objects, and for communicating the sensation of distinct vision. At the end of forty days, the infant begins to hear and to smite. About the same time it begins to look at and during the period bright objects, and frequently to turn its eyes towards the window, a candle, or any light. Now likewise it begins to weep; for its former cries and groans were not accompanied with tears. Smiles and tears are the effect of two internal sensations, both of which depend on the action of the mind. Thus they are peculiar to the human race, and serve to express mental pain or pleasure; while theories, motions, and other marks of bodily pain and pleasure, are common to man and most of the other animals. Considering the subject as metaphysicall we shall find that pain and pleasure are the universal power which lits all our passions in motion.

The size of an infant born at the full time is commonly twenty-one inches; and that fetus, which nine months before was an imperceptible bubble, now weighs ten or twelve pounds, and sometimes more. The head is large in proportion to the body; and this disproportion, which is still greater in the first stage of the fetus, continues during the period of infancy. The skin of a new-born child is of a reddish colour, because it is so fine and transparent as to allow a slight tint of the colour of the blood to shine through. The form of the body and members is by no means perfect in a child soon after birth; all the parts appear to be swollen. At the end of three days, a kind of jaundice generally comes on, and at the same time milk is to be found in the breasts of the infant, which may be squeezed out by the fingers. The swelling decreases as the child grows up.

The liquor contained in the amnions leaves a viscid whitish matter upon the body of the child. In this country we have the precaution to wash the new-born infant only with warm water; but it is the custom with whole nations inhabiting the coldest climates, to plunge their infants into cold water as soon as they are born without their receiving the least injury. It is even said that the Laplanders leave their children in the snow till the cold has almost stopped their respiration, and then plunge them into a warm bath. Among these people, the children are also washed thrice a day during the first year of their life. The inhabitants of northern countries are persuaded that the cold bath tends to make men stronger and more robust, and on that account accustom their children to the use of it from their infancy. The truth is, that we are totally ignorant of the power of habit, or how far it can make our bodies capable of suffering, of acquiring, or of losing.

The child is not allowed to suck as soon as it is born; but time is given for discharging the liquor and urine...
The young of quadrupeds can of themselves find the way to the teat of the mother; it is not so with man. The mother, in order to suckle her child, must raise it to her breasts; and, at this teetle period of life, the infant can express its wants only by its cries.

New-born children have need of frequent nourishment. During the day, the breast ought to be given every two hours, and during the night as often as they awake. At first they sleep almost continually; and they seem never to awake but when puffed by hunger or pain. Sleep is useful and refreshing to them; and it sometimes becomes necessary to employ narcotic doses, proportioned to the age and constitution of the child, for the purpose of procuring them repose.

The common way of appeasing the cries of children is by rocking them in the cradle; but this agitation must be very gentle, otherwise a great risk is run of confusing the infant's brain, and of producing a total derangement. It is necessary to their being in good health, that their sleep be long and natural. It is possible, however, that they may sleep too much, and thereby endanger their constitution. In that case, it would be proper to take them out of the cradle, and awaken them by a gentle motion, or by presenting some bright object to their eyes. At this age we receive the first impressions from the senses, which, without doubt, are more important during the rest of life than is generally imagined. Great care ought to be taken to place the cradle in such a manner that the child shall be directly opposite to the light; for their eyes are always directed towards that part of the room where the light is strongest; and, if the cradle be placed sideways, one of them, by turning towards the light, will acquire greater strength than the other; and the child will be lured. For the two first months, no other food should be given to the child but the milk of the nurse; and, when it is of a weak and delicate constitution, this nourishment alone should be continued during the third or fourth month. A child however robust and healthful, may be exposed to great danger and inconvenience, if any other aliment is administered before the end of the first month. In Holland, Italy, Turkey, and the whole Levant, the food of children is limited to the milk of the nurse for a whole year. The fuvages of Canada give their children buck for four, five, and sometimes even seven years. In this country, as nurses generally have not a sufficient quantity of milk to satisfy the appetite of their children, they commonly supply the want of it by panada or other light preparations.

The teeth usually begin to appear about the age of seven months. The cutting of these, although a natural operation, does not follow the common laws of nature, which acts continually on the human body without occasioning the smallest pain or even producing any sensation. Here a violent and painful effort is made, accompanied with cries and tears. Children at first lose their spirits and gaiety; they become sad, listless, and fretful. The gums are red, and swollen; but they afterwards become white, when the pressure of the teeth is so great as to stop the circulation of the blood. Children apply their fingers to their mouth, that they may remove the irritation which they feel there. Some relief is given by putting into their hands a bit of ivory or of coral, or some other hard and smooth body, with which they rub the gums at the affected part. This pressure, being opposed to that of the teeth, calms the pain for a moment, contributes to make the membrane of the gums thinner, and facilitates its rupture. Nature here acts in opposition to herself: and an incision of the gums must sometimes take place, to allow a passage to the tooth. For the period of dentition, number of teeth, &c. See Anatomy, no. 17.

When children are allowed to cry too long and too often, rupures are sometimes occasioned by the efforts they make. These may easily be cured by the speedy application of bandages: but if this remedy has been too long delayed, the disease may continue through life. Children are very much subject to worms. Some of the bad effects occasioned by these animals might be prevented by giving them a little wine now and then, for fermented liquors have a tendency to prevent their generation.

Though the body is very delicate in the state of infancy, it is then less sensible of cold than at any other part of life. The internal heat appears to be greater: the pulse in children is much quicker than in adults; from which we are certainly entitled to infer that the internal heat is greater in the same proportion. For the same reason, it is evident that small animals have more heat than large ones; for the bearing of the heart and of the arteries is always quicker in proportion to the smallness of the animal. The strokes of the heart in a sparrow succeed one another so rapidly that they can scarcely be counted.

Till three years of age, the life of a child is very precarious. In the two or three following years, it mortality becomes more certain; and at six or seven years of age a child has a better chance of living than at any other period of life. From the bills of mortality published at London, it appears, that of a certain number of children born at the same time, one half of them die the three first years: according to which, one half of the human race are cut off before they are three years of age. But the mortality among children is not nearly so great everywhere as in London. M. Dupre de Saint-Maur, from a great number of observations made in France, has shown that half of the children born at the same time are not extinct till seven or eight years have elapsed.

Among the causes which have occasioned so great a mortality among children, none is more alarming than the smallpox, which among adults, the smallpox may be ranked as the chief. But luckily the means of alleviating by inoculation the fatal effects of this terrible scourge are now universally known. See Inoculation, and Medicine—Index.

Children begin learning to speak about the age of speech, twelve or fifteen months. In all languages, and among every people, the first syllables they utter are ba, ba, commen- sec, ma, pa, ta, taba, akada; nor ought this to excite any surprise, when we consider that these syllables are the sounds most natural to man, because they consist of that vowel, and those consonants, the pronunciation of which require the smallest exertion in the organs of speech. Some children at two years of age articulate
At the age of adolescence, and of puberty, the body commonly attains its full height. About that time, young people shoot out several inches almost at once. But there is no part of the human body which increases more quickly and more perceptibly than the organs of generation in both sexes. In males, this growth is nothing but an unfolding of the parts, an augmentation in size; but in females it often occasions a shrinking and contraction, which have received different names from those who have treated of the figures of virginity. See Virginity.

Marriage is a state suitable to man, wherein he must make use of those new faculties which he has acquired by puberty. At this period of life, the desire of producing a being like himself is strongly felt. The external form and the correspondence of the organs of sex, occasion without doubt that irresistible attraction which unites the sexes and perpetuates the race. By connecting pleasure with the propagation of the species, nature has provided most effectually for the continuance of her work. Increase and multiply, is the express command of the Creator, and one of the natural functions of life. We may add, that at the age of puberty a thousand and one impressions act upon the nervous system, and reduce man to such a situation that he feels his existence only in that voluptuous sensibility, which then appears to become the seat of his soul, which engrosses the whole sensibility of which he is susceptible, and which proceeds to such a height, that its attacks cannot long be supported without a general derangement of the whole machine. The continuance of such a feeling may sometimes indeed prove fatal to those who indulge in excessive enjoyment; but it is equally dangerous to those who obstinately persevere in celibacy, especially when strongly solicited by nature. The female, being too long confined in the female vesture, may, by its stimulant property, occasion diseases in both sexes, and excite irritations so violent as to reduce man to a level with the brutes, which, when added upon by such impressions, are perfectly furious and ungovernmentable. When this irritation proceeds to extremity, it produces what is called the fara uterinus in women. The opposite habit, however, is infinitely more common, especially in the temperate, and above all in the frozen zones. After all, excesses is much more to be dreaded than continence. The number of dissolute and intemperate men afford us plenty of examples. Some have lost their memory, some have been deprived of sight, some have become bald, and some have died through mere weakness. In such a state, bleeding is well known to be fatal. Young men cannot be too often warned of the irreparable injury they may do to their health; and parents, to whose care they are entrusted, ought to employ all the means in their power to turn them from such dangerous excesses. But at the age of puberty, young men know not of how much importance it is to prolong this fleeting season of their days, this farox period on which the happiness or misery of their future life so much depends. Then they look not forward to futurity, nor reflect on what is past, nor enjoy present pleasures with moderation. How many cease to be men, or at least to have the faculties of men, before the age of thirty? Nature must not be forced; like a true mother, her object is the sober and discreet union of the sexes. It is sufficient to obey when he commands, and to answer when she calls. Neither must we

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Pregnancy is the time during which a woman carries in her womb the fruit of conception. It begins from the moment the prolific faculty has been reduced into a male or female fetus; and it ends with delivery. As soon as a woman is declared pregnant, says the author of the essay Sur la maniere de perfeller l'oeuf humain, she ought to direct her attention wholly to herself, and make the wants of her offspring the standard of her actions. She is now become the depository of a new creature similar to herself, and differing only in the proportion and successive unfolding of its parts. She must be highly careful not to lacerate herself tight, to avoid excessive stretchings, and in short, to disturb in no respect the natural state of the womb. She must likewise beware of indulging certain passions, for we shall afterwards see what great changes are produced in the animal economy by strong and violent passions.

An explanation, then, of what takes place during pregnancy, is nothing but a history of the formation of the fetus; of its expansion; of the extraordinary manner in which it lives, is nourished and grows in its mother's womb, and of the way in which all these operations are performed with regard to both: for see Anatomy, note 109, 110. It has been proved by many observations, that the fetus changes its position in the womb, according to the different attitudes of the mother. It is commonly situated with its feet downwards, the breech resting upon the heels, the head bent towards the knees, the hands bent towards the mouth, the feet turned inwards; and in this position it sways like a kind of vessel in the watery fluid contained in the membranes by which it is surrounded, without occasioning any inconvenience to the mother, except what arises from its motions, sometimes to the one side, and sometimes to the other. At times, it even kicks with such violence as to frighten the mother. But when once the head becomes sufficiently large to destroy the equilibrium, it tumbles over and falls downwards; the face is turned towards the os fœtum, and the crown of the head towards the orifice of the uterus. This happens six weeks or two months before delivery. When the time of delivery arrives, the fetus, finding itself too much confined in the womb, makes an effort to escape with its head first. At length, at the moment of delivery, it unites its own strength with that of the mother, and opens the orifice of the uterus wide enough to allow a passage for itself. It happens sometimes that the fetus escapes from the uter us without bursting its covering, as is the case with animals. But, in general, the human fetus pierces the membranes by its efforts; and sometimes a very thin part of them remains upon the head like a cap. The ancients considered this membranous covering as a sign of good fortune; and the same idea is still prevalent among the vulgar. The liquor which escapes during delivery is called the waters of the mother. These waters serve to guard the fetus from external injuries, by eluding the violence of the blows which the mother may receive upon the belly; and, in the same manner, they defend the womb from the shocks occasioned by the motions of the fetus. In short, by rendering the passage soft and pliable, they facilitate the escape of the child in the time of delivery. (See Midwifery.)—In the womb, the fetus does not require, as has been already mentioned; consequently what has been said of the cries of children in the womb, must be considered as altogether fabulous.—Women have generally only one child at a birth. When they bear two, three, or more, the fetuses are seldom found under the same covering; and their placenta, though adhering, are almost always distinct. Twins are not uncommon, but there are seldom more. It is supposed that among women with child, there is only one in 2,500 who brings forth three children at a birth, one in 20,000 who brings forth four, and one in a million who brings forth five. When the number amounts to five or even when there are but three or four, they are generally of a weakly constitution; most of them die in the womb, or soon after delivery. See the article Prolific.
no taller after 15 or 16, and others continue to grow till the age of 20 or 23. At this period they are very slender; but by degrees the members swell and begin to assume their proper shape; and before the age of 30, the body in men has attained its greatest perfection with regard to strength, comeliness, and symmetry. Adolescence ends at the age of 20 or 23; and at this period youth (according to the division which has been made of man's life into different ages) begins. It continues till the age of 30 or 35.

The common stature of men is about five feet and three, four, five, six, or seven inches; and of women about five feet and two, three, or four inches. Men below five feet are of a small stature. The Laplanders do not exceed four feet and a half; and the natives of some other countries are still smaller. Women attain their full height sooner than men. Haller computes, that in the temperate climates of Europe, the medium stature of men is about five feet and five or six inches. It is observed by the same author, that in Switzerland the inhabitants of the plains are taller than those of the mountains. It is difficult to ascertain with precision the actual limits of the human stature. In surveying the inhabited earth, we find greater differences in the statures of individuals than in those of nations. In the same climate, among the same people, and sometimes in the same family, there are men whose stature is either too tall or too diminutive. See the articles Giant and Dwarf.

The body having acquired its full height during the period of adolescence, and its full dimensions in youth, remains for some years in the same state before it begins to decay. This is the period of manhood, which extends from the age of 30 or 35 to that of 40 or 45 years. During this stage, the powers of the body continue in full vigour, and the principal change which takes place in the human figure arises from the formation of fat in different parts. Excessive fatness disfigures the body, and becomes a very cumbrous and inconvenient load.

The body of a well-shaped man ought to be square, the muscles ought to be strongly marked, the contour of the members boldly delineated, and the features of the face well defined. In men all the parts are more rounded and softer; the features are more delicate, and the complexion brighter. To man belongs strength and majesty; gracefulness and beauty are the portion of the other sex. The structure essential to each will be found in the description of the human skeleton, under the article Anatomy.

Every thing in both sexes points them out as the sovereigns of the earth; even the external appearance of man declares his superiority to other living creatures. His body is erect; his attitude is that of command; his augment, countenance, which is turned towards heaven, bears the impression of his dignity. The image of his soul is painted in his face; the excellence of his nature pierces through the material organs, and gives a fire and animation to the features of his countenance. His majestic deportment, his firm and emboldened gait, announce the nobleness of his rank. He touches the earth only with his extremity; he views it only at a distance, and seems to despise it. It has been justly observed, that the countenance of man is the mirror of his mind. In the looks of no animal are the expressions of passions painted with such energy and rapidity, and with such gentle gradations and shades, as in those of man. We know, that in certain emotions of the mind, the blood rises to the face, and produces blushing; and that in others, the countenance turns pale. These two symptoms, the appearance of which depends on the structure and the transparency of the cuticula, especially redness, constitute a peculiar beauty. In our climates, the natural colour of the face of a man in good health is white, with a lively red suffused upon the cheeks. Paleness of the countenance is always a suspicious symptom. That colour which is shaded with black is a sign of melancholy and of vitiated bile; and constant and universal redness, is a proof that the blood is carried with too great impetuosity to the brain. A livid colour is a morbid and dangerous symptom; and that which has a tint of yellow is a sign of jaundice or repletion of bile. The colour of the skin is generally altered by want of sleep or of nourishment, or by loofeness and diarrhea.

Notwithstanding the general fimilitude of countenance in nations and families, there is a wonderful diversity of features. No one, however, is at a loss to recollect the person to whom he intends to speak, provided he has once fully seen him. One man has live, tenacity, lines and gaiety painted in his countenance, and announces beforehand, by the cheerfulness of his appearance, the character which he is to support in society. The tears which bedew the cheeks of another man would excite compassion in the most unfeeling heart. Thus the face of man is the rendezvous of the symptoms both of his moral and physical affections: tranquillity, anger, threatening, joy, smiles, laughter, malice, envy, jealousy, pride, contempt, disdain or indignation, irony, tears, arrogance, terror, astonishment, horror, fear, shame or humiliation, forrow and affliction, compassion, meditation, particular convulsions, sleep, death, &c. &c. The difference of these characters appears to us of sufficient importance to form a principal article in the natural history of man.

When the mind is at ease, all the features of the face are in a state of profound tranquility. Their proportions, harmony, and union, point out the serenity of the thoughts. But when the soul is agitated, the human face becomes a living canvas, wherein the passions are represented with equal delicacy and energy, where every motion of the soul is expressed by some feature, and every action by some mark; the lively impression which anticipates the will, and reveals by pathetic signs our secret agitation, and those intentions which we are anxious to conceal. It is particularly in the eyes that the soul is painted in the strongest colours and with the most delicate shades.

The different colours of the eyes are, dark hazel, light hazel, green, blue, grey, and white-grey. The most common of these colours are hazel and blue, both of which are often found in the same eye. Eyes which are commonly called black, are only dark hazel; they appear black in consequence of being contradistinct with the white of the eye. Wherever there is a tint of blue, however slight, it becomes the prevailing colour, and outshines
The motions produced by them are different passions.

The mouth, which is set off by the vermilion of the lips and the enamel of the teeth, marks by the various forms in which it assumes, their different characters. The organ of the voice likewise gives animation to this feature, and communicates to it more life and expression than is pollished by any of the rest. The cheeks are uniform features, and have no motion or expression excepting from that involuntary redness or palleness with which they are covered in different passions, such as shame, anger, pride, and joy, on the one hand, and fear, terror, and sorrow on the other.

In different passions, the whole head assumes different postures, and is affected with different motions. It hangs forward during shame, humility, and sorrow; it inclines to one side in languor and compassion; it is elevated in pride, erect and fixed in obstinacy and self-conceit; in astonishment it is thrown back-wards; and it moves from side to side in contempt, ridicule, anger, and indignation.

In grief, joy, love, shame, and compassion, the eyes swell, and the tears flow. The effusion of tears is always accompanied with an extension of the muscles of the face, which opens the mouth.

In sorrow, the corners of the mouth are depressed, the under-lip rises, the eye-lids fall down, the pupil of the eye is raised and half concealed by the eye-brow. The other muscles of the face are relaxed, so that the distance between the eyes and the mouth is greater than ordinary; and consequently the countenance appears to be lengthened.

In fear, terror, confinement, and horror, the forehead is wrinkled, the eye-brows are raised, the eye-lids are opened as wide as possible, the upper lip uncovers a part of the white above the pupil, which is depressed and partly concealed by the under lip. At the same time the mouth opens wide, the lips recede from each other, and discover the teeth both above and below.

In contempt and derision, the upper lip is raised at one side and exposes the teeth, while the other side of the lip moves a little and wears the appearance of a smile. The nostril on the elevated side of the lip shrivels up, and the corner of the mouth falls down. The eye on the same side is almost shut, while the other is open as usual; but the pupils of both are depressed, as when one looks down from a height.

In jealousy, envy, and malice, the eye-brows fall down and are wrinkled; the eye-lids are elevated and the pupils are depressed. The upper lip is elevated on both sides while the corners of the mouth are a little depressed, at the under lip rises to join the middle of the upper.

In laughter, the corners of the mouth are drawn back and a little elevated; the upper parts of the cheeks rise; the eyes are more or less closed; the upper lip rises, and the under one falls down, the mouth opens; and in cases of immoderate laughter, the skin of the nose wrinkles. That gentler and more gracious kind of laughter which is called smiling, is feated wholly in the parts of the mouth. The under lip rises; the angles of the mouth are drawn back; the eyelids are pulled up; the eye-lids approach one another; and a small twinkling is observed in the eyes.

It is very extraordinary, that laughter may be excited either by a moral cause without the immediate action of external objects, or by a particular irritation of the nerves without any feeling of joy. Thus an involuntary laugh is excited by a slight tickling of the lips, of the palm of the hand, of the sole of the foot, of the arm-pits, and, in short, below the middle of the ribs. We laugh when some similar ideas, the union of which was unexpected, are presented to the mind at the same time, and when one or both of these ideas, or their union, includes some absurdity which excites an emotion, of disdain mingled with joy. In general, striking contrasts never fail to produce laughter.

A change is produced in the features of the countenance by weeping as well as by laughing. When we weep, the under lip is separated from the teeth, the forehead is wrinkled, the eye-brows are depressed; the dimple, which gives a gracefulness to laughter, forsakes the cheek; the eyes are more compressed, and almost constantly bathed in tears, which in laughter flow more seldom and less copiously.
The arms, hands, and every part of the body; contribute to the expression of the passions. In joy, for instance, all the members are agitated with quick and various motions. In languor and sorrow, the arms hang down, and the whole body remains fixed and immovable. In admiration and surprize, this total suspension of motion is likewise observed. In love, desire and hope, the head and eyes are raised to heaven, and seem to solicit the wished-for good; the body leans forwards as if to approach it; the arms are stretched out, and seem to seize before-hand the beloved object. On the contrary, in fear, hatred, and horror, the arms seem to pull backward and repel the object of our aversion; we turn away our head and eyes as if to avoid the sight of it, we recoil in order to shun it.

Although the human body is externally much more delicate than that of any other animal, yet it is very nervous, and perhaps stronger in proportion to its size than that of the strongest animals. We are assured that the porters at Constantinople carry burdens of 900 pounds weight. A thousand wonderful stories are related of the Hottentots and other savages concerning their agility in running. Civilized man knows not the full extent of his powers, nor how much he loses by that effeminacy and inactivity by which they are weakened and destroyed. He is contented even to be ignorant of the strength and vigour which his members are capable of acquiring by motion, and by being accustomed to severe exercises, as is observed in runners, tumblers and, rope dancers. The conclusion is therefore founded on the most just and indisputable induction and analogy.—The attitude of walking is less fatiguing to man than that in which he is placed when he is flopped in running. Every time he sets his foot upon the ground, he paffes over a more considerable space; the body leans forwards, and the arms follow the same direction; the respiration increases, and breathing becomes difficult. Leaping begins with great inflammations of the members; the body is then raised, but immediately stretches itself out with a great effort. The motions which accompany leaping make it very fatiguing. It is observed by M. Daubenton (Nouvelle Encyclopédie), that a cessation from exercise is not alone sufficient to restore the powers of the Body when they are exhausted by fatigue. The springs, though not in action, are still wound up while we are awake, even when every movement is suspended. In sleep nature finds what repose which is suited to her wants, and the different organs enjoy a salutary relaxation. This is that wonderful state in which man, unconscious of his own existence, and sunk in apparent death, repairs the lods which his faculties has sustained, and seems to assume a new existence. In this state of drowsiness and repose, the nerves cease to act, the functions of the soul are suspended, and the body seems abandoned to itself. The external symptoms of sleep, which alone are the object of our attention, are easily distinguished. At the approach of sleep the eyes begin to wink, the eyelids fall down, the head nods and hangs down: its fall astonishes the sleeper; he starts up, and makes an effort to drive away sleep; but in vain; a new inclination, stronger than the former, deprives him of the power of raising his head; his chin rests upon his breast, and in this position he enjoys a tranquil sleep. See the article Sleep.

Physiologists give the name of old age to that period of life which commences immediately after the age of manhood and ends at death; and they distinguish green old age from the age of decrepitude. But in our opinion, such an extensive signification of the word ought not to be admitted. We are not old men at the age of forty or forty-five; and though the body then gives signs of decay, it has not yet arrived at the period of old age. M. Daubenton observes, that it would be more proper to call it the declining age, because nature then becomes retrograde, the faculties and good plight of the body diminishes, and certain parts of it do not perform their functions with equal vigour.

The age of decline extends from forty or forty-five to sixty or sixty-five years of age. At this time of life, the diminution of the fat is the cause of those wrinkles which begin to appear in the face and some other parts of the body. The skin not being supported by the same quantity of fat, and being incapable, from want of elasticity, of contracting, sinks down and forms folds. In the decline of life, a remarkable change takes place also in vision. In the vigour of our days, the chrysaline lens, being thicker and more diaphanous than the humours of the eye, enables us to read letters of a very small character at the distance of eight to ten inches. But when the age of decline comes on, the quantity of the humours of the eye diminishes, they lose their clearness, and the transparent cornea becomes less convex. To remedy this inconvenience we place what we wish to read at a greater distance from the eye: but vision is thereby very little improved, because the image of the object becomes smaller and more obscure. Another mark of the decline of life is a weakness of the stomach, and indigestion, in most people who do not take sufficient exercise in proportion to the quantity and the quality of their food. At sixty, sixty-three, or sixty-five years of age, the signs of decline become more and more visible, and indicate old age. This period commonly extends to the age of seventy, sometimes to seventy-five, but seldom to eighty. When the body is extenuated and bent by old age, man then becomes crazy. Craziness therefore is nothing but an infirm old age. The eyes and stomach then become weaker and weaker: leanness increases the number of the wrinkles; the beard and the hair become white; the strength and the memory begin to fail. After seventy, or at most eighty years of age, the life of man is nothing but labour and sorrow: Such was the language of David near three thousand years ago. Some men of strong constitutions, and in good health, enjoy old age for a long time without decrepitude; but such instances are not very common. The infirmities of decrepitude continually increase, and at length death concludes the whole. This fatal term is uncertain. The only conclusions which we can form concerning the duration of life, must be derived from observations made on a great number of men who were born at the same time, and who died at different ages. These we shall mention in the sequel.

The signs of decrepitude form a striking picture of weakness, and announce the approaching dissolution of
of the body. The memory totally fails; the nerves become hard and blunted; deafness and blindness take place; the senses of smell, of touch, and of taste, are destroyed; the appetite fails; the necessity of eating, and more frequently that of drinking, are alone felt; after the teeth fall out, mastication is imperfectly performed, and digestion is very bad; the lips fall forwards; the edges of the jaws can no longer approach one another; the muscles of the lower jaw become so weak, that they are unable to raise and support it: the body sinks down; the spine is bent outward; and the vertebræ grow together at the anterior part: the body becomes extremely lean; the strength fails; the circulation of the blood ceases; death follows; and the dream of life is no more.

Man, says Haller in his Physiology, has no right to complain of the shortness of life. Throughout the whole of living beings, there are few who unite in a greater degree all the internal causes which tend to prolong its different periods. The term of gestation is very considerable; the eminents of the teeth are very great; the period which nature seemed to promise him, it does not appear that the life of man becomes shorter in proportion to the length of time the world has existed. In the days of the Ptolemists, the ordinary limits of human life did not exceed seventy or eighty years. No king of Judah lived beyond that period. When the Romans, however, were numbered by Vegetalians, there were found in the empire, in that age of effeminacy, ten men aged a hundred and twenty and upwards. Among the princes of modern times, the late Frederic the Great of Prussia lived to the age of 74. George II. of Britain lived to that of 77. Louis XIV. lived to the same age. Stanislaus king of Poland and duke of Lorrain exceeded that age. Pope Clement XII. lived to the age of 80. George I. of Britain attained the age of 83. M. Bomare has collected divers instances of persons who lived to the age of 110 and upwards, of which we shall in a note (9) specify a few in supplement to those already given under the article Longevity.

Before

(9) William Lecomte, a shepherd, died suddenly in 1776, in the county of Caux in Normandy, at the age of 110. Cramers, physician to the emperor, saw at Temefwar two brothers, the one aged 110 and the other 112, both of whom were fathers at that age. Saint Paul the hermit was 113 at his death. The Sieur Ifwan-Horwaths, knight of the order of St. Louis, died at Sar-Albe in Lorrain in 1775, aged almost 111. He was a great hunter. He undertook a long journey a short time before his death, and performed it on horseback. Rolina Iwiraworoukia died at Minsk in Lithuania at the age of 113. Fockjel Johannes died at Olden born in Friesland, aged 113 years and 16 days. Mark Jonas died in the year 1775 at Viljeac in Hungary, aged 119. John Neithen of Bakler in Zeland lived to the age of 120. Elenora Spencer died in 1773, in Acconsack in Virginia, aged 121. John Argus was born in the village of Latua in Turkey, and died the 6th of March 1779, aged 125; having six sons and three daughters, by whom he had posterity to the fifth generation. They amounted to the number of 160 souls, and all lived in the same village. His father died at the age of 120. In December 1777, there lived in Devonshire a farmer named John Brooks, who was 134 years of age, and had been fifteen times married. The Philosophical Transactions mention an Englishman of the name of Ecclesius, who lived to the age of 145. Another Englishman of the name of Effingham, died in 1757 at the age of 144. Niels Jukens of Hamerlet in Denmark died in 1764, aged 146. Christlian Jacob Drakenberg died in 1770 at Archusen, in the 146th year of his age. This old man of the north was born at Stavanger in Norway in 1624, and at the age of 170 married a widow of 60. In Norway some men have lived to the age of 150. John Rovin, who was born at Szatlova-Cavrantz-Betcher, in the bannett of Temefwar, lived to the age of 172, and his wife to that of 164, having been married to him during the space of 147 years. When Roven died, their youngest son was 99 years of age. In the Gazette de France, Jan. 18. 1780, we are informed that there lived at that time at Cordova du Tucuman, in Southern America, a negro woman called Louiza Tresco, who, by the judicial testimony of several persons 100 years old, and of a negro woman of 125, was aged between 174 and 175 years. Peter Zoten, a peasant, and a countryman of John Rovin, died in 1724 at the age of 185. His youngest son was then 97 years of age. The history and whole length pictures of John Rovin, Henry Jenkins, and Peter Zoten, are to be seen in the library of S. A. R. Prince de Condé, at Bruxelles, Hanovia, professor at Danzig, mention, in his nomenclature, an old man who died at the age of 184; and another still alive in Wallachia, whole age, according to this author, amounts to 186. Dictionnaire d'Histoire Naturelle, 90e Homme.
Before we proceed to assign the common causes of longevity, it is proper to inquire into the manner of life and the situation of those by whom it has been enjoyed. We find, then, that those who have lived to the greatest age have been such as did not attain their full growth till a very advanced period of life, and who have kept their appetites and passions under the most complete subjugation. In a word, those who have exceeded 100 years, have in general been robust, laborious, sober, and careful to observe the strictest regimen. Enjoying a good constitution from nature, they have seldom or never been subject to disease. They have even enjoyed the greatest health and vigour, and retained the use of their senses to the last moment of their lives.

Among those who have led a life of contemplation and study, many have reached a very advanced age. Longevity is frequent among the different orders of religions, who by their duties are confined to a moderate diet, and obliged to abstain from wine and the use of meat. Some celebrated anchorites have lived to a great age while they fed upon nothing but the wild roots and fruits which they found in the desert, whether they had retired. The philosopher Xenophiles, who lived to the age of 106, was a of the Pythagorean sect. It is well known, that those philosophers who held the transmigration of souls, denied themselves the use of meat, because they imagined that killing an animal would be to affiliate another self. A country life has produced many old and vigorous old men. It is supposd that a happy old age is attained with greater difficulty in towns than in the country. Sir Hans Sloane, Duverney, and Fontanelle, however, are instances of men whose lives have been spent in cities, and yet extended to a very great length. It has been observed, that men deprived of reason live very long; and this Dr Haller imputes to their being exempted from those inqui- tudes which he considers the most deadly poison. Persons possessing a sufficiently good understanding, but defective of ambition, have been found to enjoy very long life. Men who are devoid of pretension, who are free from those cares which a desire of shining by a display of talents, or of acquiring dignity and power, necessarilly brings in its train, who feel no regret for the past nor anxiety about the future, are strangers to those torments of the mind which waste and confine the body. To that tranquility of soul, which is so excellent a prerogative of infancy, they add that of being long young by physical constitution on which the moral has a striking and powerful influence.

Premature wisdom, and early talents, are often fitter to excite astonishment than expectation. The rapid unfolding of the moral faculties, by shortening the period of youth, seems to diminish in proportion the total duration of life. We have known a young lady of seventeen, who could speak very correctly five languages: she translated and wrote Latin, Greek, Italian, Spanish, German, English, and French; but she died at the age of eighteen. The young man by whom she was loved in marriage, having been informed that she could not obtain her hand till he had made himself worthy of her by the same degree of talents and information, died the same year and at the same age. But in some families, the web of life, to use an expression of Haller, seems to be better warped than in others; of this kind are the families of Thomas L'arr, mentioned under Longevity; and John Argus, mentioned in the foregoing note.

From the preceding observations, Dr Haller has attempted to deduce the causes why a few men are longer exempted than others from the common fate.

The circumstanes which oppose their influence are independent of our will; such as the ravages of epidemic diseases, trouble, and anxiety of mind, which create diseases in the body, or the torments of ambition. It is necessary to live in a salubrious climate, to enjoy a fortune sufficiently easy to exclude those uneasy desires which create a feeling of want and privation, to be descended from healthy parents, to avoid drinking wine in youth, to drink water, and to eat little meat and a great deal of vegetables. It is necessary also to be temperate in meals; moderate in pleasures, studious, and exercises; to be naturally inclined to cheerfulness; and to allot a due time to sleep and repose.

Long life is certainly very rare; but, as has been already observed, we most distinguish between what is natural to the constitution of man, and what is the consequence of his condition. By the former he is made to be long lived; but nature is arrested in her course by local and accidental causes, which it is not in our power to avoid.

Let us take a retrospective view of a man's life from his infancy, and enumerate the chief of these different causes. Of a thousand infants, an account of which Dr Haller has extracted from the London bills of mortality, twenty-three died almost as soon as they came into the world: teething carried off fifty, and convulsions two hundred and seventy-five; eighty died of the small pox, and seven of the measles. Among the adult females, eight at least died in child-bed: consumption and asthma, diseases more frequent in England than in France, carried off an hundred and ninety-one of the same sex, and almost a part of the full grown men. An hundred and fifty died of fevers. At a more advanced age, twelve died of apoplexy, and forty-one of dropsy, without mentioning those to whom diseases of little importance in themselves became mortal. There only remained seventy-eight whose death could be ascribed to old age; of these twenty-two lived to the age of eighty and upwards.

Among the different diseases of which we have just now been the fatal effects, and which carry off more than nine-tenths of mankind, not one, must be allowed, is natural to the constitution. The inhabitants of Britain are in general but little subject to diseases, excepting the small-pox and the measles; and many of them enjoy uninterrupted health to old age.

What are the most prevalent diseases in other countries, which prove equally fatal to the duration of human life? In northern climates, fevers, the colic of the Laplanders, and diseases of the lungs, most frequently occasion death. In temperate climates, dropsy carries off a great many at the beginning of old age, which is the boundary of life in the greatest part of both sexes, when they have escaped the acute diseases, such as putrid fever, &c. Acute diseases are most common in warm countries. In some places, the rays 4 of
of the sun kill in a few hours those who are exposed to its burning heat. The air of Egypt and of Asia Minor engenders the plague, by which one half of those who are carried off. Between the tropics men are subject to dysenteries and violent fevers. The cold of the night, in warm climates, occasions sometimes violent diseases, such as palsy, quinsy, and a swelling of the head. Damp and marshy places give rise to fevers of a different kind, but also very dangerous. The life of sailors has a great tendency to produce fever. How many professions prove fatal to the health, and in most men hasten that period which nature would have brought on by slow degrees! Miners, stone-cutters, gilders, persons employed in empyting privies, &c. are subject to diseases of the lungs, and become paralytic. Other professions of life bring on other accidents, of which it would carry us too far to give a particular account. What has been said is sufficient to show, that it is the dangers with which we are surrounded that shorten the period of human life.

By examining the life of those who have attained a great age, it will be found that mankind are longer lived in northern than in southern countries. It has been observed, that there are more old men in mountains and elevated situations than in plains and low countries. We repeat it, if the duration of life among the inhabitants of southern climates be compared with the duration of life in northern nations, it will be allowed, that the latter enjoy both longer life and better health than the former. Their growth being retarded by the rigour of the climate, their decay must also be slower, because of the proportion which exists between the growth of animals and the length of their lives. Among ten persons who have lived to the age of an hundred eight or nine will be found to have lived in the north.

It appears from the bills of mortality, that in the country more boys are born than girls: in cities, on the contrary, the number of females is commonly greater. Observations made with great care prove, that in most countries there are fewer men alive than women, and that more males die, chiefly at the first and last periods of life. In Sæden, the whole number of females in 1763, was to that of males in the proportion of ten to nine. The number of old women who exceeded 80 years of age, was to that of old men of the same age in the proportion 23 to 19: and there were more women than men who had attained the age of 86, in the proportion of almost two to one.

The late Dr Price made observations, after Dr Percival, on the difference of longevity, and the duration of human life, in towns, country-parishes, and villages; of which the following is the result. A greater number in proportion die in great towns than in small ones, and a greater number in the latter than in villages. The cause of this difference, which is found to be very great, must be, in the first place, the luxury and dilapidation which prevail in towns: and, secondly, the bad effects of the air. In the town of Manchester, according to observation, 1/10 of the inhabitants die annually; whereas, in the neighbouring country, the number of deaths does not exceed 1/20 of the whole inhabitants. It may be laid down as a general principle, that in great towns, the number of deaths annually is from 1 in 19 to 1 in 22 or 23; in middling towns, from 1 in 24 to 1 in 28; and in country parishes and villages seldom more than 1 in 40 or 50. In 1763, the number of inhabitants in Stockholm amounted to 72,797. The average number of deaths for the six years preceding had been 3802, which makes 1 in 19 annually; while throughout all Sweden, including the towns and the country, not more than 1 in 33 die annually. At Rome the inhabitants are numbered every year. In 1771 they were found to amount to 159,675; the average number of deaths for ten years was 7567, which makes 1 in 21 annually. In London not less than 1 in 29 of the inhabitants die every year.

M. Daubenton has given in the Encyclopédie Méthodique, a table of the probabilities of the duration of life, compiled from that which is to be found in the seventh volume of the Suppléments à l'Histoire Naturelle de M. de Buffon.

The following is an abridgment of it:

Of 23,994 children born at the same time, there will probably die.

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It thus appears, that a very small number of men indeed pass through all the periods of life, and arrive at the goal marked out by nature. Innumerable causes the different acceleration of our dissolution. The life of man, we have observed, consists in the activity and exercise of his organs, which grow up and acquire strength during infancy, adolescence, and youth. No sooner has the body attained its utmost perfection, than it begins to decline. Its decay is at first imperceptible; but in the progress of time the membranes become cartilaginous, the cartilages acquire the consistence of bone; the bones become more solid, and all the fibres are hardened. Almost all the fat waxes away; the skin becomes withered and seedy; wrinkles are gradually formed; the hair grows white; the teeth fall out; the face loses shape; the body is bent; and the colour and consistence of the crystalline humour become more perceptible. The first traces of this decay begin to be perceived at the age of forty, and sometimes sooner, this is the age of decline. They increase by slow degrees till at last, which is the period of old age. They increase more rapidly till the age of seventy or seventy five. At this period a crisis begins, and continues always to increase. Next succeeds decrepitude, when
when the memory is gone, the use of the senses loft, the strength totally annihilated, the organs worn out, and the functions of the body almost destroyed. Little now remains to be lost, and before the age of ninety or an hundred, death terminates at once decrepitude and life.

The body then dies by little and little: its motion gradually diminishes; life is extinguished by incalculable gradations, and death is only the last term in the succession. When the motion of the heart, which continues longest, ceases, man has then breathed his last; he has passed from the state of life to the state of death; and as at his birth a breath opened to him the career of life, so with a breath he finishes his course.

This natural cause of death is common to all animals and even to vegetables. We may observe that the centre of an oak first perishes and falls into dust, because these parts having become harder and more compact can receive no further nourishment. The causes of our dissolution, therefore, are as necessary as death is inevitable, and it is no more in our power to retard this fatal term than to alter the established laws of the universe. Hence the following maxim has been universally adopted, *Contra vim mortis, nullum remedium in horis.* In whatever manner death happens, the time and circumstances thereof are unknown. It is considered, however, as at all times terrible, and the very thoughts of it fill the mind with fear and trouble. It is withstanding our duty frequently to direct our thoughts to that event, which must inevitably happen, and by a life of virtue and innocence to prepare against those conseqnences which we so much dread.

As in women the bones, the cartilages, the muscles, and every other part of the body, are fatter and less solid than those of men, they must require more time in hardening to that degree which occasions death. — Women of course ought to live longer than men. This reasoning is confirmed by experience; for by consulting the bills of mortality, it appears, that after women have passed a certain age, they live much longer than men who have arrived at the same age. — In like manner, it is found by experience, that in women the age of youth is shorter and happier than in men, but that the period of old age is longer, and attended with more trouble. *Citius pubescent, citius senescit.*

After death, the organization of the body begins to be dissolved, and all the parts relax, corrupt, and separate. This is produced by an intellef intiimentation, which occasions putrefaction, and reduces the body to volatile alkalii, fetid oil, and earth.

The other particulars that were proposed to be noticed in this article are, the several lenes with which man is endowed; his constitution, and animal functions; and that variety of colour, form, and character, which he assumes in different quarters of the globe. But there is no occasion to enlarge upon those topics here, as they have been already explained in other parts of the work. For the twofold, see Anatomy, passion. The lexion has been partly discussed under the word Composition, and will be refumed afterwards under the article Varieties of the Human Species. For what regards man, considered as a rational, social, moral, and religious being, see Metaphysics, Moral Philosophy, Religion, and Theology; also Society, Law, Language, and Logic.

**isle of Man,** an island in the Irish sea, lying about seven leagues north from Anglesey, about the same distance west from Lancashire, nearly the like distance south-east from Galloway, and nine leagues east from Ireland. Its form is long and narrow, stretching from the north-east of Ayre-point to the Gulf of Man, which lies south-west, at least 90 English miles. Its breadth in some places is more than nine miles, in most places eight, and in some not above five, and contains about 160 square miles.

The first author who mentions this island is Caesar; for there can be as little doubt, that, by the *Mona,* of which he speaks in his Commentaries, placing it in the midst between Britain and Ireland, we are to understand Man, as that the Mona of Tacitus, which he acquaints us as had a fordoable strait between it and the continent, can be applied only to Anglesey. Pliny has set down both islands; *Mona,* by which he intends Anglesey, and *Menabia,* which is Man. In Ptolemy we find *Monaedae,* or *Monaidae,* that is, the farther of more remote Man. Orosius styles it *Mennaia;* tells us, that it was not extremely fertile; and that this, as well as Ireland, was then pollefed by the Scots. Beda, who dittin guishes clearly two Menavian islands, names this the northern *Menavia,* bewowing the epithet of southern upon Anglesey. In some copies of Nennius, this life is denominated *Labonica;* in others, *Menavia;* but both are explained to mean *Man.* Alured of Beverley also speaks of it as one of the Menavian islands. The Britons, in their own language, called it *Menaw,* more properly *Main au,* i. e., "a little island," which seems to be latinized in the word *Menavia.* All which clearly proves, that this small life was early inhabited, and as well known to the rest of the world as either Britain or Ireland.

In the close of the first century, the Druids, who were the priests, prophets, and philosophers of the old Britons, were finally expelled by Julius Agricola from the southern Mona; and we are told, that they then took shelter in the northern. This island they found well planted with firs; and, from a certain measure, what they delighted in most, the shelter of trees; but, however, not the shelter of those trees in which they most delighted, viz. the oaks; and therefore these they introduced. No histories tell us this; but we learn it from more certain authority, great woods of fir having been discovered interred in the bowels of the earth, and here and there small groves of oaks; but as these trees are never met with intermixed, so it is plain they never grew together; and as the former are by far the most numerous, we may presume them the natural produce of the country, and that the latter were planted and preferred by the Druids. They gave the people, with whom they lived, and over whom they ruled, a gentle government, wife laws, but withal a very superstitious religion. It is also very likely that they hindered them, as much as they could, from having any correspondence with their neighbours; which is the reason that
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that, though the island is mentioned by so many writers, not one of them, before Orosius, says a word about its inhabitants. A little before his time, that is, in the beginning of the fifth century, the Scots had transported themselves thither, it is said, from Ireland. The tradition of the natives of Man (for they have a traditional history) begins at this period. They style this first discoverer Manann Mac Lear; and they say that he was a magician, who kept this country covered with mists, so that the inhabitants of other places could never find it. But the ancient chronicles of Ireland inform us, that the true name of this adventurer was Orbhenius, the son of Alldius, a prince in their island; and that he was afo named Manannan, from his having first entered the island of Man, and Nuac Lir, i. e. “the offspring of the sea,” from his great skill in navigation. He promoted commerce; and is said to have given a good reception to St Patrick, by whom the natives were converted to Christianity.

The princes who ruled after him seem to have been of the same line with the kings of Scotland, with which country they had a great intercourse, affailing its monarchs in their wars, and having the education of their princes confided to them in time of peace.

In the beginning of the seventh century, Edwin, king of Northumberland, invaded the Menavian islands, ravaged Man, and kept it for some time, when Beda affures us, there were in it about 300 families: which was less than a third part of the people in Anglesey, though Man wants but a third of the size of that island.

The second line of their princes they derive from Orri, who, they say, was the son of the king of Norway; and that there were 12 princes of this house who governed Man. The old constitution, settled by the Druids, while they swayed the sceptre, was perfectly restored: the country was well cultivated and well peopled; their subjects were equally versed in the exercise of arms and in the knowledge of the arts of peace: in a word, they had a considerable naval force, an extensive commerce, and were a great nation, tho’ inhabiting only a little isle. Guttred the son of Orri built the castle of Ruffyn, A. D. 960, which is a strong place, a large palace, and has subsisted now above 800 years. Macao, was the ninth of these kings, and maintained an unsuccessful struggle against Edger, who reduced all the little sovereigns of the different parts of Britain to own him for their lord; and who, upon the submission of Macao, made him his high-admiral, by which title (archipirate, in the Latin of those times) he subscribes that monarch’s charter to the abbey of Glastonbury.

After the death of Edward the Confessor, when Harold, who poiffessed the crown of England, had defeated the Norwegians at the battle of Stamford, there was amongst the fugitives one Goddard Crownan, the son of Harold the Black, of Iceland, who took shelter in the isle of Man. This isle was then governed by another Goddard, who was a descendant from Macao, and he gave him a very kind and friendly reception. Goddard Crownan, during the short stay he made in the island, perceived that his name-fake was universally hated by his subjects; which inspired him with hopes that he might expel the king, and become master of the island. This he at last accomplished, after having defeated and killed Edgar the son of Godgrand, who had succeeded his father. Upon this he assigned the north part of the island to the natives, and gave the south to his own people; becoming, in virtue of his conquest, the founder of their third race of princes. However he might acquire his kingdom, he governed it with spirit and prudence; made war with success in Ireland; gained several victories over the Scots in the isles; and, making a tour through his new obtained dominions, deceased in the island of Ilay. He left behind him three sons. A civil war breaking out between the two eldists, and both of them depecting in a few years, Magnus king of Norway coming with a powerful fleet, poiffessed himself of Man and the isles, and held them as long as he lived; but being slain in Ireland; the people invited home Olave the youngest son of Goddard Crownan, who had fled to the court of England, and been very honourably treated by Henry the Second. There were in the whole nine princes of this race, who were all of them feudatories to the kings of England; and often returned to their court, were very kindly received, and had penions bestowed upon them. Henry III. in particular charged Olavo, king of Man, with the defence of the coasts of England and Ireland; and granted him annually for that service 40 marks, 100 measures of wheat, and five pieces of wine. Upon the demise of Magnus, the last king of this isle, without heirs male, Alexander III. king of Scots, who had conquered the other isles, seized likewise upon this; which as parcel of that kingdom, came into the hands of Edward I. who directed William Huncicumbe, guardian or warden of that isle for him, to restore it to John Baliol, who had done homage to him for the kingdom of Scotland.

But it seems there was still remaining a lady named Anseth, who claimed this soverignty, as cousin and nearest of kin to the deceased Magnus. This claimant being able to obtain nothing from John Baliol, applied herself next to king Edward, as the superior lord. He, upon this application by his writ, which is yet extant, commanded both parties, in order to determine their right, to appear in the king’s bench. The progress of this suit does not appear; but we know farther, that this lady, by a deed of gift, conveyed her claim to Sir Simon de Montacute; and, after many disputes, invasions by the Scots and other accidents, the title was examined in parliament, in the seventh of Edward III. and solemnly adjudged to William de Montacute; to whom, by letters-patent, dated the same year, that monarch released all claim whatsoever.

In the succeeding reign, William Montacute, earl of Salisbury, sold it to Sir William Scroop, afterwards earl of Wiltshire; and upon his looting his head, it was granted by Henry IV. to Henry Percy, earl of Northumberland; who, being attainted, had, by the grace of that king, all his lands restored, except the isle of Man, which the same monarch granted to Sir John Stanley, to be held by him of the king, his 3 U 2 heirs.
heirs and succesors, by homage, and a cast of falcons to be presented at every coronation. Thus it was possessed by this noble family, who were created earls of Derby, till the reign of queen Elizabeth, when, upon the demise of earl Ferdinand, who left three daughters, it was, as lord Coke tells us, adjudged to those ladies, and from them purchased by William earl of Derby, the brother of Ferdinand, from whom it was claimed by defecnt, and adjudged to its present possessor, his grace the duke of Athol.

This island, from its situation directly in the mouth of the channel, is very beneficial to Britain, by lessening the force of the tides, which would otherwise break with greater violence than they do at present. It is frequently exposed to very high winds; and at other times to mists, which however, are not at all unwholesome. The soil towards the north is dry and sandy, of consequence infertile, but not unimproveable; the mountains, which may include near two-thirds of the island, are bleak and barren; yet afford excellent peat, and contain several kinds of metals. They maintain also a kind of small swine, called pears, which are esteemed excellent pork. In the valleys there is as good pasture, hay, and corn, as in any of the northern counties; and the southern part of the island is as fine soil as can be wished. They have small and lime-flour sufficient to render even their poorest land fertile; excellent flate, rag-flour, black marble, and some other kinds for building. They have vegetables of all sorts, and in the utmost perfection; potatoes in immense quantities; and, where proper pains have been taken, they have tolerable fruit. They have also hemp, flax, large crops of oats and barley, and some wheat. Hogs, sheep, goats, black cattle, and horses, they have in plenty; and, though small in size, yet if the country was thoroughly and skilfully cultivated, they might improve the breed of all animals, as experience has shown. They have rabbits and hares very fat and fine; tame and wild fowl in great plenty; and in their high mountains they have one airy of eagles and two of excellent hawks.

Their rivulets furnish them with salmon, trout, eels, and other kinds of fresh-water fish; on their coasts are caught cod, turbot, ling, halibut, all sorts of shell fish (oysters only are scarce, but large and good), and herrings of which they made anciently a great profit, though this fishery is of late much declined.

The inhabitants of Man, though far from being unmixed, were, perhaps till within the course of the present century, more so than any other under the dominion of the Crown of Great Britain; to which they are very proud of being subject, though, like the inhabitants of Jersey and Guernsey, they have a constitution of their own, and a peculiarity of manners naturally resulting from a long enjoyment of it.—The Manx tongue is the only one spoken by the common people. It is the old British, mingled with Norfe, or the Norwegian language, and the modern language. The clergy preach and read the common prayer in it. In ancient times they were distinguished by their stature, courage, and great skill in maritime affairs. They are at this day a brisk, lively, hard, industrious, and well-meaning people. Their frugality defends them from want; and though there are few that abound, there are as few in distress; and those that are, meet with a cheerful unconstrained relief. On the other hand, they are choleric, loquacious, and, as the law till lately was cheap, and unencumbered with solicitors and attorneys, not a little litigious. The revenue, in the earl of Derby's time, amounted to about 2500 l. a-year; from which, deducting his civil lift, which was about 700 l. the clear income amounted to 1800 l. At the same time, the number of his subjects was computed at 20,000.—The sovereign of Man, though he has long ago waved the title of king, was still invested with regal rights and prerogatives; but the distinct jurisdiction of this little subordinate royalty, being found inconvenient for the purposes of public justice, and for the revenue (it affording a commodious asylum for debtors, outlaws, and smugglers), authority was given to the treasury, by (stat. 12 Geo. I. c. 28.) to purchase the interest of the then proprietors for the use of the crown: which purchase was at length completed in the years 1765, and confirmed by (stat. 5 Geo. III. c. 26 and 39.) whereby the whole island and all its dependencies (except the landed property of the Athol family); their manorial rights and emoluments, and the patronage of the bishopric and other ecclesiastical benefices, are unalienably vested in the crown, and subjected to the regulation of the British excise and customs. The duke, however, is procuring an act of parliament to revive the former one.

The most general division of this island is into north and south; and it contains 17 parishes, of which five are market-towns, the rest villages. Its division with regard to its civil government, is into six deaneries, every one having its proper coroner, who is in the nature of a sheriff, is intrusted with the peace of his district, secures criminals, brings them to justice, &c. The lord chief-justice Coke says, "their laws were as fierce to be found any where else." In July 1766, a copper coinage for the use of the island was issued from the Tower of London. There is a ridge of mountains runs almost the length of the isle, from whence they have abundance of good water from the rivulets and springs; and Snaefell, the highest, rises about 380 yards. The air is sharp and cold in winter, the frosts short, and the snow, especially near the sea, lies not long on the ground. Here are quarries of good stone, rocks of lime-flour, and red freestone, and good slate, with some mines of lead, copper, and iron. The trade of this island was very great before the year 1726; but the late lord Derby farming out his customs to foreigners, the influence of these farmers drew on them the resentment of the government of England, who, by an act of parliament, deprived the inhabitants of an open trade with the kingdom. This naturally introduced a clandestine commerce, which they carried on with England and Ireland with prodigious succeds, and an immense quantity of foreign goods was run into both kingdoms, till the government in 1765 thought proper to put an entire stop to it, by purchasing the island of the duke of Athol, as already mentioned, and permitting a free trade with England. On the little isle of Pele, on the west side of Man is a town of the same name, with a fortified castle.
castle. Before the south promontory of Man, is a little island called the Gulf of Man: it is about three miles in circuit, and separated from Man by a channel about two furlongs broad. At one time of the year it abounds with puffins, and also with a species of ducks and drakes, by the English called barnacle, and by the Scots clakes and Soland geese.

The inhabitants of this isle are of the church of England; and the bishop is styled Bishop of Sodor and Man. This bishopric was first erected by Pope Gregory IV, and for its diocese had this isle and all the Hebrides, or western islands of Scotland; but which were called Sodorac by the Danes, who went to them by the north, from the Swedih Sodor, Sall or Ork islands, from which the title of the bishop of Sodor is supposed to originate. The bishop's seat was at Rushin, or Caftle town in the isle of Man, and in Latin is entitled Sodorensis. But when this isle became dependent upon the kingdom of England, the Western islands withdrew themselves from the obedience of their bishop and had a bishop of their own, whom they entitled also Sodorensis, but commonly Bishop of the Isles. The patronage of the bishopric was given together with the isle, to the Stanleys by king Edward IV. and came by an heir-female to the family of Athole; and, on a vacancy thereof, they nominated their designed bishop to the king, who diffimulated him to the archbishop of York for consecration. By an act of parliament, the 33d of king Henry VIII. this bishopric is declared in the province of York.

**MANOF-WAR BIRD.** See PELICANUS.

**MANAGE.** See MANEGE.

**MANNASEH** (in Scripture list.,) the eldest son of Joseph, and grandson of the patriarch Jacob (Gen. xii. 30, 31.) was born in the year of the world 2290, before Jefus Christ 1714.

The tribe descended from him came out of Egypt, in number 32,200 men, fit for battle, upwards of 20 years old, under the conduct of Gamaliel, son of Pethazar (Numb. ii. 20, 21.) This tribe was divided at their entrance into the land of Promise. One half had its portion beyond the river Jordan, and the other half on this side the river. The half tribe of Manasseh which settled beyond the river possessed the country of Bashan, from the river Jabbok to mount Libanus, (Numb. xxii. 33, 34, &c. 1) and the other half tribe of Manasseh on this side Jordan, obtained for its inheritance the country between the tribe of Ephraim to the South, and the tribe of Issachar to the north, having the river Jordan to the east, and the Mediterranean sea to the west, (John. xvi. xvii.)

**MANASSEH,** the 15th king of Judah, being the son and successor of Hezekiah. His acts are recorded in 2 Kings xx. xxi. and 2 Chr. xxxii.

**MANATI,** in zoology. See TRICHECUS.

**MANCA,** was a square piece of gold coin, commonly valued at 30 pence; and manca was as much as a mark of silver, having its name manca-causa, being coined with the hand. (Leg. Can.) But the manca and manca-causa were not always of that value; for sometimes the former was valued at 60 florins, and the latter, as used by the English Saxons, was equal in value to 23.6d. sterling. Manca sex solidis aequa (Leg. H. i. 69.) Thorn, in his chronicle, tells us, that manca est pondus duorum solidorum et sex dinar.
Manchester once most precious mines of well-earned private wealth, and important contributors to the necessary public treasure of the state. Its post-office, which may afford an evidence of its extensive commerce. The population of the town may be further calculated from the great number of cotton factories within the boundaries of the town, wherein it is thought that 20,000 men, women, and children, are employed in the manufacture of preparing warp and weft. If to these be added the many hands applied to weaving, &c. &c. &c. besides all the more general mechanics, as well as householders, domestic servants, &c. Manchester may be ranked as the most populous market-town in Great Britain. The marriages in Manchester and Salford, from January 1791 to January 1792, were 1302, the christenings 2960, and the burials 2286. Hence, should it be computed that one in every 30 persons died, the number of inhabitants would amount to 68,580, which is thought to be much under the sum of an actual enumeration. The streets are about 600, many of them spacious and airy, great part of the old buildings being removed, and the new streets allowed a convenient breadth. The town is now lighted every night by 2000 lamps, and guarded by nearly 200 watchmen.

The college here was founded in 1422 by Thomas Welf Lord Delaware; and consisted of a warden, eight fellows, four clerks, and six choristers. About the same time the present collegiate church was built (timber only having been used for the first warden), and John Huntington bachelor of laws was the first warden, named by the founder himself; he enjoyed the wardenship nearly 40 years; and a monument with some lines added to his memory, he having been the first to propose and attain the erection of the church. He died Nov. 11, 1458, and was interred in the middle of the choir. This church is a fine structure of what is termed the Gothic system, and is more enriched with sculpture than such churches usually are. The tabernacle work over the sills in the choir is very curious, as are the large arches added upon vaulting the choir. The organ, which cost not less than £1000, is large and powerful. The last warden, whose name was D. D. the 14th in succession, the college was new-founded in 1636; and Richard Heyrick, B. D. named the first warden on that foundation. The present warden, Richard Atchison, D. D. rector of Middleton, is the fifth in succession from Richard Heyrick. The collegiate body now consists of a warden, eight fellows, two chaplains, two clerks (one of whom, by a late regulation, is to be at least bachelor of arts and in priest's orders), four choristers, and four singing men.

Beside the collegiate church, there are also the following: St Anne's, a handsome church, begun in 1709 and finished in 1723; it is in the gift of the Bishop of Chester. St Mary's, built by the clergy of the collegiate church, and consecrated upwards of 30 years ago, is a neat and indeed a elegant edifice: as is St John's, which was built about 20 years since by the late Edward Byrom, Esq. The next representation thereof is, by act of parliament, vested in his heirs, afterwards devolving to the warden and fellows of the collegiate church. St Paul's church was erected upwards of 12 years ago; and is a handsome spacious building, chiefly brick; to which has been added, within the last two years, a lofty and substantial stone tower. St James's Manchester church has been finished within the last ten years: it is a large well-lighted building of brick and stone, with a small stone steeple. St Michael's is also of brick and stone, with a square tower. It was built by the late Rev. Humphrey Owen (one of the chaplains of the collegiate church, and rector of St Mary's), in whose heirs the presentation is vested for a term of 60 years, and thenceforward in the warden and fellows of the college. To these may be added, St Thomas's Ardwick Green, and Trinity church, Salford: for though the Irwell intervenes between Manchester and Salford, and each is governed by its respective con­fiables; yet, being connected by three bridges, by mutual friendship, and by the common pursuit of universally useful manufactures and commerce, the two places are generally considered under the name of Manchester, as the borough of Southwark is not improperly deemed a part of the metropolis. In Salford there is likewise a Methodist chapel nearly finished. A new church is also about to be built and dedicated to St Stephen.—In Manchester a new church is lately finished, and called George's; but divine service has not yet been performed therein. St Peter's church, at the end of Mosley-street, was begun about three years since: when finished, it will be a strong and elegant stone structure with a high spire; at present the body only is completed, and lighted, in a manner not very common, by six semicircular windows. The foundation of another church, to be called St George's, has been laid, within the year 1792 in Stephen's square lately planned; and also one called the New Jerusalem Church, nearly finished. Beside the 14 churches above enumerated, there are, a Catholic chapel, a large Methodist chapel, a chapel for the people called Quakers, and 5 chapels for dissenters of other denominations.

Cheetham's Hospital, commonly called the College, because it was originally the place of residence of the warden and fellows, is deserving of particular notice. Humphrey Cheetham of Clayton near Manchester, Esq; having been remarkably successful in trade in the middle of the 17th century, having the funds of the college, and liberally endowed it for the maintenance and education of 40 poor boys, admissible between the age of 6 and 10 years. By an improvement of the funds of the charity, the numbers of boys was increased to 60; and continued such till the Easter meeting of the office in 1780, when another augmentation took place, and the number has since been constantly 80. The townships, pointed out by the founder for objects of his charity, are the following, together with the respective numbers admitted from each: Manchester, original number 14, now 28; Salford 6, now 12; Droyliden 5, now 6; Crumpsall 2, now 4; Bolton-le-moors 10, now 20; Turton 5, now 10. So that 89 persons are now annually provided for by this liberal benefactor; including for the hospital a governor, 1 man and 5 women servants; a school-master; and, on the library establishment, a librarian (See an authentic letter in the Gent. Mag. for June 1792, p. 521.) The boys of this hospital are comfortably provided for till the age of 14, when they are further clothed, and with a premium placed apprentices to useful trades; and, in order to incite early
Manchester early habits of industry, to make them good servants, and at length good masters, it has been suggested to furnish some kind of easy employment for a small part of their time not engaged at school. The Literary subscription is thus divided. The library which occupies an extensive gallery of the same building, owes its foundation and increasing importance to the fame benevolent source. The annual value of the fund originally bequeathed for the purchase of books and for a librarian's salary was £161; but, by recent improvements of the estate, the income is more than thrice that sum. The books at this time amount to 10,000 volumes, of which a catalogue handomely printed in 2 volumes 8vo, has been published by the present librarian, the Rev. John Rudcliffe, A.M.

At stated hours, on all days, except Sundays and other holidays, the students may have free access to read, *in the library*, any book it contains; and in order to render it comfortable during the cold season of the year, several foyes are kept heated at the reading hours. This college and a large inclosed area are situated upon a high perpendicular rock, bounded by the Irk close to its confluence with the Irwell; and is thought by Mr Whitaker to be included, as well as the collegiate church, within the boundaries of the ancient Roman praetorium; the whole of which site towards the Irwell, as on the site of the Irk, is confiderably elevated above the water and the opposite land of Salford. The Free-school, higher up on the same site the Irk, almost joining to the college, is supported by the rents of three mills; one of which is for grinding malt, another for corn, and the third is employed as a snuff-mill. These rents are now increased to 700l. *per annum*, for which salaries are paid to three masters and two assistents. The scholars educated here have certain exhibitions allowed at the university; and such of them as are entered at Braven-nose college Oxford, have a chance of obtaining a scholarship. The Literary and Philosophical Society of Manchester was instituted in the beginning of the year 1783, and is well known by its Memoirs, of which three volumes 8vo have been published; they have been translated into the German language. A fourth volume is now in the press, and in all probability will be published in the spring of 1793. A society was established here in November 1789, under the name of the *Lancashire Humane Society*, for the encouragement of all who may attempt the recovery of persons apparenly drowned. The Infirmary, Dispensary, Lunatic Asylum, and public Baths, are all situated on one large airy plot of land, in the most elevated and agreeable part of the town; a pleasant gardens-plots and gravel-walk extending the whole length of the buildings; a canal intervening between them and the public front, and next to which it is guarded by iron palisades. The Lying-in-hospital is situated in Salford, at the end of the old bridge. A New Work-house is nearly completed; and for such a purpose a happier spot could not be found. Manchester in any town than that whereon it is erected, being on an equal eminence with the college on the opposite side of the Irk, and promising the greatest possible comforts to such as may be necessitated to become its inhabitants. The exchange was a strong good building; but since the late act of parliament obtained for farther improvements of the town, it has been sold and taken down, and its site formed into a convenient area, to the great advantage of the surrounding houses. The Theatre is a neat building, wherein the boxes are placed in a semicircle opposite to the stage. The Gentlemen Concert-room is an elegant building, capacious enough to accommodate 1200 persons. The concerts are supported by annual subscriptions; but strangers and military gentlemen have free admittance to the private concerts; as also to the public, concerts, with a subscriber's ticket. The new Assembly-rooms are large and commodious. A Circus is almost finished. Here are two Market-places, the old and the new; which are well supplied with every thing in season, though at high rates. There are several charity-schools belonging to different churches and chapels, where children are furnished with clothes and taught to read. The Sunday-schools are numerous, and afford instruction to upwards of 5000 children.

Over the Irwell are three bridges, uniting the town with Salford: the old bridge is very high at the Manchester end, whence it slopes into Salford. The middle bridge, four feet wide, raised upon timber and flagged, is only for accommodation of foot-passengers, who from the Manchester side must descend to it by nearly forty steps. The lower bridge is a handsome stone building of two arches; this bridge affords a level road for two or three carriages abreast. It was undertaken and finished by the private subscription of a few gentlemen; and a small toll is taken for all passing, which toll is now annually levied; and pays the proprietors remarkably well. From Manchester there are likewise the same number of bridges over the Irk; only one, however, is adapted for the passage of carriages. The Irwell, having at a great expense been rendered navigable for vessels of 20 or 30 tons, burden, there is a constant communication between Liverpool, Manchester, and the intermediate places on the Irwell and Mersey, to the great advantage of the proprietors and the country at large. This navigation, and more especially the duke of Bridgewater's canal, opening a passage from Manchester to the Mersey at 30 miles distance, have, together, greatly contributed to the present highly flourishing state of the town. Advantages still greater, because more widely diffusive, may result from the intended union of the Humber and the Mersey by means of canals. Indeed, every mile of canal would benefit many miles of land; and such would be the reciprocity of interest, that it would undoubtedly extend and be felt far beyond the visible measurement of the navigation.

We must not omit to notice the new penitentiary house, called the *New Bailey*, for separate confinement of various criminals. Over the entrance is a large cell-room, with adjoining rooms for the magistrates, council, jurors, &c. Beyond this, in the centre of a very large area inclosed by very high walls,
Manchester walls, stands the Prison, an extensive building, forming a cross three stories high; and the four wards of each story may in an infall be seen by any person in its centre. This prison is kept surprizingly neat and healthy; and such as call unfit for the duties of a busy at the loom; and in another, one or more be seen beating and cleaning cotton, another roving, and a fourth spinning. In its centre. This prison is kept surprizingly neat and clean! and in weight to 55 Troy grains. The first account of this coin that occurs in the history of England, is about the close of the 8th century, in an embassy of Cenwulf king of Mercia to Leo III. requesting the restoration of the jurisdiction of the see of Canterbury; this embassy was enforced by a present of 120 mancuses. Ethelwaldo sent yearly to Rome 300 mancuses: and these coins are said to have continued in some form or other till towards the conclusion of the Saxon government. The herioct of the nobility are chiefly estimated by this standard in Cnut's laws. It came originally from Italy, where it was called denar; and is supposed to have been the same with the drachma or millemata current in the Byzantine empire.

Mandamus, in law, a right that issues out of the court of king's-bench, sent to a corporation, commanding them to admit or restore a person to his office. This writ also lies where justices of the peace refuse to admit a person to take the oaths in order to qualify himself for enjoying any post or office: or where a bishop or archdeacon refuses to grant a probate of a will, to admit an executor to prove it, or to swear a church-warden, &c.

Mandanes, an Indian prince and philosopher, who for the renown of his wisdom was invited by the ambassadors of Alexander the Great to the banquet of the son of Jupiter. A reward was promised him if he obeyed, but he was threatened with punishment in case of a refusal. Unmoved by promises and threatenings, the philosopher dismissed them with observing, that though Alexander ruled over a great part of the universe, he was not the son of Jupiter; and that he gave himself no trouble about the presents of a man who poifeeded not what he himself stated himself. "I despise his threats (added he): if I live, India is sufficient for my subsistence; and to me death has no terror, for it will only be an exchange of old age and infirmity for the happiness of a better life."

Mandarins, a name given to the magistrates and governors of provinces in China who are chosen out of the most learned men, and whose government is always at a great distance from the place of their birth.—Mandarin is also a name given by the Chinese to the learned language of the country; for besides the language peculiar to every province, there is one common to all the learned in the empire, which is in China what Latin is in Europe; this is called the mandarin tongue, or the language of the court.

Mandate, in law, a judicial commandment to do something. See the article Mandamus.

Mandate, in the canon law, a redit of the pope commanding any ordinary collator to put the person therein named in possession of the first vacant benefice in his collation.

Mandatum, was a fee or retainer given by the Romans to the procurator and advocati. The mandate was a necessary condition, without which they had not the liberty of pleading. Thus the legal eloquence of Rome, like that of our own country, could not be unlocked without a golden key.

Manderscheit, a town of Germany in the circle
MANDEVILLE (Sir John), a physician, famous for his travels, was born at St Albans, about the beginning of the 18th century. He had a liberal education, and applied himself to the study of physic; but being at length seized with an invincible desire of seeing distant parts of the globe, he left England in 1732, and did not return till 34 years after. His friends, who had long suppofed him dead, did not know him when he appeared. He had travelled through almost all the eafi, and made himself master of a great variety of languages. He particularly visited Seythia, Armenia the Greater and Lefs, Egypt, Arabia, Syria, Media, Mesopotamia, Persia, Chaldea, Greece, Dalmatia, &c. His rambling disposition did not fuffer him to refi: for he left his own country a second time, and died at Liege in the Netherlands in 1724. He wrote An itinerary, or an accoumt of his Travels, in English, French, and Latin.

MANDEVILLO (Bernard de), an eminent writer in the 18th century, was born in Holland, where he studied phyfic, and took the degree of doctor in that faculty. He afterwards came over into England, and in 1714 published a poem, intituled, "The Gumbling Hive, or Knaves turned Honest;" upon which he afterwards wrote remarks, and published the whole at London, 1723, in 8vo, under the title of, "The Fable of the Bees, or private Vices made public Benefits; with an effay on Charity and Charity-schools, and a Search into the Nature of Society." This book was prefented by the jury of Middlefex in July the fame year, and severely animadverted upon in "A Letter to the Right Honourable Lord C." printed in the London Journal of Saturday July 27, 1723. Our author published a Vindication. His book was attacked by feveral writers. He published other pieces, and died in 1724.

MANDRAGORA, in botany. See Atropa.
MANDRAKE, in botany. See Atropa and Musa.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe. Of these there are feveral kinds, as Flat mandrels, which have three or more points between the bed and the verge, and are ufed for turning flat boards on. Pin Mandrels, which have a long wooden Shank to fit into a round hole made in the work to be turned. Hollow Mandrels, which are hollow of themselves, and ufed for turning hollow work. Screw Mandrels, for turning screws, &c.

MANE, the hair hanging down from a horse's neck; which should be long, thin, and fine; and if frizzled, fo much the better.

MANEGE, or Manège, the exercife of riding the great horfe; or the ground fet apart for that purpofe; which is fometimes covered, for continuing the exercife in bad weather; and fometimes open, in order to give more liberty and freedom both to the horfe and horfeman. See Horfeman.

The word is borrowed from the French manège, and that from the Italian maneggio; or, as fome will have it, a manus agendo, "acting with the hand."

Vol. X.
MANGANESE an invasion. Charles of Anjou afterwards removed the bell to Bari, and offered it at the shrine of St Nicholas, as a thanksgiving for the recovery of one of his children. In spite of all the precautions taken by Manfred to secure a brilliant destiny to his new city, neither his pains, nor the horoscopes of his wizards, have been able to render it opulent or powerful. At present, Mr Swinburn informs us, it scarce mutters six thousand inhabitants, though most of the corn exported from the province is shipped off here, and a direct trade carried on with Venice and Greece, for which reason there is a lazaretto established: but from some late instances we may gather, that if the kingdom of Naples has for many years past remained free from the plague, it is more owing to good luck, and the very trifling communication with Turkey, than to the vigilance or incorruptibility of the officers of this port. In 1620, the Turks landed and pillaged Manfredonia. All sorts of vegetables abound here, for flavour and succulence infinitely superior to those raised by continual waterings in the eminent soil of Naples. Lettuce in particular is delicious, and coloured ready, or by superadding a new colour to it. It is rendering glass colourless.

MANGANESE, or MAGNESIA NIGRA, a dark-coloured mineral employed in glass-works for purifying the glaze, by taking away the colour it has already, or by superadding a new colour to it. It is also used in the glazing of earthen ware, where it communicates a black colour. From its property of rendering glass colourless, it has sometimes been called the soap of glaze.

This substance, commonly called black or glass-maker's manganese, is scarcely any other thing than the calx of a new ferimetal, whose properties were for the first time investigated by Mr Scheele in the Stockholm Memoirs for 1774: afterwards it was more fully investigated by Dr Gahn, and lately by several other chemists. Its colour is of a dusky white; and the surface is uneven and irregular, owing to its imperfect fusion. It is bright and shining when first broken, but tarnishes by exposure to air much sooner than any other metallic substance. Its specific gravity is 6.80: it equals, if it does not exceed, iron in hardness as well as difficulty of fusion. When reduced to powder, it becomes magnetic, though large pieces of it are not so. When exposed to the air, it soon crumbles into a blackish brown powder, somewhat heavier than the regulus itself; and this effect is sooner produced in a moist than a dry air.

The regulus is obtained by making the calx or ore of manganese into a ball with pitch, and putting it into a crucible with powdered charcoal one-tenth of an inch thick on the sides and a quarter of an inch at the bottom. The empty space is then to be filled with powdered charcoal, covering the crucible with another. Having luted the joints, the whole is to be exposed to the strongest heat of forge for an hour or more. This regulus is soluble in all the acids, but most readily in the nitrous, the solution in which is generally, a brownish colour. Though that in the others is moli-

Precipitate from these solutions, which by heat grows black and is converted into the original calx of the metal.

Regulus of manganese melts readily with other metals, mercury alone excepted. Copper, united with a certain quantity of it, is extremely malleable; but scarce any traces of the red colour are to be seen on the surface when polished, but the mixture sometimes has a green effulgence by age. Its decomposition by air is very remarkable. A piece of it newly made, when put into a dry bottle well corked, remained perfect for six months: but afterwards, when exposed only for two days to the open air of a chamber, contracted a brown colour on the surface, and became so friable as to crumble, into powder between the fingers the internal parts only retaining an obscure metallic splendour, which also disappeared in a few hours.

This surprising facility of decomposition might naturally lead us to suppose that no such thing as native manganese could exist in the earth. In the Journal de Physique for January 1786, however, M. de Peyrane gives an account of a native regulus of manganese, the properties of which are as follow: 1. In appearance it very much resembles the artificial regulus already mentioned. 2. It dries the fingers by handling. 3. None of its particles are in the least affected by the magnet. 4. It is composed of laminae having a kind of divergence among themselves. 5. Its metallic brilliancy is the same with that of the artificial regulus, and it has a partial malleability. 6. When repeatedly hammered, it exhibits a kind of exfoliation, forming itself into very thin leaves. 7. Its opacity and density are so completely similar to the artificial regulus, that it were not for the matrix in which the latter is imbedded, it would be in a manner impossible to distinguish it.

This regulus is not found in large masses, or in any solid continuous body, but only in clots or lumps inclosed and intermixed with the powdery or calciform ore. These lumps are somewhat flattened or compressed in their form like the artificial ones, though for the most part they are of a larger size. This powdery magnesian ore, in which the reguncle lumps are imbedded, has an argentius hue, as if the materials had been subjected to some violent heat upon the spot.

This regulus was found among the iron mines of Sem in the valley of Viedorfo, in the county of Pox, near the Pyrenean mountains.

Manganese is found in a calciform state, of various colours. M. de Magellan observes, that the aerial acid is the only mineralizer of this ferimetal in its dry state; and that in proportion to the different degrees of phlogification, a variety of colours is produced. When it contains as much phlogiston as possible, without being reduced to a regulus, it always appears of a white colour, and contains about 43 per cent. of fixed air. In proportion to its dephtlogification and union with other substances, its colour is either blue, green, yellow, red, or black.

The black manganese seems to be the decayed particles of that which is indurated. The latter is met with either pure, or in form of balls, seemingly composed of concentric fibres; sometimes, but very rarely, it is met with of a white colour. Cronfeld informs us, that he had a specimen of this from an unknown place.
Manganese in Norway. He found that it differed from the common kind by giving a deep red colour to borax in the fire. By calcination it assumes a reddish brown colour.

Blue manganese, according to Mr. Scheele, acquires its colour from the phlogiston which it is enabled to retain by its union with fixed alkalies. Green arises from a mixture of the blue with the yellow calx of iron, and the yellow colour, from a prevalence of this calx; red from a flight dephlogification of the calx; and black from a thorough dephlogification of it. — The white kind, above mentioned, contains but a very small proportion of iron. Mr. Kirwan also met with it in the form of calcareous spar, and in round masses in the cavities of quartz, and adhering to glaze-blende. The hardness rather less than mellite, the texture sparry, and the substance scarcely magnetic even after roasting: it affords a colourless solution with nitrous acid, from which mild alkalies throw down a white precipitate turning black with heat, as already mentioned, of the regular itself. The white ore has also been found vegetating on the surface of some iron ores, particularly haematites. Mr. Rinman also met with it in a state of union with fixed alkali; but this consists of manganese bedded in zeolite. It melts per ss with the heat of a blow-pipe into a whitish grey porous flag; and with the addition of calcined borax gives a garnet colour to glass. According to Kirwan, many of the white sparry iron ores may be classed among those of manganese, as they contain more of the semi-metal than of iron.

Red manganese is said to be found in Piedmont, but Crompted says he never saw it. He was told by an ingenious workman, that this variety is free from iron, and gives rather a red than violet colour to glas. Mr. Kirwan says, that this kind has less fixed air and more iron than the white kind. It is also joined with ponderous earth, calcareous earth, ponderous spar, and flint. It is found either loose or semi-run over the crucible by too short a time; and covered over in some places like barm with flour, little clots will be formed, and, after being dried before the fire, and after a quarter of an hour the whole will melt and burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame. The heat of the room in which this experiment was tried might be something more than half an hour the whole will grow hot, and at last burst into flame.

Besides the ores mentioned above, Scheele informs us, that he has found manganese existing in potashes. Chemists, he tells us, have often observed, that alkaline salts, when calcined, assume a bluish or greenish colour. The cause of this has been said to be a quantity of phlogiston present in the alkali; but to this he objects, that such a colour is not destroyed by fusion with nitre. When fixed alkali is made to run over the crucible too strongly a fire, the part that attaches itself to the outer skin of the crucible, assumes a yellow colour in consequence of the ashes uniting with it. If one part of alkali of tartar be mixed with one-fourth of fine sifted ashes and one-eighth of nitre, a dark-green mass is obtained, which, by solution in water, affords a beautiful green solution, and when filtered turns red on the addition of a few drops of vitriolic acid. Some days afterwards a small quantity of brown powder falls to the bottom, which discriminates the same chemical properties as manganese. On dissolving a quantity of sifted ashes in nitric acid by digestion in a sand-heat, the same smell of aqua-regias is perceived in mixing manganese with spirit of salt. Adding some hours afterwards a certain quantity of vitriolic acid, in order to precipitate the greater part of the calcareous earth, the liquor had a yellow colour when filtered, and by means of fixed alkali let fall a yellow precipitate, which by calcination turned of a dark-grey, and showed signs of containing manganese. Hence it appears that manganese really exists in the ashes of vegetables, but not equally in all; for Mr. Scheele observes, that wood-ashes contain much more than those of thyme (thymus serpyllum).

Mr
Manganese

Mr Scheele has laboured exceedingly to decompose this substance, and to discover its component parts. He candidly acknowledges, however, that he did not succeed in this investigation according to his wish, and therefore cannot be certain that his conclusions are altogether just. The following experiments, however, he tells us, were made with the greatest accuracy as well as expense of time and trouble.

Half an ounce of phlogilicated manganese, purified from all foreign particles, was calcined upon an iron plate till it grew black. It was then dissolved in diluted vitriolic acid, with the addition of a little sugar, in a sand-heat till the solution became limpid. On cooling, a fine thinning powder precipitated, which proved to be selenite. Having separated this by filtration, and then dissolved the solution with fix ounces of distilled water, precipitating it afterwards by vegetable alkali, the powder was decolorised, and again exposed to calcination (a). The manganese, when deprived of its phlogiton was again dissolved by means of sugar in diluted vitriolic acid; by which means as much selenite was obtained as before. The filtered solution was treated exactly in the same manner, and the operation repeated eleven times, yielding to appearance as much selenite as before. Observing the results of all these calcinations, the manganese was found to be reduced to three drachms and five grains, and the quantity of selenite had increased to 49 grains; the whole seems therefore to be convertible into selenaceous earth. On attempting to invert the experiment, and to produce manganese by combining phlogiton with selenaceous earth, he found it impossible to unite the two substances by any means he could devise.

This analysis of manganese was undertaken at the desire of Mr Bergman; who having informed him that Mr Sage supposes manganese to be nothing else than a mineralised mixture of cobalt and zinc, he afterwards made several experiments with a view to detect these substances, but in vain. "Manganese (says Mr Bergman) has been classed by all mineralogists among the ores of iron; but Mr Pott supposed the iron to be only accidentally mixed with it; and at last Mr Cronstedt, in his Essay on Mineralogy, 1759, placed it among the earths. For my part, however, I must own that there are several circumstances which make me think that it is a metallic substance. No pure earth colours glass, but all metallic caleces have this property. Manganese, therefore, in this respect, shows a great resemblance to the latter; which is further increased by its specific gravity, and its strong attraction for phlogiton." Having then mentioned its precipitation by the Prussian alkali as an additional proof of its metallic nature, he proceeds thus:

"But what kind of metal it is which manganese contains is not so easily ascertained. The solution of cobalt does not lose its colour on adding sugar or any other phlogilicate substance, and zinc does not impart any colour to acids. These two substances consequently differ from manganese, which does not indeed entirely agree with any other of the known metallic earths. I have, however, great reason to conjecture that it must be platina, the earth of which is not yet known; or a new metal, which at least would agree manganese with platina in the greatest difficulty with which it fuses."

It has already been observed, that manganese is used in glass-works, and is capable both of destroying the colour of glass, and of giving a new colour to it, viz. that of violet. Mr Scheele deduces its operation from the properties related under the article Chemistry, no. 159 & seq. He enumerates its effects on glass-fluxes as follows. 1. A colourless glass-flux becomes constantly more or less red on an addition of manganese, according to the quantity. 2. If the flux be a little alkaline, the colour will approach to violet. 3. Arsenic, gypsum, and calx of tin, destroy the red colour in these glasses, and thus render them clearer. But what kind of metal it is which manganese expels the colour to acids. Thefe two substances consequently have some affinity for it, for when gypsum or calx of tin have been mixed with the glassy substance, the red colour disappears; and the same thing takes place on the addition of any metallic calx or any neutral salt containing the vitriolic acid. But here it must be observed, that all metals whose caleces colour glasses, while they deprive it of that which it has received from the manganese, will not fail to communicate their own peculiar colour to it. If to such a colourless glass globule, nitre, even in the smallest quantity, be added, it presently grows red again; and the fame thing happens if such a colourless glass globule be kept in fusion for a few minutes upon an iron plate; and thus the red colour may be made to appear and disappear as often as we please.

From this explanation it appears how manganese purifies glass. When the colour of it depends on a quantity of costly matter, it is improper to add more than is just sufficient to sature the phlogiton. With regard to the green colour of common bottle-glasses, Mr Scheele made the following experiment to determine whether it proceeded from iron or not. Having melted green glass by the blow-pipe upon a piece of the same substance, left in using a crucible he should have been deceived by the iron it contained, he pour-

(a) As in this process a quantity of fixed air is always expelled from the alkali, it was necessary, in order to prevent any of the manganese from being dissolved by it, to place the whole for some hours upon hot sand to expel the aerial fluid.
Manganese, ed upon a large quantity of nitric acid; and having extracted a portion, and poured it into a few drops of the solution of Potrofian alkalies, it assumed a bluish colour. Hence he concludes, that iron, nearly in its metallic form, is present in common green glases: for itself alone gives a yellowish colour to glases, and manganese added to a solution of iron in acids destroys the green colour, substituting a yellow one in its room; and in like manner, nitre added to green glases in fusion takes away its colour. The same effect is produced by manganese if added in proper quantity; though, according to the experiments of Mr Scheele, somewhat of a yellowish colour ought to have been communicated by it; and he is of opinion that it was really so, though the quantity of iron was too small to render it distinctly visible. It is also remarkable, that the rays of light passing through glases of this kind, when nearly red hot, appear of a yellowish colour.

Mr Engel'strom's experiments on this subject are somewhat different from those of Mr Scheele. Having melted manganese and borax together upon a piece of charcoal, the glases at first assumed the common colour of manganese; but this was repeatedly destroyed, and made to appear without adding any thing. During the operation he took notice of the following phenomena: 1. When a small quantity of manganese was taken, the colour was light, but with a larger it became nearly black; and whatever colour it assumed on the first fusion was manifested also at the second, when it was made to reappear. 2. Manganese, on being melted with borax, effervesces violently; which ceases, however, as soon as the manganese is dissolved. 3. To make the colour of the glases disappear, it was necessary only to direct the blue flame of the candle upon the glase, and that equally and constantly, but not very violently. On blowing more faintly, and allowing the brown flame to touch the place, the colour returned. 4. About the time that the glases becomes colourless, a kind of section or partition is observed in it; and as soon as the colour disappears, the blowing must be immediately discontinued, so that the brown flame shall not afterwards touch the glase. When it is taken out with the forceps, it appears perfectly colourless. 5. This destruction of the colour seems to happen suddenly, but by degrees; for when the blowing was now and then discontinued before the two parts had appeared, the glase was generally lighter than before, though not quite colourless.

Though our author had been able to discharge the colour thus from glases, and to make it reappear, it seemed doubtful whether this could be done frequently; for having blown the blue flame violently against some glases, the colour of which he had already twice discharged and made to reappear, he found that it could not again be discharged even by constant blowing for an hour. In another experiment, having added a large quantity of manganese, he found that the glase retained its colour even in the utmost heat he could give it, though it always became colourless when warm, but regained its colour in the cold.

In both these experiments, the violence of the flame had dispersed and driven off some small globules which always remained colourless; the reason of this he thinks is, that manganese, or its colouring part, has a strong attraction for a small part only of borax; and that, by means of a violent heat, the superfluous part of manganese may be separated, and the rest unite more closely with the earthy particles. The same thing happened likewise with the small globules which sometimes remained after the mass was taken away, fixed to the charcoal by the violence of the flame. "If this is really the case (says he), it would follow, that by repeating the experiment some of these particles would always separate a sufficiently strong flame was applied, and it would be impossible to expel the red colour afterwards. I dare not, however, advance this conjecture, though it is grounded on some experiments, as a matter of certainty."

Cronfeld observes, that manganese communicates a colour both to glases and saline solutions. Borax, which has dissolved it, becomes transparent, and assumes a reddish brown hyacinthine colour; the microcosmic falt becomes transparent, of a crimson colour, and mullers in the air. In compositions for glases it becomes violet with the fixed alkalies; but if a great quantity of manganese be added, the glases is in thine lamps and looks black; by scorification with leach the glases obtained the common colour of manganese; and when melted, becomes violet with the fixed alkalies. This is of opinion that it may be destroyed by the blast of fire or arsenic, and like with vanishes of themselves in the air. According to Dr Brunnic, manganese, when melted with nitre, assumes a green colour. Tin unites very readily with manganese, but zinc not without great difficulty; perhaps on account of its volatility and inflammable nature. White arsenic adheres to it, and, by means of the phlogiston, reduces it to a metallic form. By simple calcination a blackish powder is produced; but if the ignition be continued for twelve days, it acquires dark green colour; producing all, sometimes, one of a white or reddish colour. All these various calces, by means of a sufficient degree of heat in a common crucible, run into a yellowish-red glases, which is pellucid, unless from too great thicknesses.

MANGE, in dogs. See Disease of Dogs.

Mange, in fowls. See there, xxii.

MANGEART (Dom. Thomas), a Benedictine of the Congregation of St. Vanne and St. Hidulphe, whose knowledge was an ornament to his order. It gained him also the titles of antiquarian, librarian, and counsellor, to Charles Duke of Lorrian. He was preparing a very considerable work when he died. A.D. 1763, before he had put his last hand to his book, which was published by Abbe Jacquin. This production appeared in 1760 in folio, with this title: "Introduction à la science des Médailles, pour servir à la connoissance des Dieux, de la Religion, des Sciences, des Arts, et de toutes qui appartiennent à l'Histoire ancienne, avec les pieces tirées des Médailles." The elementary treatises on the numismatic science were not sufficiently comprehensive and the particulars disjoined only by tedious and prolix. This learned Benedictine has collected into a single volume all the principles contained in the former, and all the ideas of any consequence which
MANGEL, or Mangelwurzel. See Beta; and Agriculture, no. 52.

MANGER, a raised trench under the rack in the stall, made for receiving the grain or corn that a horse eats.

MANGER, a small apartment, extending abwart the lower-deck of a ship of war, immediately within the haufe-holes, and fenced on the after-part by a partition, which separates it from the other part of the deck behind it. This partition serves as a fence to interrupt the passage of the water, which occasionally gushes in at the haufe holes, or falls from the wet cable whilst it is heaved in by the captern. The water, thus prevented from running aft, is immediately returned into the sea by several small channels, called scuppers, cut through the ship's side within the manger. The manger is therefore particularly useful in giving a convenient direction to the water that enters at the haufe-holes, which would otherwise run aft in great streams upon the lower-deck, and render it extremely wet and uncomfortable, particularly in tempestuous weather, to the men who mets and sleep in different parts thereof.

MANGENOT (Lewis), a cannon of the temple at Paris, where he was born A.D. 1694, and died in 1768 at the age of 74. He was a focial poet, and an amiable man. But although lively and agreeable in his conversation, his character leaned somewhat towards cynical misanthropy. Of this we may judge from the following verses, written on a little portrait which he had erected in a garden dependent on his benefice:

Sans inquietude, sans peine,
Je jouis dans ces lieux du deffin le plus beau.
Les Dieux m'ont accorde l'Amant de Dieux;
Et me fit tous elemens ou tout ce qui toumme.

His Poems were published at Amsterdam in 1776. This collection contains two eclogues full of nature, simplicity, and elegance; and several of which are well composed; tales, which are by far too licentious; moral reflections; sentences; madrigals, &c. &c.

MANGENT (John-James), an eminent phisician, born at Geneva in 1652. The elecor of Brandenburg made him his first physician in 1699; in which post he continued till his death, which happened at Geneva in 1742. He wrote many works; of the most known of which are, 1. A collection of several Pharmacopoeias, in folio. 2. Bibliotheca pharmaceutica-medica. 3. Bibliotheca anatomica. 4. Bibliotheca chemica. 5. Bibliotheca chirurgica. 6. A bibliography of all the authors who have written on medicine, in 4 vols folio. All these works are in Latin. Danielle Clerc, the author of a History of Phyfic, assisted him in writing them.

MANGIFERA, the mango-tree, in botany: A genus of the monogynia order, belonging to the pentandra clas of plants; and in the natural method ranking with those of which the order is doubtfull. The corolla is pentapetalous; the plum kidney-shaped. There is but one species, a native of many parts of the East Indies, whence it has been transplanted to Brazil and other warm parts of America. It grows to a large size; the wood is brittle, the bark Magdalan rough when old; the leaves are seven or eight inches long, and more than two inches broad. The flowers are produced in loose panicles at the ends of the branches, and are succeeded by large oblong kidney-shaped plums. This fruit, when fully ripe, is greatly esteemed in the countries where it grows; but in Europe we have only the unripe fruit brought over in pickle. All attempts to propagate the plant have hitherto proved ineffectual; and Mr Miller is of opinion that the stones will not vegetate unless they are planted soon after they are ripe. He thinks therefore that the young plants ought to be brought over in boxes of earth; after which they may be kept in the tambed of the flove.

MANGOSTAN, or Mangosteen. See Garciniæ.

MANGROVE. See Rhizophora.

MANHEIM, a town of Germany, in the Lower Palatinate, with a very strong citadel, and a palace, where the elector Palatine often resides. It is seated at the confluence of the rivers Neckar and Rhine, in E. Long. 8. 33. N. Lat. 49. 25.

MANHOOD, that stage of life which succeeds puberty or adolescence. See Man, no. 23.

MANIA, or Madness. See Medicine-Index.

MANICHEES, or Manicheans (Manichæa), a sect of ancient heretics, who adhered two principles; so called from their author Manes or Manichæus, a Persian by nation, and educated among the magi, being himself one of that number before he embraced Christianity.

This heresy had its first rise about the year 277, and spread itself principally in Arabia, Egypt, and Africa. St Epiphanius, who treats of it at large, observes, that the true name of this heretarch was Cubricus; and that he changed it for Manes, which in the Persian or Babylonish language signifies vellor. A rich widow, whose servant he had been, dying without issue, left him frote of wealth; after which he assumed the title of the appetor or envoy of Jesus Christ.

Manes was not contented with the quality of apostle of Jesus Chrift, but he also affirmed that of the Paraclete, whom Christ had promised to send; which Augustin explains, by saying, that Manes endeavoured to persuade men, that the Holy Ghost did personally dwell in him with full authority. He left several disciples, and among others Addas, Thomas, and Hermas. These he sent in his lifetime into several provinces to preach his doctrine. Manes, having undertaken to cure the king of Persia's son, and not succeeding, was put in prison upon the young prince's death, whence he made his escape; but he was apprehended soon after, and flayed alive.

However, the oriental writers, cited by D'Herbelot and Hyde, tell us, that Manes, after having been protected in a singular manner by Hormizdas, who succeeded Sapor in the Persian throne, who but was not able to defend him, at length, against the united hatred of the Christians, the Magi, the Jews, and the Pagans, was flut up in a strong castle, to serve him as a refuge against those who persecuted him on account of his doctrine. They add, that after the death of Hormizdas, Varanes I. his successor, first protected Manes, but afterwards gave him up to the fury of the Magi, whose resentment against him was due to his having
Manicheans having adopted the Sadducean principles, as some say; while others attribute it to his having mingled the tenets of the Magi with the doctrines of Christianity. However, it is certain that the Manicheans celebrated the day of their master’s death. It has been a subject of much controversy whether the Manichæans were a real people. The learned Dr Lardner has examined the arguments on both sides; and though he does not choose to deny that he was an impostor, he does not discern evident proofs of it. He acknowledges, that he was an arrogant philosopher and a great schemer; but whether he was an impostor, he cannot certainly say. He was much too fond of philosophical notions, which he endeavored to bring into religion, for which he is to be blamed: nevertheless, he believes, that every bold dogmatist is not an impostor.

The doctrine of Manes was a motley mixture of the tenets of Christianity and the ancient philosophy of the Persians, in which he had been instructed during his youth. He combined these two systems, and applied and accommodated to Jesus Christ the characters and actions which the Persians attributed to the god Mithras.

He established two principles, viz. a good and an evil one: the first, a most pure and subtle matter, which he calls light, did nothing but good; and the second a gross and corrupt substance, which he called darkness, nothing but evil. This philosophy is very ancient; and Plutarch treats of it at large in his fragments, and Orphus.

Our souls, according to Manes, were made by the good principle, and our bodies by the evil one; these two principles being according to him, coeternal and independent of each other. Each of these is subject to the dominion of a superintending being, whose existence is from all eternity. The being who prevails over the light is called God; he that rules the land of darkness bears the title of Hylæ or demon. The ruler of the light is supremely happy, and in consequence thereof, benevolent and good: the prince of darkness is unhappiness in himself, and devourer of rendering others partakers of his misery, and is evil and malignant. These two beings have produced an immense multitude of creatures, resembling themselves, and distributed them through their respective provinces. After a contest between the ruler of light and the prince of darkness, in which the latter was defeated, this prince of darkness produced the first parents of the human race. The beings engendered from this original flock, confit of a body formed out of the corrupt matter of the kingdom of darkness, and of two souls; one of which is sentient and insatiable, and owes its existence to the evil principle; the other rational and immortal, a particle of that divine light which had been carried away in the contest by the army of darkness, and immersed into the mists of malignant matter. The earth was created by God out of this corrupt mass of matter, in order to be a dwelling for the human race, that their captive souls might by degrees be delivered from their corporeal prisons, and the celestial elements extended from the gross substance in which they were involved. With this view God produced two beings from his own substance, viz. Christ and the Holy Ghost: for the Manicheans held a confubstantial Trinity. Christ, or the glorious intelligence, called by the Persians Mithras, subsisting in and by himself, and ruling in Manichees.

The Jew’s, appeared in due time among the Jews, clothed with the shadowy form of a human body, to disengagé the rational soul from the corrupt body, and to conquer the violence of malignant matter. The Jews, invited by the prince of darkness, put him to an ignominious death, which he suffered not in reality, but only in appearance, and according to the opinion of men. When the purposes of Christ were accomplished, he returned to his throne in the sun, appointing apostles to propagate his religion, and leaving his followers the promise of the Paraclete or Comforter, who is Manes the Persian. Those souls who believe Jesus Christ to be the Son of God, renounce the worship of the god of the Jews, who is the prince of darkness, and obey the laws delivered by Christ, and illustrated by Manes the Comforter, are gradually purified from the contagion of matter; and their purification being completed, after having passed through two states of trial, by water and fire, they are immediately raised from the dead, and then in the sun, their bodies return to the original mass (for the Manicheans denied the resurrection of bodies), and their souls ascend to the regions of light. But the souls of those who have neglected the salutary work of purification, pass after death into the bodies of other animals or nature, where they remain till they have accomplished their probation. Some, however, more persevering and obstinate, are consigned to a severer course of trial, being delivered over for a time to the power of malignant aerial spirits, who torment them in various ways. After this a fire shall break forth and consume the frame of the world: and the prince and powers of darkness shall return to their primitive states of anguish and misery, in which they shall dwell for ever. These mansions shall be surrounded by an invincible guard, to prevent their ever renewing a war in the regions of light.

Manes borrowed many things from the ancient Gnostics; on which account many authors consider the Manicheans as a branch of the Gnostics.

In truth, the Manichean doctrine was a system of philosophy rather than of religion. They made use of amulets, in imitation of the Baalians, and are said to have made profession of astronomy and astrology. They denied that Jesus Christ, who was the only God, assumed a true human body, and maintained it was only imaginary: and therefore, they denied his incarnation, death, &c. They pretended that the law of Moses did not come from God, or the good principle, but from the evil one; and that for this reason it was abrogated. They rejected almost all the sacred books in which Christians look for the sublime truths of their holy religion. They affirm, that the Old Testament was not the work of God, but of the prince of darkness, who was substituted by the Jews in the place of the true God. They abjured entirely from eating the flesh of any animal; following herein the doctrine of the ancient Pythagoreans: they also condemned marriage. The rest of their errors may be seen in St Epiphanius and St Augustine; which last, having been of their sect, may be presumed to have been thoroughly acquainted with them.

Tho’ the Manichees professed to receive the books of the New Testament, yet in effect they only took so much of them as suited with their own opinions.
Manichees. They first formed to themselves a certain idea of scheme of Christianity; and to this adjusted the writings of the apostles, pretending that whatever was inconsistent with this had been foiled into the New Testament by later writers who were not Jews. On the other hand, they made fables and apocryphal books pass for apotolical writings; and even are suspected to have forged several others, the better to maintain their errors. St Epiphanius gives a catalogue of several pieces published by Manes, and adds extracts of some of them. These are the Mysteries, Chapters, Gospel, and Treasury.

The rule of life and manners which Manes prescribed to his followers was most extravagantly rigorous and severe. However, he divided his disciples into two classes; one of which comprehended the perfect Christians, under the name of the elect, and the other the imperfect and feeble, under the title of apostates or hearers. The elect were subjected to rigorous and castaneous abstinence from flesh, eggs, milk, fish, wine, all intoxicating drink, wedlock, and all amorous gratifications; and to live in a state of the severest penury, nourishing their emaciated bodies with bread, herbs, pulse, and melons, and depriving themselves of all the comforts that arise from the moderate indulgence of natural passions, and also from a variety of innocent and agreeable pursuits. The auditors were allowed to possess houses, lands, and wealth, to feed on flesh, to enter into the bonds of conjugal tenderness; but this liberty was granted them with many limitations, and under the slightest conditions of moderation and temperance. The general assembly of the Manicheans was headed by a president, who represented Jesus Christ. There were joined to him 12 rulers or masters, who were designed to represent the 12 apostles, and these were followed by 72 bishops, the images of the 72 disciples of our Lord. These bishops and presbyters or deacons under them, and all the members of the religious orders were chosen out of the class of the elect. Their worship was simple and plain; and consisted of prayers, reading the scriptures, and hearing public discourses, at which both the auditors and elect were allowed to be present. They also observed the Christian sacraments of baptism and the eucharist. They kept the Lord's day, observing it as a fast; and they likewise kept Easter and Pentecost.

Towards the 4th century the Manicheans concealed themselves under various names, which they successively adopted, and changed in proportion as they were discovered by them. Thus they assumed the names of Encratites, Apoteles, Saccophori, Hydroparallels, Solitaries, and several others, under which they lay concealed for a certain time, but could not however long escape the vigilance of their enemies. About the close of the 6th century, this sect gained a very considerable influence, particularly among the Persians.

Toward the middle of the 12th century, the sect of Manicheans took a new face, on occasion of one Constatine, an Armenian, and an adherer to it; who took upon him to suppress the reading of all other books besides the Evangelists and the Epistles of St Paul, which he explained in such a manner as to make them contain a new sytem of Manicheism. He entirely disapproved all the writings of his predecessors; rejecting the chimeras of the Valentinians, and their 50 zeons; the fable of Manes, with regard to the origin of rain and other dreams; but still retained the impieties of Basilides. In this manner he reformed Manicheism, informing his followers made no scruple of anathematizing Seuthus, Buddha, called also Adam and Terebrinth, the contemporaries and disciples, as false, and, according to others, the predeccessors and masters of Manes, and even Manes himself, Constantine being now their great apostle. After he had redued an infinite number of people, he was at last flonned by order of the emperor.

This sect prevailed in Bofnia and the adjacent provinces about the close of the 15th century; propagated their doctrines with confidence, and held their religious assemblies with impunity.

MANICORDON, or MANICORD, a musical instrument in form of a spinner; the strings of which like those of the clarionet, are covered with little pieces of cloth, to deaden as well as to soften their sound, whence it is also called the dumb fiddle.

MANIFESTO; a public declaration made by a prince in writing, shewing his intentions to begin a war or other enterprise, with the motives that induce him to it, and the reasons on which he finds his right, and pretensions.

MANIHOT, or MANIOC. See Jatropha.

MANILA, LUSONIA, or Luzon, the name of the largest of the Philippine islands in the East Indies, subject to Spain. It had the name of Luzon from a custom that prevailed among the natives of beating or bruising their rice in wooden mortars, before they either boiled or baked it; luzon, in their language, signifying a mortar.

As to situation, it is remarkably happy, lying between the eastern and western continents, and having China on the north, at the distance of about 60 leagues; the islands of Japan on the north-east, at the distance of about 250 leagues from the nearest of them; the ocean on the east; the other islands on the south; and on the west Malacca, Patana, Siam, Cambodia, Cochinchina, and other provinces of India, the nearest of the 300 leagues.

The middle of this island is at the latitude 12° north; the east point is 13° 38', and the most northern point on 19°. The shape of it is said to resemble that of an arm bent; the whole length being about 160 Spanish leagues, the greatest breadth between 30 and 40, and the circumference about 350. As to the longitude, the charts differ, some making the middle of the island to lie 113° east from London, and others in 160°. The climate is hot and moist. One thing is held very extraordinary, that in stormy weather there is much lightning and rain, and that thunder is seldom heard till this is over. During the months of June, July, August, and part of September, the wet and south winds blow, which they call sendanais, bringing such rains and storms, that the fields are all over-flowed, and they are forced to have little boats to go from one place to another. From October till the middle of December, the north wind prevails; and from that time till May, the east and south-east; which winds are there called breezes. Thus there are two seasons in those seas, by the Portuguese called monzes; whence our word monsoons; that is, the breezes half
Plate CCLXXIX.

Machul.

Masrahitha.

Maccropelocidus.

Mantis.

Manus or Scaly Lizard. Long tailed.

Short tailed.
half the year with a serene dry air; and the venn
vales the other half, wet and stormy. It is further to
be observed, that in this climate no venom breed up
on the earth, though they wear dirty frits, whereas
it is otherwise with the Indians. The days here being
always of an equal length, and the weather never
cold, neither their clothes, nor the hour of dining,
sleeping, doing business, studying, or praying, are
ever changed; nor is cloth worn, but only against
the rain.

The air here being, as has been observed, very
hot and moist, is not wholesome; but is worse for young
men that come from Europe than for the old. As
for the natives, without using many precautions, they
live very commonly to four o'clock or 100. The soil is so
rich that rice grows even on the mountains without
being watered; and this makes it fo

The face of the soil,

entirely on the gifts of the

There are 40 different sorts of palm-trees, the most
excellent cocoa, wild cinnamon, wild nutmegs, and
some few wild clove-aloe; ebony; sandalwood; the
best caña, and in such plenty, that they feed their
hogs with its fruit; all kinds of cattle, and prodigious
quantities of gold, amber, and ambergilfe.

Among the disadvantages of the island, besides frequent and terrible earthquakes, there are several burning
mountains. The face of the island, however, is far from
being disfigured by them, or by the consequences of their
explosions.

The mountaineers, called Tengilian, have no particular
place of abode, but always live under the shelter of
trees, which serve them instead of houses, and furnish
them with food; and when the fruit is eaten up, they
remove where there is a fresh fruit.

There are 40 different sorts of palm-trees, the most
efficient cocoa, wild cinnamon, wild nutmegs, and
some few wild clove-aloes; ebony; sandalwood; the
best caña, and in such plenty, that they feed their
hogs with its fruit; all kinds of cattle, and prodigious
quantities of gold, amber, and ambergilfe.

There are several forts of people in this island besides
the Spaniards, as the Tagalians or Tagalezle, the
Pintadues or painted negroes, the Hayas or Tingi­
lanos, and the Negritos. The Tagalians, who are
thought to be Malayans by defect, are amorous, trac­
table, and well disposed people. The Pintadues, or
painted negroes, are tall, straight, strong, active, and
of an excellent disposition. The Tingi­lanos, whom some
suppose to be descended from the Japanese, are
verybrave, yet very courteous and humane. They live
entirely on the gifts of nature; and never sleep under
any other shade than that of the trees or a cave.
The Negritos, who are held to be the Aborigines of the
island, are barbarous and brutal to the last degree.
When they kill a Spaniard, they make a cup of his
skull and drink out of it.

This island is divided into several provinces, con­
taining divers towns, the chief of which are Manila,
Caceres, New-Segovia, Bondo, Halifaco, Ibálon, Bal­
law, Serfocon, of Bagatao, Lampot, Fernando, Boh­
lao, Playahonda, Cavit, Myndora, Callely, and Balyan.

Manila, the capital of an island of the same name in
the East Indies, on the south-east side of the island,
where a large river falls into the sea, and forms a noble
bay 30 leagues in compass, to which the the Spaniards
have given the name of Bahía, because the river runs
out of a great lake, which lies at the distance of
six leagues behind it. In compass it is two miles,
in length one third of a mile; the shape irregular,
being narrow at both ends, and wide in the middle. On
the south it is washed by the sea, and on the north
and east by the river, being also strongly fortified with
walls, bastions, forts, and batteries.—Manila contains
about 30,000 souls, who are a very motley race, distin­
guished by several strange names, and produced by the
junction of Spaniards, Chinese, Malays, Blacks, and
others inhabiting the city or islands depending on
it. Without the walls are large suburbs particularly
that inhabited by the Chinese merchants, called
Sangleyes. In proportion to the size of the place, the
number of churches and religious houses is very great.
Only small vessels can come up to Manila; but three
leagues from it is the town and port of Cavite, de­
defended by the castle of S. Philip, and capable of re­
ceiving the largest ships. Here stands the arsenal
where the galleons are built, for which there are from
300 to 600 or 800 men constantly employed, who are
reached every month, and while upon duty are main­
tained at the king's expence. By an earthquake which
happened here in 1645, a third part of the city of
Manila was destroyed, and no less than 3000 people
perished in the ruins.

In the war before lafi, Spain having entered into en­
gagements with France, in consequence of the family
compact of the house of Bourbon, it was found expe­
dent by Britain to declare war also against Spain.
Whereupon a force was sent out from the East-India
settlements, particularly Madras, for the conquest of
the Philippine Islands, under General Draper and
Admiral Cornwall; who after a siege of 12 days, took
Manila on the 6th of October 1762 by storm; but, to
save some city from destruction, agreed to accept a
ransom, amounting to a million sterling; a part of
which, it is said, was never paid. The Spanish vice­
roy resides in the city, and lives like a sovereign
prince. The government is said to be one of the best
in the gift of the king of Spain. When the city was
taken, as above, the archbishop, who is a kind of
pope in this part of the world, was also viceroy. Five
large ships loaded with the riches of the East, as dia­
monds from Golconda, cinnamon from Ceylon, pepper
from Sumatra and Java, clove and nutmegs from the
Moluccas and Banda islands, camphire from Borneo,
and others, were sent to Portugal, and returned freighted
in silver, making 400 per cent. profit.

The city of Manila is governed by two alcaldes: the reft
of the cities and great towns have each an alcaldé;
and in every village there is a corrregidor. Appeals
from their sentences are made to the royal court at
Manila, in which there are four judges, and of which
each has a salary of 3000 pieces of eight per annum. The
vicecy is pres­ident; and in that quality he has an income of 4000
pieces of eight, but he has no voice; yet if the judges
are equally divided, the president names a doctor of
the civil law, who, in virtue of his appointment, has a
decisive voice. The attorney-general, in right of
his office, is protector of the Chineses, in consideration
of which he receives 600 pieces of eight every year.
As for the Indians that are in subjection, they pay
tribute in the following proportions: Young men from
The Greeks and Maronilies.

Manilius (Marcus), a Latin poet, whose poem, had the ill luck to lie buried in some German libraries, and was not heard of in the world until Poggio, about two centuries ago, published him from some old manuscripts he found there. There is no account to be found of him but what can be drawn from his poem, which is called *Astronomicon*; and contains a system of the ancient astronomy and astrology, together with the philosophy of the Stoics. It consists of five books; though there was a sixth, which is lost. It is probable he died centuries ago, published him from some old manuscripts, deacons, and subdeacons in the same thing.

**MANIPULUS** is also an ecclesiastical ornament worn by the priests, deacons, and subdeacons in the Roman church. It consists of a little fillet in form of a rosette, three or four inches broad, and made of the same stuff with the chasuble; signifying and representing an handcğerchief which the priests in the primitive church wore on the arm to wipe off the tears they were continually shedding for the sins of the people. There still remains a mark of this usage in a prayer rehearsed by those who wear it:

*Domine, Domine, fortiter manipulus fertur et doleris.*

The Greeks and Maronites wore two maniples one on each arm.

**MANIPULUS,** among physicians, is used to signify a handful of herbs or leaves, or so much as a man can grasp in his hand at once; which quantity is frequently denoted by the abbreviation, **M.**

**MANOS,** **MANIOC,** **MANIPULUS.**

**MANILLE,** in commerce, a large brass ring in the form of a bracelet, either plain or engraved, flat or round.

Manilles are the principal commodities which the Europeans carry to the coast of Africa, and exchange with the natives for slaves. These people wear them as ornaments on the wrist of the leg, and on the thick part of the arm above the elbow. The great men wear manilles of gold and silver; but these are made in the country by the natives themselves.

**MANIOC,** **MANIPULUS,** **MANIPILUS.** See JATROPHA.

**MANIPULUS,** **MANIPILUS.** Among the Romans, was a little body of infantry, which in the time of Romulus consisted of 100 men; and in the time of the confuls, and first Caesars, of 200.

The word properly signifies "a handful," and, according to some authors, was first given to the handful of hay, which they bore at the end of a pole, to distinguish themselves by, before the custom was introduced of bearing an eagle for their ensign; and hence also the phrase, a *handful of men.* But Vegetius, Modestus, and Varro, gave other etymologies of the word: the last derives it from *manu,* a little body of men following the same standard. According to the former, this was called manipuliius, because they fought hand in hand or all together; *Consulturnium autem manipulus vocatur at ejus, quod conjunctis manipulis partier detinere.*

Each manipule had two centurions, or captains, called *manipularii,* to command it; one whereof was lieutenant to the other. Each cohort was divided into three maniples, and each manipule into two centuries.

Aulus Gellius quotes an old author, one Cincius, who lived in the time of Hannibal (whose prisoner he was), and who, writing on the art of war, observes, that then each legion consisted of 60 centuries, of 30 maniples, and of ten cohorts. And again, Varro and Vegetius mention it as the least division in the army, only consisting of the tenth part of a century; and Spartian adds, that it contained no more than ten men. This shows that the manipule was not always the same thing.

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M A N [ 539 ]

Manlius; Manna.

of Guinea; the *qofele* of the Negroes, which, Des
Marchais says, grows to the length of eight feet, of
which the tail is four. It lives in woods and marshy
places; feeds on ants, which it takes by laying its long
tongue across their paths, which is covered with a
vicious fangs, so that the insects which attempt to pull
over it cannot extricate themselves.

2. The *retrādēstyla*, or long-tailed manis, with four
toes on each foot. This species is very similar to
the former; only the tail of it is much longer in propor-
tion to the body; and such parts as want scales,
instead of being naked, are covered with a soft hair.
It inhabits Guinea, and is also found in the East In-
dies.

MANLEY (Mrs), the celebrated writer of the *A-
talantis*, was the daughter of Sir Roger Manley, the
reputed author of the first volume of the *Turkish Spy*.
She left her parents very early; and after having been
deluded into a false marriage by her guardian, who
was her cousin, and after she had deserted him, she was
patronized by the duchesses of Cleveland, mistresses
of Charles II. But the duchesses, being a woman of a
very fickle temper, grew tired of Mrs Manley in six
months time; and discharged her upon a pretext,
whether groundless or not is uncertain, that she
injured her with her fan. After this she wrote her first
tragedy, called *Royal Mistick*, which was acted with
great applause in 1696; and her apartment being fre-
bred by men of wit and gallantry, the foon engaged in
amours, and was taken into keeping. Her pen now
grew as licentious as her conduct; for, in her retired
hours, she wrote four volumes, called *Memoirs of the New Atlantis*; in which she was not only very free in
her wanton tales of love-adventures, but satirized
the characters of many distinguished personages,
especially those who had a principal concern in the Re-
volution. A prosecution was commenced against her for
this work; but whether those in power were allured
to bring a woman to trial for a few amorous trifles,
or whether the laws could not reach her disgraced fa-
tire, she was discharged; and a total change of the
ministry ensuing. Mrs Manley lived in high reputa-
tion and gaiety, amusing herself with the conversation
of wits, and writing plays, poems, and letters. She
died in 1722.

MANLIUS (Capitolinus), the renowned Roman
confid and general, who saved the capital when it was
attacked by the Gauls in the night; he was alarmed
by the cries of geese, which were ever after held fa-
cred. But being afterwards accused of aspiring at the
sovereignty, he was thrown from the Tarpeian rock.
See GAIU and ROME.

MANLIUS (Torquatus), a celebrated confid and Ro-
man captain; had great wit, but difficulty in expres-
ing himself, which induced Manlius Imperiosus, his
father, to keep him almost by force in the country.
Pompey, tribune of the people, enraged at this in-
stance of severity, formed a design of accusing Man-
lius the father before the judges; but Torquatus be-
ing informed of it, went to that tribune, and, with a
poniard in his hand, made him swear that he would
not proceed in that accusation against him to whom he
owed his life. At length Torquatus was made mili-
tary tribune, and killed a solder of the Gauls in single
combat, from whom he took a gold chain that he
wore about his neck. From this action he obtained
the name of Torquatus. He was confid in the war
against the Latinis; when he ordered his own fon to be
beheaded, for fighting contrary to his orders, though
he had gained the victory. He conquered the
enemies of the republic, and was several times made
confid; but at last refused the consulship, saying,
that it was no more possible for him to bear with
the vices of the people, than it was for the people to bear
with his severity.

M ANNA, in the materia medica, the juice of cer-
tain trees of the aff kind*, either naturally concreted
on the plants, or exsiccated and purified by art. There
are several sorts of manna in the thops. The larger
pieces, called *flake manna*, are usually preferred;
though the smaller grains are equally good, provided
they are white, or of an agreeable yellow colour; very light,
of a sweet, not unpleasant taste, and free from any vi-
bile impurities. Some people in India, particularly prefer the rat-
honey-like manna to the foregoing; this has either
been exposed to a moif air, or damaged by sea or other
water. This kind of manna is said to be sometimes
counterfeited by a composition of sugar and honey mix-
ed with a little scummony; there is also a fictitious
manna, which is white and dry, said to be composed of
sugar, manna, and some purgative ingredient, boiled to
a proper consistence. This may be distinguished by its
weight, solidity, transparent whiteness, and its
taste, which is different from that of manna.

Manna is a mild, agreeable laxative; and may be
given with safety to children and pregnant women;
whereas, in some particular confidions, it acts
very indifferently, producing flatulent and diffusions
of the visceræ; these inconveniences may be prevented
by the addition of any grateful warm aromatic. It
operates so weakly, that it does not produce the full
effect of a cathartic, unless taken in large doses; and
hence it is rarely given in this intention by itself.
It may be commodiously dissolved in the purging min-
eral waters, or united to the cathartic salts, senna,
rhubarb, or the like. Geoffroy recommends acuating it
with a few grains of emetic tartar; by this manage-
ment, he says, bilious fomn will be plentifully evac-
uated, without any nausea, gripes, or other incon-
vence. It is remarkable, that the efficacy of this drug
is greatly promoted (if the account of Vallisneri is to
be relied on) by a sublimate which is itself every flow of
operation, *viz.*, *calxi*; See CASSIA.

M ANNA, is also a Scripture-term, signifying a mi-
raculous kind of food which fell from heaven for the
support of the Israelites in their paffage through the
wilderness, being in form of coriander-seeds, its co-
lor like that of balsam, and its taste like honey.

The Scripture gives to manna the name of the *bread
of heaven*, and the *food of angels*, Psal. lxxviii. 25.
whether it would intimitate us, that the angels fent
and prepared this food, or that angels themselves, if
they had need of any food, could not have any that
was more agreeable than manna was. The author of
the Book of Wisdom says, xvi. 20-21. that manna
so accommodated itself to every one's taste, that every
one found it pleasing to him; and that it included every
thing that was agreeable to the palate and fit for good
nourish-
The critics are divided about the original of the word manna. Some think that man is put instead of the Hebrew word mab, which signifies "What is this? and that the Hebrews, then first seeing that new food which God had sent them, cried to one another, for food to the people; that it falls in Arabia, which is this, etc. Others maintain, that the Hebrews very well knew before what manna was; and that, seeing it in great abundance about their camp, they said to one another, man-hu, 'This is manna.' Mr. Sammisse and some other moderns are of this last opinion. They imagine, that the manna which God sent the Israelites was nothing else but that fat and thick dew which still falls in Arabia, which very soon congealed, and served for food to the people; that this was the same thing as the wild honey, mentioned Matt. iii. 4. Wherewith John the Baptist was fed; and that the miracle of Moses did not consist in the production of any new substance, but in the exact and uniform manner in which the manna was dispensed by Providence for the maintenance of such a great multitude.

On the contrary, the Hebrews and Orientals believe, that the fall of the manna was wholly miraculous. The Arabians call it the sugar-plums of the Almighty; and the Jews are so jealous of this miracle, that they pronounce a curse against all such as presume to deny the interposition of a miraculous power.

Our translation, and some others, make Moses fall into a plain contradiction in relating this story of the manna, which they render thus: "And when the children of Israel saw it, they said one to another, It is manna; for they knew not what it was." Exodus xvi. 15. Whereas the Septuagint, and several authors both ancient and modern, have translated the text according to the original, "The Israelites seeing this, said one to another, 'What is this? for they knew not what it was.' " For we must observe, that the word by which they asked, what this is &c. was in their language man, which signifies likewise meat ready provided; and therefore it was always afterwards called man or manna.

Whether this manna had those extraordinary qualities in it or no, which some imagine, it must be allowed to be truly miraculous, upon the following accounts. 1. That it fell but six days in the week. 2. That it fell in such a prodigious quantity, as sustained almost three millions of souls. 3. That there fell a double quantity every Friday, to serve them for the next day, which was their Sabbath. 4. That what was gathered on the first five days flew and bred worms if kept above one day: but that which was gathered on Friday kept sweet for two days. And lastly, That it continued falling while the Israelites abode in the wilderness, but ceased as soon as they came out of it and had got corn to eat in the land of Canaan.

A great quantity of fine manna is gathered at Carini in Sicily, oozing from a kind of alh-tree with a bark similar to that of the ebony, and a leaf somewhat like the acea. M. de Non*, who gives an account of this manna, says, that it is produced from young trees about seven or eight years old when they are only about eight feet high. Incisions are then made horizontally in the bark, and from these the manna flows. The incisions are made from the earth to the top of the tree, and are repeated every two days from the end of July till the circulation is stopped in the course of the year, or till the manna becomes worse in quality. It exudes first as a white frothy liquor extremely light, pleasannt to the taste, and of an agreeable flavour, which is coagulated by the heat of the sun, and assumes an appearance somewhat resembling filalities. This is the best kind, and by the people of that country is called lachrymatory or cane manna. The inferior kind appears at the foot of the tree in the form of a glutinous and higher colored liquor, which is received on the leaves of the Indian fig, which are placed for that purpose at the foot of the tree. This also conceals by the heat of the sun; though it is more heavy, purgative, and of much less value than the former. It is called fat manna: In this part only resides the sweet and disagreeable flavour observablc in manna; for the cane manna is of an agreeable flavour, and is an excellent stomalic. It is got off from the bark of the tree by bending and shaking it. In rainy seasons, they must gather the manna every day, which both lessens the quantity and renders it of inferior quality. When the skin of the tree is entirely covered with incisions, they cut it down close to the ground: after which it punes out new tufts of wood, one or two stems of which are preferred, and at a proper age produce manna as before. The tree itself is propagated by seed, and afterwards transplanting it. The wood is hard and heavy, of a bitter taste, and recommended in the dropy. It thrives only in hot climates, and requires to be exposed to the north winds in order to make it productive; but M. de Non is of opinion, that it might be propagated, and would produce manna in Provence in France. The Sicilian manna is dearer and more esteemed than that of Calabria, though the latter is more generally known and cultivated. The tree does not grow in any other part of the island excepting about Carini, where it is native.

MANNERS, in painting, a habitude that a man acquires in the three principal parts of painting, the management of colours, lights, and shadows; which is either good or bad according as the painter has practiced, more or less after the truth, with judgment and study. But the best painter is he who has no manner at all. The good or bad choice he makes is called gusto.

MANNERS, the plural noun, has various significations; as, the general way of life, the morals, or the habits, of any person or people; also ceremonial behaviour, or studied civility. See the next article.
M A N

Good-Manners, according to Swift, is the art of making those people easy with whom we converse. Whoever makes the well-born persons uneasy, is the butt bred in the company.

As the best law is founded upon reason, so are the best manners. And as some lawyers have introduced unreasonable things into common law; so likewise many teachers have introduced absurd things into common good-manners.

One principal point of this art is to suit our behaviour to the three several degrees of men; our superiors, our equals, and those below us.

For instance, to pres, either of the two former to eat or drink is a breach of manners, but a tradesman or a farmer must be thus treated, or else it will be difficult to persuade them that they are welcome.

Pride, ill-nature, and want of tenderness, are the three great sources of ill-manners: without some one of these defects, no man will behave himself ill for want of experience; or of what, in the language of fools, is called knowing the world.

I defy (proceeds our author) any one to assign an incident wherein reason will not direct us what we are to say or do in company, if we are not misled by pride or ill-nature. Therefore, I insist that good sense is the principal foundation of good-manners; but because the former is a gift which very few among mankind are possessed of, therefore all the civilized nations of the world have agreed upon fixing some rules for common behaviour, best suited to their general customs, or fancies, as a kind of artificial good-taste to supply the defects of reason. Without which, the gentle many part of dunces would be perpetually at cuffs, as they seldom fail when they happen to be drunk, or engaged in squabbles about women or play. And, God be thanked, there hardly happens a duel in a year, which may not be imputed to one of those three motives. Upon which account, I should be exceedingly sorry to find the legislature make any new laws, against the practice of duelling; because the methods are easy, and many, for the wise man to avoid a quarrel with honours, or engage in it with innocence. And I can discover no political evil, in suffering bullies, sharers, and rakes, to rid the world of each other by a method of their own, where the law hath not been able to find an expedient.

As the common forms of good-manners were intended for regulating the conduct of those who have weak understandings; so they have been corrupted by the persons for whose use they were contrived. For these people have fallen into a needleless and endless way of multiplying ceremonies, which have been extremely troublesome to those who practice them, and impossible to every body else; insomuch that wise men are often more uneasy at the over-civility of these refiners, than they could possibly be in the conversation of peasants or mechanics.

The impertinencies of this ceremonial behaviour are nowhere better seen than at those tables where ladies preside, who value themselves upon account of their good-breeding, where a man must reckon upon falling an hour without doing any one thing he hath a mind to, unless he will be so hardy as to break thro' all the settled decorum of the family. She determines what he loveth best, and how much he shall eat; and if the master of the house happeneth to be of the same disposition, he proceedeth in the same tyrannical manner: but if not, at the same time you are under the necessity of answering a thousand apologies for your entertainment. And although a good deal of this humour is pretty well worn off among many people of the best fashion, yet too much of it still remaineth, especially in the country; where an honest gentleman assured me, that having been kept four days against his will at a friend's house, with all the circumstances of hiding his boots, locking up the fable, and other contrivances of the like nature, he could not remember, from the moment he came into the house to the moment he left it, any one thing wherein his inclination was not directly contradicted; as if the whole family had entered into a combination to torment him.

But, besides all this, it would be endless to recount the many foolish and ridiculous accidents I have observed among these unfortunate profelytes to ceremony. I have seen a duchess fairly knocked down by the precipitancy of an officious coxcomb running to fence her the trouble of opening a door. I remember, upon a birth-day at court, a great lady was rendered utterly discomfited, by a dill of the sauce let fall by a page directly upon her head-dress and brocade, while she gave a sudden turn to her elbow upon some point of ceremony with the person who fat next her. Monsieur Boys, the Dutch envoy, whose politics and manners were much of a size, brought a box with him about 13 years old to a great table at court. The boy and his father, whatever they put on their plates, they first offered round in order, to every person in the company; so that we could not get a minute's quiet during the whole dinner. At last their two plates happened to encounter and with so much violence, that, being china, they broke in 20 pieces, and stained half the company with wet sweetmeats and cream.

There is a pedantry in manners as in all arts and sciences, and sometimes in trades. Pedantry is properly the over-rating any kind of knowledge we pretend to. And if that kind of knowledge be a face in itself, the pedantry is the greater. For which reason I look upon fiddlers, dancing-masters, heralds, masters of the ceremony, &c., to be greater pedants than Lippis, or the elder Scalliger. With these kind of pedants the court, while I knew it, was always plentifully flocked, I mean from the gentleman- usher (at least) inclusive, downward to the gentleman porter; who are, generally speaking, the most insignificant race of people that this island can afford, and with the smallest tincture of good-manners, which is the only trade they profess. For being wholly illiterate and conversing chiefly with each other, they reduce the whole system of breeding within the forms and circles of their several offices; and as they are below the notice of minifters, they live and die in court under all revolutions, with great obsequiousness to those who are in any degree of credit or favour, and with rudeness and insolence to every body else. From whence I have long concluded that good-manners are not a plant of the court-growth: for if they were, those people who have understandings directly of a level for such acquisitions, and who have served such long apprenticeships to nothing else, would certainly have picked them up. For as to the great
great officers who attend the prince's person or council, or preside in his family, they are a transient body, who have no better a title to good-manners than their neighbours, nor will probably have recourse to gentlemen-uthers for instruction. So that I know little is to be learned at court on this head, except in the material circumstance of drefs: wherein the authority of the maids of honour must indeed be allowed to be almost equal to that of a favourite acrée.

"I remember a passage my lord Bolingbroke told me: That to receive prince Eugene of Savoy at his landing, in order to conduct him immediately to the queen, the prince said he was much concerned that he could not see her majesty that night: for Monsieur Hoffman (who was then by) had assuèd his highness, that he could not be admitted into her presence with a tied up periwig: that his equipage was not arrived: and that he had endeavoured in vain to borrow a long one among all his valets and pages. My lord turned the matter to a jest, and brought the priacè to her majesty: for which he was highly cenfured by the whole tribe of gentlemen-uthers, among whom Monsieur Hoffman, an old dull resident of the emperor's, had picked up this material point of ceremony: and which, I believe, was the better lesson he had learned in 25 years residence.

"I make a difference between good-manners and good breeding: although, in order to vary my expression, I am sometimes forced to confound them. By the first, I only understand the art of remembering and applying, certain settled forms of general behaviour. But good-breeding is of a much larger extent: for besides an uncommon degree of literature sufficient to qualify a gentleman for reading a play, or a political pamphlet, it taketh in a great compass of knowledge; no less than that of dancing, fighting, gaming, making the circle of Italy, riding the great horse, and speaking French; but to mention some other secondary or subservient accomplishments, which are more easily acquired. So that the difference between good-breeding and good-manners lieth in this: That the former cannot be attained to by the best understandings, without study and labour: whereas a tolerable degree of reason will instruct us in every part of good-manners without other assistance.

"I can think of nothing more useful upon this subject, than to point out some particulars wherein the very essentials of good-manners are concerned, the negligence or perverting of which doth very much disturb the good commerce of the world, by introducing a traffic of a mutual unacquaintance in most companies.

"First, a necessary part of good-manners is a punctual observance of time at our own dwellings, or those of others, or at third places, whether upon matters of civility, business, or diversion; which rule, though it be a plain dictate of common reason, yet the greatest minifier I ever knew, was the greatest transgressor against it; by which all his businesses doubled upon him, and placed him in a continual arrear. Upon which I often used to rally him as deficient in point of good-manners.

I have known more than one ambassadour, and secretary of state, with a very moderate portion of intellectual parts, execute their office with great faces and aplaus, by the mere force of exactness and regularity. If you duly observe time for the service of another, it doubles the obligation; if upon your own account, it would be manifest folly, as well as ingratitude to neglect it; if both are concerned, to make your equal or inferior attend on you to his own disadvantage, is pride and injustice.

"Ignorance of forms cannot properly be styled ill-manners: because they are subject to frequent changes; and consequently not being founded upon reason, are beneath a woman's regard. Besides, they vary in every country; and after a short period of time vary frequently in the same: so that a man who travelleth, must needs be at first a stranger to them in every court through which he passeth; and perhaps, at his return, as much a stranger in his own; and, after all, they are easier to be remembered or forgotten than faces or names.

"Indeed, among the many impertinencies that superficial young men bring with them from abroad, this bigotry of forms is one of the principal, and more predominant than the rest; who look upon them not only as if they were matters capable of admiring of choice, but even as points of importance; and therefore are zealous upon all occasions to introduce and propagate the new forms and fashions they have brought back with them: so that, usually speaking, the world-born person in the company is a young traveller just arrived from abroad."

MANNORI (Lewis), late advocate of the parliament of Paris, where he was born in 1696, and died in 1777. From him we have 18 vols 12mo of Pleadings and Memoirs. A great number of singular cases occur in this collection: and the author has the talent of rendering them more striking by the agreeable manner in which they are stated. He was Travanc's counsellor in his process against Voltaire, and was very satirical against that poet. The latter took revenge by describing him as a mercenary babbler, who told his pen and his abode to the highest bidder.—Whatever may be the case, Mannoni would certainly have been more esteemed both as an advocate and as a writer, if he had paid more attention to his style, and had been less prolix: if he had thought more deeply, and been more sparing of knowledge and found reason. He published also a translation into French of Father Père's funeral Oration on Louis XIV. and very judicious Observations on the Semiramis of Voltaire. In company Mannoni was full of wit and spirit, but sometimes a little too cutting and severe.

MANGEVRE, in a military sense, consists solely in distributing equal motion to every part of a body of troops, to enable the whole to form, or change their position in the most expeditious and best method, to answer the purpose required of a battalion, brigade, or line of cavalry, artillery, or infantry. It has always been lamented, that men have been brought on service without being informed of the uses of the different maneuvres they have been practising; and, having no ideas of any thing but the uniformity of the parade, instantly fall into disorder and confusion when they lose the step, or see a deviation from the straight line they have been accustomed to at exercise. It is a pity to see so much attention given to show, and so little to instruct the troops in what may be of use to
MAN [ 543 ]

Manometer, or Manometer, or Manoscope, an instrument to show or measure the alterations in the rarity or density of the air. The manometer differs from the barometer in this, that the latter only serves to measure the weight of the atmosphere, or of the column of air over it; but the former, the density of the air in which it is found; which density depends not only on the weight of the atmosphere, but also on the action of the heat and cold, &c. Authors, however, generally confound the two together; and Mr. Boyle himself gives us a very good manometer of his contrivance, under the name of a flat or horizontal barometer, consisting of a bubble of thin glass, about the size of an orange, which, being counterpoised when the air was in a mean state of density, by means of a nice pair of scales, sunk when the atmosphere became lighter, and rose as it grew heavier.

Another kind of manometers were made use of by colonel Roy, in his attempts to correct the errors of the barometer, and are described in the Philosophical Transactions, Vol. LXVII. p. 689. "They were (says he) of various lengths, from four to upwards of eight feet; they confisted of straight tubes," whose bores were commonly from 1/12th to 1/8th of an inch in diameter. The capacity of the tube was carefully measured, by making a column of quicksilver, about three or four inches in length, move along it from one end to the other. These spaces were severally marked, with a fine-edged file, on the tube; and transferred from them to long slips of pasteboard, for the subsequent construction of the scales respectively belonging to each. The bulb, attached to one end of the manometer at the glass-house, was of the form of a pear, whose point being occasionally opened, dry or moist air could be readily admitted, and the bulb sealed again, without any sensible alteration in its capacity.

"The air was confined by means of a column of quicksilver, long or short, and with the bulb downward or upwards, according to the nature of the proposed experiment. Here it was observed, that from the motion of the quicksilver to the tube, the instrument will not act truly, except it be in a vertical position; and even then it is necessary to give it a small degree of motion, to bring the quicksilver into its true place; where it will remain in equilibrio, between the external pressure of the atmosphere on one side, and the interior elastic force of the confined air on the other.

"Pounded ice and water were used to fix a freezing point on the tube; and by means of salt and ice, the air was further condensed, generally four, and sometimes five or six degrees below zero. The thermometer and manometer were then placed in a tin vessel among water, which was brought into violent ebullition; where having remained a sufficient time, and motion being given to the manometer, a boiling point was marked therewith. After this the fire was removed, and the gradual defects of the piece of quicksilver, corresponding to every 20 degrees of temperature in the thermometer, were successively marked on a deal rod applied to the manometer. It is to be observed, that both instruments, while in the water were in circumstances perfectly similar; that is to say, the ball and bulb were at the bottom of the vessel.

In order to be certain that no air had escaped by the side of the quicksilver during the operation, the manometer was frequently placed a second time in melting ice. If the barometer had not altered between the beginning and end of the experiment, the quicksilver always became stationary at or near the first mark. If any sudden change had taken place in the weight of the atmosphere during that interval, the same was noted, and allowance made for it in afterwards proportioning the spaces.

"Long tubes, with bores truly cylindrical, or of any uniform figure, are scarcely ever met with. Such however as were used in the experiments, generally tapered in a pretty regular manner from one end to the other. When the bulb was downwards, and the tube narrowed that way, the column of quicksilver confining the air lengthened in the lower-half of the scale, and augmented the pressure above the mean. In the upper half, the column being shortened, the pressure was diminished below the mean. In this case, the observed spaces both ways from the centre were diminished in the inverse ratio of the heights of the barometer at each space, compared with its mean height. If the bore widened towards the bulb when downwards, the observed spaces, each way from the centre, were augmented in the same inverse ratio; but in the experiments on air less dense than the atmosphere, the bulb being upwards, the same equation was applied with contrary figure; and any extraordinary irregularity took place in the tube, the corresponding spaces were proportioned both ways from that point, whether high or low, that answered to the mean.

"The observed and equated manometrical spaces being thus laid down on the pasteboard containing the measures of the tube; the 212° of the thermometer, in exact proportion to the sections of the bore, were constructed alongside of them; hence the coincidences with each other were easily seen; and the number of thermometrical degrees answering to each manometrical space readily transferred into a table, prepared for the purpose."

MANOR, MANERIUM, (a manenda, became the usual refidence of the owner), seems to have been a district of ground held by lords or great personages; who kept in their own hands so much land as was necessary for the use of their families, which were called terrae dominicales, or desemine lands; being occupied by the lord, or dominus maneri, and his servants. The other, or tenemental lands, they distributed among their tenants; which, from the different modes of tenure, were called and distinguished by two different names. First, book-land, or charter-land, which was held by deed under certain rents and services, and in effect differed nothing from free fagage lands; and from hence have arisen most of the freehold tenants who hold of particular manors, and owe suit and service to the same. The other species was called folk-land, which was held by no assurance in writing, but distributed among the common folk or people at the pleasure of the lord, and resided at his direction; being indeed land held in villenage. See VILLENAGE. The residue of the manor, being uncultivated, was termed.
Mansfeld, Erneft, the illegitimate son of Peter Ernfeet by a lady of Malines, was educated at Brussels, in the principles of the Roman Catholic religion, by his godfather Ernfeet archduke of Austria.

He was employed in the service of the king of Spain in the Low Countries, and in that of the emperor in Hungary, together with his brother Charles count of Mansfeld. He was legitimated on account of his bravery.
MANSFIELD, bravery by the emperor Rodolphus II.; but his father's spoils and poissillons in the Spanish Netherlandss having been refused him, contrary to promises which he had received, he, in 1610, joined the party of the Protestant princes. Being now become one of the most damous enemies of the house of Austria, who called him the Attila of Christianity, he fet himself, in 1618, at the head of the rebels in Bohemia, and got poissillon of Pilfen in 1619. Though his troops were defeated in several battles, he was able to penetrate into the palatinate. He there took several places, ravaged Alfse, made himself master of Haguenau, and defeated the Bavarians. At length he was totally defeated by Wallstein, at the battle of Daffou, which happened in the month of April 1626. He gave over his remaining troops to the Duke of Weimar, and intended to pass into the Venetian States; but fell sick in a village between Zara and Spalatro and there expired, A.D. 1626, aged 46. The procurator Nani thus describes him; "He was bold, intrepid in danger, and the most skilful negociator of the age in which he lived. He possessed a natural eloquence, and well knew how to inculcate himself into the hearts of those whom he wished to gain. He was greedy of other's wealth, and prodigal of his own. He was full of vast projects and great hopes, and yet possessed neither lands nor money at his death." He did not wish to die in his bed; but dressed himself in his finest robes, put on his sword, and, fat up, leaning upon two domesticats, and in this position, highly becoming a warrior, breathed his last. But of all the actions of this great captain and singular man, the following is without doubt the most extraordinary: Having got the certain information that Cazell, in whom all his officers placed the greatest confidence, had communicated his plans to the Austrian chief, he showed neither passion nor resentment at his treachery, but gave him 300 dix-hollos, and sent him to count Buquoy, with a letter expressed in these words "Cazell being attached to you and not to me, I fend him to you, that you may have the benefit of his services." The opinions of men were divided about this action, and it was as much cenfured as applauded. Be this as it may, Ernst is defervedly esteemed one of the greatest generals of his age. There was never a leader more patient, more indomitable, more insured of the result by the constancy of his army and his abilities, to cold, to cold, and to hunger. He raised armies, and ravaged the enemy's territories with an incredible celerity. The Hollander's aid of him, he was bonus in auxilio, carus in preio; that is, that he rendered great services to those who employed him, and that he made them pay well for it.

MANSFIELD (Henry-Francis, count of), was of the same house with the former, and signalized himself in the wars for the Spanish succession. He died at Vienna on the 8th of June 1715, at the age of 74, after being a prince of the Holy Empire, a grandee of Spain, field-marshall general of the emperor's armies general of artillery, ambassador to France and Spain, president of the Aulic council, and great chamberlain to the emperor.

MANSFIELD, a town of Nottinghamshire, in England, seated on the forest of Sherwood, and 140 miles from London. It was anciently a royal demesne. It has a market on Thursdays, and two fairs. By an ancient custom of this manor, the heirs were declared of age as soon as born. It is a well built town, and drives a great trade in malt. Its market is well stocked with corn, cattle, &c. Here is a charity-school for 36 boys.

MANSIO, a term often mentioned in itineraries, denoting innis on the public roads to lodge in, at the distance of eighteen miles from each other; (Caelantius). Also, in the lower ages, it came to denote "an encampment for one night," (Lampridius).

MANSIO, or manifest, was sometimes also used in the same sense with hide; that is, for as much land as one plough could till in a year. See HIDE.

MANSION, MANSIO, a dwelling-house, or habitation, especially in the country. See MANSE.

MANSIO is more particularly used for the lord's chief dwelling-house within his fee; otherwise called the capital messuage, or chief manor place. See MANOR.

MANSLAUGHTER, the unlawful killing of another, without malice either express or implied: Which may be either Voluntarily, upon a sudden heat; or involuntarily, but in the commission of some unlawful act. These were called, in the Gothic constitutions, homicide vulgaris; quae aut cabu, aut etiam sponse commissurar, séd in substances quomodiscindum carere et impet. And hence it follows, that in manslaughter there can be no accidents before the act; because it must be done without premotion.

1. As to the first, or voluntary branch: If upon a sudden quarrel two persons fight, and one of them kills the other, that is manslaughter; and so it is, if they upon such an occasion go out and fight in a field: for this is one continued act of passion: and the law pays that regard to human frailty, as not to put a hafty and deliberate act upon the same footing with regard to guilt. So also if a man be greatly provoked, as by pulling his horse, or other great indignity, and immediately kills the aggressor; though this is not executable in extremo, since there is no absolute necessity for doing it to preserve himself; yet neither is it murder, for there is no previous malice but it is manslaughter. But in this case, and in every other case of homicide upon provocation, if there be a sufficient cooling-time for passion to subside and reason to interpose, and the person so provoked afterwards kills the other, this is deliberate revenge and not heat of blood, and accordingly amounts to murder. So if a man takes another in the act of adultery with his wife, and kills him directly upon the spot; though this was allowed by the law of Solon, as likewise by the Roman civil law (if the adulterer was found in the husband's own house) and also among the ancient Goths; yet in England it is not absolutely ranked in the class of justifiable homicide, as in case of a terrible rape, but it is manslaughter. It is however, the lowest degree of it; and therefore in such a case the court directed the burning in the hand to be gently inflicted, because there could not be a greater provocation. Manslaughter, therefore, on a sudden provocation, differs from execusable homicide in this. That in one case

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2. The second branch, or involuntary manslaughter, differs also from homicide executable by misadventure, in this: That misadventure always happens in consequence of a lawful act, but this species of manslaughter in consequence of an unlawful one. As if two persons play at football and不幸, under the king's command, and one of them kills the other; this is manslaughter, because the original act was unlawful; but it is not murder, for the one had no intent to do the other any personal mischief. Where a person does an act, lawful in itself, but in an unlawful manner, and without due caution and circumspection; as when a workman slings down a stone or piece of timber into the street, and kills a man; this may be either misadventure, manslaughter, or murder according to the circumstances under which the original act was done. If it were in a country village, where few passengers are, and he calls out to all people to have a care, it is misadventure only; but if it were in London, or other populous towns, where people are continually passing, it is manslaughter, though he gives loud warning; and murder, if he knows of their passing and gives no warning at all, for then it is made against all mankind. And, in general, when an involuntary killing happens in consequence of an unlawful act, it will be either murder or manslaughter according to the nature of the act which occasioned it. If it be in prosecution of a felonious intent, or in its consequences naturally tending to bloodshed, it will be murder; but if no more was intended than a mere civil trespass, it will only amount to manslaughter.

3. As to the punishment of this degree of homicide: The crime of manslaughter amounts to felony, but within the benefit of clergy; and the offender shall be burnt in the hand, and forfeit all his goods and chattels.

But there is one species of manslaughter, which is punished as murder, the benefit of clergy being taken away from it by statute: namely, the offence of mortally stabbing another, though done upon sudden provocation. See STABLING.

MANSTEIN (Christopher Herman of), was born at Peterberg, Sept. 1, 1711, and for a long time served with great distinction as a colonel in the Russian armies. In 1745 he went into the service of the king of Prussia; was appointed major-general of infantry in 1754; and distinguished himself on all occasions by his bravery and his knowledge of the art of war. He was wounded at the battle of Kolin, and soon after killed near Leutweizitz. He was universally regretted by those who knew him; and even the enemy shed tears upon the occasion. Those leisure moments which the laborious profession of war allowed him to enjoy, Manstein dedicated to study. He was acquainted with almost all the languages of Europe. From him we have Historical, Political, and Military Memoirs of Russia, (Lyons, 1772), 2 vols, 8vo, with plans and charts. These memoirs commence with the death of Catherine I. 1727, and end in 1744. He was an eyewitness, or had a very intimate knowledge, of all the events contained in them. A supplement is added, which goes back to the times of the ancient Czars, and in particular treats to a considerable length on Peter I. At the conclusion of the work, the author gives an idea of the military and naval force, of the trade, &c. of this extensive empire. The facts contained in this little historical tract, are not more interesting in themselves than they are valuable on account of the candor of the historian, who witnessed every event which he relates. Mr. Hume having received the original French of these memoirs, caused them to be translated into English, and published at London, soon after there appeared a German translation of them, published at Hamburg. A French edition was published by M. Haber at Leipzig in 1771; and there appeared a new and enlarged edition in 1782.

MANTA, in ichthyology; a flat fish mentioned by Ultor and others, as exceedingly harmful to the pearl-fishers, and which seems to be the same with that which Phryn has described under the name of nubesor nebula: Ipsfi sunt (Urmatores) et ubi nemus quumam cras et aequore efferent cropatia planorum piscium liminis, prae­menti eam, arcuamque a reciprocando et ob filos praecutus linces ancortis habere sed quia in ip pro­futuram, non recedunt saltimagi et pravorn, ut arbitror, sparsa. Nubes evum sic cunhili: (cujus nomine id man­iam appellante) inter animalia hactenus reperire quin­qua. (Plin. Hist. Nat. lib. ix. cap. 46.) The account given of this cloud by these divers is much the same with that which the divers in the American seas give of the manta; and the name of the cloud is perfectly applicable to it, as it really seems to be a cloud to those who are in the water below it; the swimmers likewise carry long knives, or sharp sticks, for the purpose of dispersing this animal. It is not improbable, that this fish has made its way into these seas from that of the old word in the same manner as some others appear to have done. The strength of this fish is so great, that it will not only flrange a man whom it embraces or winds itself about, but it has been seen to take the cables of an anchor and move it from the place where it had been cast. It has been called manta, because, when it lies stretched upon the sea, as it frequently does, it seems like a fleece of wool floating upon the water.

MANTE, a considerable town of France, capital of the Manoe; seated on the river Seine, in E. Long. 1°. 45. N. Lat. 48° 38".

MANTEGAR, or MAN-TIEGER, as it is sometimes written, in zoology, is the tufted speck, a species of finia. See SIMIA.

MANTEGNA (Andrew), was born in a village near Padua in 1431, and at first employed in keeping sheep. It was observed, that instead of watching over his flock, he amused himself with drawing; and he was placed with a painter who, being delighted with his taste and taste in work, and with his gentle and agreeable conduct in society, adopted him for his son, and made him his heir. At the age of 17, Mantegna was employed to paint the altar of St Sophia in Padua, and the four evangelists. James Bellini, who admired his talents, gave him his daughter in marriage. Mantegna painted, for the duke of Mantua, the Triumph of Cæsar, which is the chief d'œuvre of this painter, and has been engraved in claro-obscuro, in nine plates. From respect to his extraordinary merit, the duke made
made him knight of his order. The invention of engraving prints with the graver is commonly ascribed to Mantegna, who died at Mantua in 1517.

MANTLETS, in the art of war, a kind of moveable parapets, made of planks about three inches thick, nailed one over another, to the height of almost six feet, generally cased with tin, and set upon little wheels, so that in a fight they may be driven before the pioneers, and serve as blinds to shelter them from the enemy's small shot.

MANTICORA, in natural history, a name given by the Roman authors to a fierce and terrible creature, which they describe from the Greeks, who call it sometimes alce mantichora; but when they write more correctly, mantichora and martiora. We have formed the name war-tiger on the sound of the Roman name, tho' expressing a very different sense; and our authors of the histories of animals, figure to us under this name a terrible creature, partly from the accounts of Pliny exaggerated, and partly from their own imagination, with three rows of teeth, and with such a shape as no animal ever possessed. See Mantegara.

The whole story of this animal seems founded on the love of the wonderful; and very probably the mantichora, properly speaking, was no other than some of the larger hyenas, which was at first ill described, and afterwards more and more wonders were added to the story, till all shadow of truth was lost.

MANTINEA (anc. geogr.), a town situated in the south of Arcadia, on the confines of Laconia (Prolemy); called afterwards Antigone, in honour of king Antigonus. It is memorable for a battle fought in its neighbourhood between the Thebans and Spartans, in which fell the celebrated commander Epaminondas. See Thebes.

MANTIS, in zoology, a genus of insects belonging to the order of hemiptera, the characters of which are these: The head is unsteady, or appears from its continual nodding motion to be slightly attached to the thorax; the mouth is armed with jaws, and furnished with a form of pincers. The antennae are facetous. The four wings are membranaceous, and wrapped around the body: the under ones folded: The anterior or first pair of feet are compressed, armed on the under side with teeth like a saw, and terminated by a single nail or crotchett: the four hindermost are crested, or formed rather for advancing slowly than for performing quick movements: The thorax is extended to a considerable length, narrow, and throughout of equal size. The name mantis, given to this genus, denotes footslayer: because it has been imagined, that this insect, by stretching out its fore feet, divined and pointed out those things that were asked of it. The insect often rests on its four hinder legs only, and holding the two fore ones raised up, joins them together, which has occasioned it being called by the people of Languedoc, where it is very common, prigdonas, as if it prayed to God. The country folks moreover maintain, that this creature shows the way when asked, because it stretches those same fore legs sometimes to the right and sometimes to the left; and indeed it is looked upon as an insect almost sacred, that must not be hurt. Its colour is all over of a brownish green. The young ones have more of the green, the old more of the brown, cast. It deposits its eggs collected in a hemispherical parcel, flat on one side. There are in the parcel two rows of oblong eggs placed transversely, and one row of shells placed longitudinally in form of a roof, one over the other, which cover the joining of the two rows of eggs. The whole parcel is light, and as it were composed of very thin parchment.

There are 53 species of this genus. In plate CCLXXIX is represented the gongylocor, the shape of which is extraordinary, being narrow and long. The head is small, flat, with two filiform short antennae. On the sides of the head are situated two large polished eyes. The thorax is subelliptical, ora, narrowed, with a longitudinal ribbing in the middle, and a transverse depression at one-third of its length. The elytra, which cover two-thirds of the insect, are veined, reticulated, crossed one over the other, and cover the wings, which are veined, and diaphanous. The hinder legs are very long, the middle ones shorter; and the foremost pair of thighs are terminated with spines, thereon winged, as it were, with membranaceous lobes. The top of the head has the shape of an awl, is membranaceous, often split in two at the extremity. It is an inhabitant of China.

The insects belonging to this genus, in their most perfect state, are generally of very beautiful colours, which form a fade, and become the colour of dead leaves. Their elytra bearing a strong resemblance to the leaves of some plants, have procured them the name of walking leaves.

MANTLE, or Mantle-tree, in architecture, the lower part of the chimney, or that piece of timber which is laid across the jamb, and constitutes the compartments of the chimney-piece.

MANTLE, or mantling, in heraldry, that appearance of folding of cloth, flourishing, or drapery, which in any achievement is drawn about a coat of arms. See Heraldry, p. 464, Sect. V.

MANTO, in poetic history, the daughter of Tireflis, and like her father strongly Inspired with prophecy. She was in great esteem, that when the Argives pillaged Thebes, they thought they could not desecrate their vow to Apollo, of consecrating to him the most precious thing in their plunder, without offering him this young woman. She was therefore sent for the temple of Delphi. But this did not engage her in any vow of continency; or, if it did, the observed it very ill; for the borne a son called Amphicles to Alcmeon, who had been generalissimo of the army which took Thebes; and a daughter to the same, named Tiphophone. These children were the fruits of an amour carried on during the madness which had seized Alcmeon, after he had put his mother to death. Virgil transports her into Italy, not for the sake of securing her virginity, but to produce a son of her who built Mantua.

MANTUA, anciently a town of the Transpadana in Italy, situated on the Mincus, a river running from the Lacus Benua. It is said to have been founded about 300 years before Rome by Banor or Onus, the son of Manto: and was the ancient capital of Etruria. When Cremona, which had followed the interest of Bruttus, was given to the soldiers of Octavius, Mantua also, which was in the neighbourhood, shared the common calamity, and many of the inhabitants

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wore tyrannically deprived of their possessions. Virgil was among them and native of the town, applied for redress to Augustus, and obtained it by means of his poetical talents.

It is still called Mantua, and is the capital of the duchy of that name. It is now a large place, having eight gates and about 16,000 inhabitants. The streets are broad and straight, and the houses well built. It is very famous for the service of art; lying in the middle of a lake, or rather morasses, formed by the river Mincio. There is no access to the city but by two canals which cross these morasses, and which are strongly fortified so that the city is looked upon to be one of the most considerable fortresses of Europe; and the allies in 1745, though their army was in the duchy durst not undertake the siege. It was greatly noted for its silk manufactures, which are now much decayed. The air in the summer-time is very unwholesome. The celebrated poet Virgil was born at a village near this city. E. Long. 10. 47. N. Lat. 45° 10'.

MANTUA, the duchy of, a country of Italy, lying along the River Po, which divides it into two parts. It is bounded on the north by the Veronese on the south by the duchies of Reggio, Modena, and Miralda; on the east by the Ferrarise; and on the west by the Cremonese. It is about 50 miles in length, and 25 in breadth; is fruitful in corn, pastures, flax, fruits, and excellent wine. Charles IV. the last duke of Mantua, being a vassal of the empire took part with the French in the disputes relating to the succession of Spain; for which reason he was put under the ban of the empire, and died at Venice in 1708. He having no heirs the emperor kept the Mantuan in his own hands, and the duke of Savoy had Montferrat, which were confirmed to them by subsequent treaties. After the death of the emperor in 1746, his eldest daughter, now empress-queen, kept possession of the Mantuan and the governor of the Milanese had the administration of affairs. The Mantuan comprehends the duchies of Mantua, Guastalla, and Sabboneta; the principalities of Castiglione, Solforino, and Bosolo; like wife the county of Novellara. The principal rivers are the Po, the Oglio, and the Mincio; and the principal towns are Mantua.

MANTUAN (Baptist), a famous Italian poet born at Mantua in 1439. He took his name from the town; not having a right to that of his father, as being a natural son. In his youth, he applied himself to Latin poetry, which he cultivated all his life; for it does not appear that he wrote anything in Italian. He entered among the Carmelites and became general of the order; though he quitted that dignity upon some difficulty in 1575, and died the year following. The duke of Mantua, some years after, erected a marble statue to his memory crowned with laurel, and placed it next to Virgil. His works were collected and published at Paris in three volumes folio in 1513, with the commentaries of St. Maurhon, S. Brant, and L. Badius.

MANUAL, a word signifying any thing performed by the hand.

MANUAL (Manuel), in law, signifies what is employed or used by the hand, and whereof a present profit may be made; as such a thing in the manual occupation of one is where it is actually used or employed by him.

MANUAL is the name of a service-book used in the church of Rome, containing the rites, directions to the priests, and prayers used in the administration of baptism and other sacraments; the form of blessing holy water, and the whole service used in processions.

MANUAL exercere, in the army, consists in the observance of certain words of command appointed for this purpose. When a regiment is drawn up, or paraded for exercere, the men are placed three deep, either by companies, or divided into platoons, with the grenadiers on the right. When soldiers are drawn up for exercere, the ranks and files should be exactly even; and each soldier should be instructed to carry his arms well, to keep his firelock steady and even upon his shoulder, with the right hand hanging down, and the whole body without constraint. The distances between files must be equal, and the ranks eight feet distant from each other. Every motion should be performed with life, and the greatest exactness observed in all the firings, wheelings, and marching; and therefore a regiment should never be under arms longer than two hours.

The following is an abstrack of the words of command at the manual exercere, with their explanation.

1. Point your firelock: i.e. Seize the firelock with your right hand, and turn the lock outwards, keeping the firelock perpendicular; then bring up the firelock with a quick motion from the shoulder, and seize it with the left hand, just above the lock, so that the fingers may lie upon the lock, with the elbows down, and the thumb upon the lock; the firelock must not be held too far from the body, and the left-hand must be of an equal height with the eyes.

2. Cook your firelock: i.e. Turn the barrel opposite to your face, and place your thumb upon the cock, raising your elbow square at this motion; then cock your fire-lock, by drawing your elbow down, placing your right-thumb on the breech-pin, and the fingers under the guard.

3. Fisten: i.e. Step back about six inches to the rear with the right-foot, bringing the left-toe to the front; at the same time place the butt end of the fire-lock must be brought to an equal height with the shoulder, placing the left-hand on the swell and the fore-finger of the right hand before the trigger, sinking the muzzle a little.

4. Fire; i.e. Pull the trigger briskly, and immediately after, bringing up the right foot to the inside of the left, come to the priming position, with the lock opposite to the right-elbow, the muzzle to the height of the hip, keeping it firm and steady; and at the same time seize the cock with the fore-finger and thumb of the right hand, the back of the hand being turned up.

5. Half-cock your firelock: i.e. Half-bend the cock briskly with a draw back of the right-elbow, bringing it close to the butt of the fire-lock.

6. Handle your Cartridge; i.e. Bring your right hand with a short round to your pouch, flapping it hard; seize the cartridge, and bring it with a quick motion to your mouth; bite the top well off and bring the hand as low as the chin, with the elbow down.

7. Prime: i.e. Shake the powder into the pan, placing the three fore-fingers behind the rammer with the elbow up.

8. Shot your pans; i.e. Shout your pans briskly, drawing your right-arm at this motion.
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motion towards your body, holding the cartridge fall in your hand, as before; then turn the piece nimbly round to the loading position, with the lock to the front, and the muzzle to the height of the chin, bringing the right hand behind the muzzle, with both feet kept fast in this position. 9. Charge with cartridge: i.e. Take your right hand, and put the cartridge into the muzzle, filling the powder into the barrel; place your hand, closed, with a quick and strong motion, upon the rammer. 10. Draw your rammer: i.e. Draw the rammer with a quick motion half out, seizing it at the muzzle back-handed; draw it quite out, turn it, and enter it into the muzzle. 11. Ram down your charge: i.e. Ram the cartridge well down in the barrel, instantly recovering and seizing the rammer back-handed at the centre, turning it, and entering it as far as the lower pipe, placing at the same time the edge of the hand on the butt end of the rammer, with fingers extended. 12. Return your rammer: i.e. Return the rammer, bringing up the piece with the left-hand to the shoulder, fixing it with the right-hand under the cock, keeping the left-hand fall at the forehead, turning the body square to the front. 13. Shoulder your firelock: i.e. Quit the left-hand, and place it strongly upon the butt; quit the right-hand, and throw it down the right-side. 14. Left your firelock: i.e. Seize the firelock with the right-hand, turning the lock outwards; raise the firelock from the shoulder, and place your left-hand with a quick motion above the lock, holding the piece right up and down in both hands before you, and your left-hand even with your eyes; step briskly back with your right-foot, placing it a hand's-breadth distance from your left-heel, and at the same time bring down your firelock as quick as possible to the rest, linking it as far down before your left-hand as your right-hand will permit without constraint; your left-hand being at the feather-spring, and your right-hand, with fingers extended, held under the guard, taking care to draw in the muzzle well towards your body, and to drefs in a line with the butt-end. 15. Order your firelock: i.e. Place your firelock nimbly with your left-hand against your right-shoulder; quit the firelock with the right-hand, linking it at the same time with your left; seize it at the muzzle, which must be of an equal height with your chin, and hold it close against your right-hand; lift up your right-foot, and place it by your left; at the same time throw back your left-hand by your left-side, and with your right bring down the butt-end firmly upon the ground, placing it even with the toe of your right-foot; the thumb of your right-hand lying along the barrel, and the muzzle kept at a little distance from your body. 16. Ground your firelock: i.e. Half-face to the right upon your heels, and at the same time turn the firelock, so that the lock may point to the rear, and the flat of the butt-end lie against the inside of your foot; at the same time slipping the right-foot behind the butt of the firelock, the right-toe pointing to the right, and the left to the front: step directly forward with your left-foot, about as far as the swell of the firelock, and lay it upon the ground, your left-hand hanging down by your left-leg, and your right kept fast, with the butt-end against it; raise yourself up again nimbly, bringing back your left-foot to its former position, keeping your body faced to the right; face again to the left upon your heels, and come to your proper front, letting your hands hang down without motion. 17. Take up your firelock: i.e. Face to the right upon both heels; sink your body down, and come to the position described in the second motion of grounding; i.e. Face yourself and firelock, bringing it close to your right-side; come to your proper front, seizing your firelock at the muzzle, as in explanation 15. 18. Relock your firelock: i.e. Bring your right-hand as far as the swell; raise the firelock high up in a perpendicular line from the ground with your right-hand, and seize it with your left above the spring, the cock being at the height of the waist-belt; step back with your right-foot, placing it behind your left-heel, and come to the rest. 19. Should your firelock: i.e. Lift up your right-foot, and place it by your left; bring the firelock at the same time to your left-shoulder, and seize the butt-end with the left-hand, keeping it in the same position as above described; throw your right-hand briskly back. 20. Square your firelock: i.e. Bring your right-hand briskly back, and seize it with the left-hand, keeping the firelock fixed in the same position; quit the butt with the left-hand, and seize the firelock with it at the swell, bringing the elbow close down upon the lock; the right-hand being kept fast in this motion, and the piece still upright; quit the right-hand, and bring it down your right-side, bringing the firelock nimbly down to the secure; the left-hand in a line with the waist-belt. 21. Should your firelock: i.e. Bring the firelock up to a perpendicular line, seizing it with the right-hand under the cock; quit the left-hand, and place it strongly upon the butt; quit the right-hand, and bring it firmly down the right-side. 22. Fix your bayonet: i.e. First and second motions, as in the two first of the secure; quit the right-hand, and bring the firelock firmly down to the secure; the left-hand with the right-side, as far as it will admit without constraint, seizing the bayonet at the same time with the right-hand, and fixing it, placing that hand just below the braise, with the piece kept close to the hollow of the shoulder. 23. Should your firelock: i.e. Quit the right-hand, and bring up the firelock with the left; seize it again under the cock with your right, as in the second motion of the secure; quit the left-hand, and place it strongly upon the butt; quit the right-hand, and bring it down the right-side. 24. Present your arms: i.e. as explained in three motions of the 14th word of command. 25. To the right face: i.e. Bring up the firelock with a quick motion high before you, till your left-hand comes even with your eyes, with the fingers of that hand extended along the fock, just above the feather-spring, the right-foot to be brought close up to the left-heel in this motion; face to the right, taking care in facing to hold the firelock right up and down, and steady in your hands; step back with your right-foot, and come down to your present, as in the foregoing explanation. 26. To the right face: i.e. as in the foregoing explanation, facing to the right. 27. To the right-about face: i.e. as in the 25th explanation, only coming to the right-about instead of to the right. 28. To the left face: i.e. Bring the right-foot briskly to the hollow of your left, with the firelock in the same position as in the first motion of facing to the right; face to the left; come down to the present, as before. 29. To the left face: i.e. as
in the foregoing explanation. 30. To the left-about face; i. e. as before, coming to the left-about instead of to the left. 31. Shoulder your firelock; i. e. as in the two motions of the 19th explanation. 32. Charge your bayonet; i. e. as in the first explanation: bring the swell of the firelock down strongly upon the palm of the hand, grasping the piece at the small, behind the lock, and as high as the waist-belt; the firelock upon a level with the barrel upwards. 33. Shoulder your firelock; i. e. Bring up the firelock to the shoulder, place the left-hand upon the butt, bringing the feet square to the front; quit the right-hand, and throw it down on the right-side. 34. Advance your arms; i. e. first and second motions, as in the first explanation: bring the firelock down the right-side, with the right-hand as low as it will admit without constraint, flipping up the left-hand at the same time to the swell, the guard between the thumb and fore-finger of the right hand, the three little fingers under the cock, with the barrel to the rear; quit the left-hand. 35. Shoulder your firelock; i. e. Bring up the left-hand, and seize it at the swell; come smartly up to the poise; shoulder. 36. Prime and load; i. e. come smartly to the recover, by springing the firelock straight up with the left-hand, turning the barrel inward to another height of the recover: at the same time that the left-hand springs the firelock, the right hand is raised briskly from the right-side, and feizes the firelock across the breast: as it raiseth below the cock, the left-hand comes with a quick motion from the butt, and seizeth the firelock strong above the lock, the little finger of the left-hand at the spring of the lock, the left-hand at an equal height with the face, the butt close to the body, but not pressed, the firelock perpendicular opposite the left-side of the face: bring the firelock down with a brisk motion to the priming position, the left-hand holding the firelock, as in the priming; the thumb of the right-hand placed against the face of the lock, the fingers clinched, and the elbow turned a little out, that the wrist may be clear of the cock: open the pan, by throwing up the steel with a strong motion of the right arm, turning the elbow in, and keeping the firelock steady in the left-hand: handle your cartridge, prime, flout your pan, cast about, load, draw rammers, ram down the cartridge, return the rammers, shoulder. N. B. The motion of recover, and coming down to the priming position and opening pans, are to be done in the usual time. The motions of handling cartridge to flout the pans, are to be done as quick as possible: when the pans are flout, a small pause is to be made, and then cast about together; then the loading motions are to be done as quick as possible; but before the rammer is returned, another small pause is to be made, counting 1, 2, between each motion, till the firelock is shouldered.—Front rank, make ready: i. e. Spring the firelock briskly to the recover, keeping the left foot fast in this motion; as soon as the firelock is at the recover, without any flop, sink the body briskly without flopping forward, with a quick motion down upon the right-knee; the butt-end of the firelock at the same time falls upon the ground, the front part of the butt being in a line with the heel of the left-foot. As soon as the butt comes to the ground, the firelock is to be cocked, immediately seizing the cock and steel in the right-hand; the firelock to be held firm in the left-hand, about the middle of that part of the firelock between the lock and the swell of the lock; the point of the left-thumb to be close to the swell, pointing upwards. As the body is sinking, the right knee is to be thrown as far back as the left-leg may be right up and down; the right foot to be thrown a little to the right; the body to be kept straight; the head up, looking to the right along the rank, the same as if shouldered; the firelock to be upright, and the butt about four inches to the right of the inside of the left-foot. Present; i. e. Bring the firelock briskly down to the present, by extending the left-arm to the full length with a strong motion; at the same time spring up the butt by the cock with the right-hand, and raise the butt so high upon the right-shoulder, that you may not be obliged to floop too much with the head; the right-check to be close to the butt, and the left-eye shut, and look along the barrel with the right-eye from the breech-pin to the muzzle; keep the left-elbow down in an easy position, and stand as steady as possible; the thumb of the right hand to remain in the position as described in the third explanation of the manual. Fire; i. e. Point the trigger as directed in the manual; and as soon as the piece is fired, give yourself a brisk spring upon your left-leg, lifting your body briskly, and straight up, keeping your left-foot fast, and bringing the right-heal to the inside of the left; at the same time the firelock is to be brought up to the priming position, and half-cocked immediately: a short pause is to be made; then handle cartridge, and go on with the loading motions described in the explanation of prime and load.—Centre rank make ready: i. e. Spring the firelock briskly to the recover; as soon as the left-hand seizes the firelock above the lock, the right elbow is to be smartly raised a little, placing the thumb of that hand upon the cock; the fingers open by the plate of the lock, and as quick as possible force the piece to the cock, by dropping the elbow, and forcing down the cock with the thumb, stepping at the same time a moderate pace to the right, keeping the left foot fast; as the firelock is cocked, the thumb is to fall below the cock, the right hand seizing the firelock close under the cock firmly, the fore-finger not to be before the trigger; the piece to be held in this position perpendicular, opposite the left-side of the face, the butt close to the left-breast, but not pressed; the body to be straight, and as full to the front as possible; the head kept up, looking to the right of the rank, that the body and the firelock may not flop forward, nor lean much out of the rank. Present; i. e. Spring the firelock from the body of the arm's length with a quick motion, pressing down the muzzle with the left-hand, and springing up the butt with the right-hand, as in the foregoing explanation of the front rank. Fire. As in explanation 4, in the manual, with this difference, that the left-foot is to be brought up to the right, at the same time that the firelock is brought down to the priming position. The loading motions as in the explanations of priming and loading; and at the last motion of shouldering, to spring to the left again, and cover the file-leaders.—Rear rank, make ready; i. e. Recover the firelock, and cock as before directed for the centre-rank; as the firelock is recovered and cocked, step briskly straight to the right, with the right-foot,
Of manumission there have also been various forms in England. In the time of the Conqueror, villains were manumitted by the master's delivering them by the right hand to the vicount, in full court, showing them the door, giving them a lance and a sword, and proclaiming them free. Others were manumitted by charter. There was also an implicit manumission; as when the lord made an obligation for payment of money to the bondman at a certain day, or freed him where he might enter without fail, and the like.

MANURE, anything used for fattening and improving land. See AGRICULTURE, Part I. Sec. I. II. and III.

MANUSCRIPT, a book or paper written with the hand; by which it stands opposed to a printed book or paper. A manuscript is usually denoted by the two letters MS. and in the plural by MSS. What makes public libraries valuable is the number of ancient manuscripts repose therein; see ALEXANDRIAN, CAMBRIDGE, CLERMONT, COTTONTON, HARLEIAN, VATICAN, &c.

MANUTIUS (Aldus), the first of those celebrated Venetian printers who were as illusory for their learning as for uncommon skill in their profession. He was born at Bassano in Italy about the middle of the 15th century; and hence is sometimes called Bassianus, though generally better known by the name of Aldus. He was the first who printed Greek neatly and correctly; and acquired so much reputation by it, that whatever was finely printed was proverbially said to have come from the press of Aldus. We have a kind of Greek grammar of his; with Notes upon Homer, Horace, &c. He died at Venice, where he exercised his profession, in 1516.

MANUTIUS (Paulus), son of the former, was brought up to his father's profession. He was more learned than him; and he acquired, by continual reading of Tully, such a purity in writing Latin, that even Scaliger allows a Roman could not exceed. Pope Pius IV. placed him at the head of the apostolical prefs, and gave him the charge of the Vatican library. His Epistles are infinitely laboured, and very correct; but, as may be said of most of the Ciceronians, they contain scarcely anything new or original. The splendid reading of Tully, however, together with his profound knowledge of antiquity, qualified him extremely well for an editor of Tully: whose works he accordingly published, with Commentaries on them, in 4 vols. folio, at Venice in 1523. He died in 1574.

MANUTIUS (Aldus), the Younger, the son of Paulus, and the grandson of Aldus, was esteemed one of the greatest geniuses and most learned men of his time. Clement VIII. gave him the direction of the Vatican printing-house; but probably the profits of that place were very small, since Manutius was obliged, for his subsistence, to accept of a professor of rhetoric's chair, and to sell the excellent library that was in his family, which his father, his uncle, and his great-uncle, had collected with extraordinary care, and which it is said contained 80,000 volumes. He died at Rome in 1597, without any other recompense than the praise due to his merit. He wrote, 1. Commentaries on Cicero. 2. A treatise on orthography. 3. Three books of epitaphs; and other works in Latin and Italian, which are esteemed.

MANUFACTURE, a commodity produced from raw or natural materials, either by the work of the hand or by machinery.

MANUFACTURER, one who works up a natural product into an artificial commodity.

MANUMISSION, an act whereby a slave or villain is set at liberty, or let out of bondage. The word comes from the Latin manus, “hand” and mittere, “to send.” quasi servus; mitti, dat manum suum potestatem domini sui. Some authors define manumission an act by which a lord enfranchises his tenants, who till that time had been his vassals, and in a state of slavery inconsistent with the dignity of the Christian faith.

Among the Romans, the manumission of slaves was performed three several ways. 1. When, with his master's consent, a slave had his name entered in the census or public register of the citizens. 2. When the slave was led before the praetor, and that magistrates laid his wand called vindici on his head. 3. When the master gave the slave his freedom by his testament. Servius Tullius is said to have freed 13,000 in five years; and P. Valerius Publicola the second. A particular account is given of the third in the Institutes of Justinian. It was not necessary that the praetor should be on his tribunal to perform the ceremony of manumission: he did it any where differently, in his house, in the street, in going to bathe, &c. He laid the rod on the slave's head, pronouncing these words, Dico eum liberum esse. Quirites, “I declare him a freeman, after the manner of the Romans.” This done, he gave the rod to the locutor, who struck the slave with it on the head, and afterwards with his hand on his face and back; and the notary or scribe entered the name of the new freed man in the register, with the reasons of his manumission. The slave had likewise his head shaved, and a cup given him by his master as a token of freedom. Tertullian adds, that he had then also a third name given him: if this were so, three names were not a token of nobility, but of freedom. The emperor Constantine ordered the manumissions at Rome to be performed in the churches.
MARANO, a town of the tribe of Judah, to the south-east, towards the Dead Sea. It gave name to the wilderets of Maon, 1 Sam. xxii.

MAP, a plain figure, representing the surface of the earth, or a part thereof, according to the laws of perspective. See Geography, no 65—73.

MAPLE. See Sugar.

MAPLE-SUGAR. See Sugar.

MAPLETOFT (Dr John), descended from a good family in Huntingdonshire, was born in 1631. He was educated in Trinity-college, Cambridge, and qualified himself for the profession of physic; and in 1675 was chosen professor of that art at Gresham college. He translated Dr Sydenham's Observations Medicae circa morborum acutiorum historia et curacionem into the Latin, and Sydenham dedicated them to Mapletoft. He married in 1679, and soon after transferred his studies from physic to divinity; took orders; obtained the vicarage of St Laurence Jewry, with the lectureship of St Christopher's in London; and having been a benefactor to Sion college, was, in 1707, elected president. He continued to preach in his church of St Laurence Jewry till he was above 80 years of age; and in his decline printed a book intitled The principles and duties of the Christian religion, &c. 8vo. 1710, a copy of which he sent to every house in his parish. He was a polite scholar; and besides some other pieces on moral and theological subjects, there are in the Appendix to Ward's Lives of the professors of Gresham college, three Latin lectures read there by him, on the origin of the art of medicine, and the history of its invention.

MAPPA, in the public games of the Roman circus, was a napkin hung out at the prætor's or other great magistrate's seat, as a signal for the race or other diversions to begin. The mappa was received by the mapparius, or person who held it, from the conful, prætor, or other great officer. Notice was anciently given by sound of trumpet; but Nero is said to have introduced the mappa, by throwing his napkin out of the window to satisfy the people, who grew noisy at the delay of the sports while he was at dinner.

MAPPARIUS, in Roman antiquity, the officer who gave the signal to the gladiators to begin fighting, which he did by throwing an handkerchief that he had received from the emperor or other magistrate.

MARACANDA (anc, geog.), capital of the Sogdiana. Now thought to be Samarcand, a city of Usbek Tartary in Asia, the country and royal residence of Tamerlane. See Samarcand.

MARACAYBO, a rich and considerable town of South America, and capital of the province of Venezuela, seated near a lake of the same name. It carries on a great trade in skins and chocolate, which is the belt in America; and they have likewise very fine tobacco. It was taken by the French buccaneers in 1666 and 1678. See La G. 70—95. capsule. c. 166. Maracaybo, a lake in South America, 200 miles long and 100 broad, which discharges itself by a river into the North Sea. It is well defended by strong forts; which, however, did not hinder Sir Henry Morgan, a buccaneer, from entering it, and plundering several Spanish towns on the coast, after defeating a squadron sent out against him.

MARAGNAN, a province of Brazil in South America, which comprehends a fertile populous island, 112 miles in circumference. The French settled here in 1612, and built a town; but they were soon driven from thence by the Portuguese, who have possessed it ever since. The town is little, but strong; and has a castle, a harbour, and a bishop's fee. The climate is very agreeable and wholesome, and the soil produces plenty of all the necessaries of life. W. Long 51° 35'. S. Lat. Lat. 2° 0. 0.

MARALDI (James Philip), a learned mathematician and astronomer, of the academy of sciences at Paris, was born in 1663. He was the son of Francis Maraldi and Angela Catharine Caffini, the father of the famous astronomer of that name. His uncle made him go to France in 1687, where he acquired great reputation on account of his learning and observations. He made a catalogue of the fixed stars, which is more particular and exact than Bayer's, and has given a great number of curious and interesting observations in the memoirs of the academy; in particular, those on bees and petrifactions have been universally applauded. He died in 1729.

MARANA (John Paul), an ingenious writer of the 17th century, was of a distinguished family, and born at Genoa; where he received an education suitable to his birth, and made a great progress in the study of polite literature and the sciences. Having been engaged in the conspiracy of Raphael della Terra, he delivered up Genoa to the duke of Savoy, he was in 1670, when 28 years of age, imprisoned in the tower of that city, and remained there four years. Being at length fet at liberty, he was ordered to write the history of that conspiracy; but, when finished, it was seized and prevented from being published. When the republic of Genoa was at variance with the court of France, Marana, who had always an inclination for that court, was afraid of being imprisoned a second time; and retired to Monaco, where he again wrote the history of the conspiracy in Italian, and, in 1682, went to Lyons to get it printed. From Lyons he went to Paris, where his merit soon acquired him powerful protectors. He spent the rest of his life in a happy and tranquil mediocrity, devoted to study and the society of men of learning; and died in 1697. His history of the conspiracy contains many curious and interesting anecdotes, which are nowhere else to be found. He also wrote several other works; the most known of which is the Turkish Spy, in 6 vols 12mo, which was in 1742 augmented to seven. Of this ingenious work we have an excellent English translation.

MARANO, a town of Italy, in the territory of Venice and province of Friuli, with a strong citadel; seated in a marsh at the bottom of the Gulf of Venice, which renders it difficult of access.

MARANS, a rich town of France, in the territory of Aymes and diocese of Noyon, seated among fertile marshes, near the river Sevre, three miles from the sea. It carries on a very great trade in corn; and is seated in W. Long. o. 55 N. Lat. 46° 20'.

MARANTA, Indian Arrow-root: A genius of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking under the eighth order, Selianinae. The corolla is ringent.
ringent and quinquifolium, with two segments alternately petal. There are three species, the arundinacea, galango, and comosa, all of them herbaceous perennial exotics of the Indies, kept here in hot-houses for curiosity: they have thick, knotty, creeping roots, crowned with long, broad, arundinaceous leaves, ending in points, and upright stalks, half a yard high, terminated by bunches of monopetalous, ringent, five-parted flowers. They are propagated by parting the roots in spring, and planting them in pots of light rich earth, and then plunging them in the bark-bed. The root of the galango is used by the Indians to extract the virus communicated by their poisoned arrows; from whence it has derived its name of arrow root. The arundinacea, or flax plant, rises to two feet, has broad pointed leaves, small white flowers, and one seed. It is cultivated in gardens and in provision-grounds in the West Indies; and the flax is obtained from it by the following process described by Dr. Wright. "The roots when a year old are dug up, well washed in water, and then beaten in large deep wooden mortars to a pulp. This is thrown into a large tub of clear water. The whole is then well filtered, and the pulpy part wrung out by the hands, and thrown away. The milky liquor being passed through a hair sieve, or coarse cloth, is suffered to settle, and the clear water is drained off. At the bottom of the vessel is a white mass, which is again mixed with clean water and drained: lastly, the mass is dried on sheaves in the sun, and is pure flax."—A decoction of the fresh roots (the doctor informs us) makes an excellent tisane in acute diseases.

MARASmus, among physicians, denotes an atrophy or consumption in its last and most deplorable stage.

MARATHON (anc. geog.), one of the demi or hamlets of Attica; about ten miles to the north-east of Athens, towards Boeotia, near the sea. It still retains its ancient name (Dr. Chandler informs us); but is very inconvenient, confining only of a few houses and gardens. The plain of Marathon, famous for Miltiades' victory over the Persians, by which the liberties of Athens and other cities of Greece were saved, is long and narrow, but confining chiefly of level ground, and therefore admitting the operations of cavalry, which formed the main strength of the barbarian army, and with which the Greeks were very poorly provided. Here the Persians, under the command of Datis, pitched their camp, by the advice of Hippias the banished king of Athens, whose solicitations and intrigues had promoted the expedition, and who, of perfect knowledge of the country, and intimate acquaintance with the affairs of Greece, rendered his opinion on all occasions respectable. The Persian army is said to have consisted of 100,000 infantry, and 10,000 horse.—Athens was in the utmost consternation and dismay. She had, upon the first appearance of the Persian fleet, sent to implore assistance from the other nations of Greece; but none had submitted to Darius, and others trembled at the very name of the Medes or Persians. The Lacede-

memians alone promised troops; but various obstacles did not allow them immediately to form a junction with those of Athens. This city therefore could only rely on its own strength; and happily at this moment there appeared three men destined to give new energy to the state. These were Miltiades, Aristides, and Themistocles. The example and harangues kindled the flame of the noblest heroism in the minds of the Athenians. Leves were immediately made. Each of the ten tribes furnished 1000 foot soldiers with a commander at their head. To complete this number it was necessary to enrol the slaves (A.) No sooner were the troops assembled than they marched out of the city into the plain of Marathon, where the inhabitants of Platea in Boeotia sent them a reinforcement of 1000 infantry.

Scarcely were the two armies in sight of each other, before Miltiades proposed to attack the enemy. Aristides and several of the commanders warmly supported this measure: but the rest, terrified at the excessive disproportion of the armies, were deferss of waiting for the favourable moment. Miltiades, on the other hand, seeing a greater number of the enemies being divided, had recourse to that of the polemarch, or chief of the militia, who was consulted on such occasions, to put an end to the equality of sufrages. Miltiades addressed himself to him, with the ardour of a man deeply impressed with the importance of present circumstances: "Athens (said he to him) is on the point of experiencing the greatest of vicissitudes. Ready to become the first power of Greece, or the theatre of the tyranny and fury of Hippias, from you alone, Callimachus, the now awaits her deliverance. If we suffer the ardour of the troops to cool, they will shamefully bow beneath the Persian yoke; but if we lead them on to battle, the gods and victory will favour us. A word from your mouth must now precipitate your country into slavery or preserve her liberty." Callimachus gave his suffrage, and the battle was resolved. To ensure success, Aristides, and the other generals after his example, yielded to Miltiades the honour of the command which belonged to them in rotation; but, to secure them from every hazard, he preferred waiting for the day which of right placed him at the head of the army.

When that day arrived, Miltiades drew up his troops at the foot of a mountain, on a spot of ground scattered over with trees to impede the Persian cavalry. The Plateans were placed on the left wing; Callimachus commanded the right; Aristides and Themistocles were in the centre of the battle, and Miltiades every where. An interval of nearly a mile separated the Grecian army from that of the Persians. At the first signal the Greeks advanced over this space running. The Persians, astonished at a mode of attack so novel to both nations, for a moment remained motionless; but the impetuous fury of the enemy they soon opposed a more feate and not less formidable fury. After an obstinate conflict of some hours, victory began to declare herself in the two wings of the
Marathon, the Grecian army. The right differed the enemy in the plain, while the left drove them back on a morass that had the appearance of a meadow, in which they stuck fast and were lost. Both these bodies of troops now flew to the succour of Aristeides and Themistocles, ready to give way before the flower of the Persian troops placed by Datis in the centre of the battle. From this moment the rout became general. The Persians, resting on all sides, found their only asylum in the fleet which had approached the shore. The conquerors pursued them with fire and sword, and took, burnt or sunk the greater part of their vessels: the rest escaped by dint of rowing.

The Persian army lost about 6,400 men; that of the Athenians 192. Miltiades was wounded; Hippias was left dead on the field, as were Scylaceus and Callimachus, two of the Athenian generals. Scarcely was the battle over, when a pioneer worn out with fatigue forms the project of carrying the first news of so great a success to the magistrates of Athens, and without quitting his arms, he runs, flies, arrives, announces the victory, and falls dead at their feet.

This battle was fought on the 6th of Boedromion, in the third year of the 72 Olympiad (or 29th September anno 490 B. C.). The next day 2000 Spartans arrived. In three days and nights they had marched 1200 stadia. Though informed of the defeat of the Persians, they continued their march to Marathon, nor did they enviously hun to behold those fields where a rival nation had signalized itself by so heroic an action: there they beheld the tents of the Persians still standing, the plain strewn over with dead, and covered with costly spoil; there they found Aristeides, who with his tribe was guarding the prisoners and booty; and did not rest until they had bestowed just applause on the victors.

The Athenians neglected nothing to eternize the memory of those who fell in the battle. It had been usual to inter the citizens who perished in war, at the public expense, in the Ceramicus without the city; but the death of these was deemed uncommonly meritorious. They were buried, and a barrow was made for them, where their bravery had been manifested.

Their names were engraved on the marble columns erected on the plain of Marathon. These monuments, not excepting those of the generals Callimachus and Scylaceus, were in a style of the greatest simplicity. In the intervals between them were erected trophies bearing the arms of the Persians. An artist of eminence had painted all the circumstances of the battle in one of the most frequented poricci of the city: Miltiades was there represented at the head of the generals, and in the act of exhorting the troops to fight for their country.

Paunias examined the field of battle about 600 years after this event. His account of it is as follows.

"The barrow of the Athenians is in the plain, and on it are pillars containing the names of the dead under those of the tribes to which they belonged; and there is another for the Plataeans and flaves; and a distinct monument of Miltiades the commander, who survived this exploit. There may be perceived nightly the neighing of horses and the clashing of arms. No person has derived any good from waiting on purpose to behold the spectres, but their anger does not fall on any one who happens to see them without design. The Marathonians worship those who were slain in the battle, flying them heroes. A trophy also of white marble has been erected. The Athenians say the Medes were buried, religion requiring that the corpse of a man be covered with earth; though I was not able to find any place of sepulture; for there is no barrac or other sign visible, but they threw them promiscuously into a pit.---Above the lake are the marble mangers of the horses of Artaphernes, with marks of a tent on the rocks."

Many centuries have elapsed since the age of Pausanias; but the principal barrow, it is likely that of the gallant Athenians, still towers above the level of the plain. It is of light fine earth, and has a bath or two growing on it. Dr Chandler informs us that he enjoyed a pleasing and satisfactory view from the summit, and he looked, but in vain, for the pillars on which the names were recorded, lamenting that such memorials should ever be removed. At a small distance northward is a naked monument of white marble, perhaps part of the trophy. A Greek temple has stood near it; and some stones and rubbish, disposed so as to form an open place of worship, remains.

Maratta. See MarATTAS.

MarATTI (Carlo), a celebrated painter, was born at Camarano, near Ancona, in 1625. He came a poor boy to Rome, when only 11 years old; and at 12 recommended himself so effectually to Andrea Sacchi, by his drawings after Raphael in the Vatican, that he took him into his school, where he continued 25 years till his master's death. His graceful and beautiful ideas occasioned his being generally employed in painting madonas and female figures. No man ever performed in a better style, or with a greater elegance. From the finest statues and pictures, he made himself master of the most perfect forms, and the most charming airs of heads, which he sketched with equal ease and grace. He has produced a noble variety of draperies, more artfully managed, more richly ornamented, and with greater propriety than even the best of the moderns. He was insensible in adorning the head, in the disposition of the hair, and the elegance of his hands and feet, who have equal to those of Raphael; and he particularly excelled in graceful forms. In his younger days he etched a few prints, as well of his own invention as after others, with equal spirit and correctness. It would be endless to recount the celebrated paintings done by this great man. Yet he executed nothing slightly, often changed his design, and almost always for the better, whence his pictures were long in hand. By the example of his master, he made several admirable portraits of popes, cardinals, and other people of distinction, from whom he received the highest testimonials of esteem, as he likewise did from almost all the monarchs and princes of Europe. Innocent XI. appointed him keeper of the paintings in his chapel and the Vatican. Maratti erected two noble monuments for Raphael and Hannibal, at his own expense, in the Pantheon. How well he maintained the dignity of his profession, appears by his answer to a Roman prince, who complaining of the excessive price of his pictures, he told him there was a vast debt due from the world to the famous artists his predecessors, and that he, as their rightful successor, was come to claim.
MAR

Marauding claim those arrivals. His abilities in painting were accompanied with many virtues, and particularly with an extensive charity. This great painter died at Rome in 1773, in the 88th year of his age.

MARAUDING, in a military sense, means a party of soldiers, who, without any order, go into the neighbouring houses and villages, when the army is either in camp or garrison, to plunder and destroy, &c. Marauders are a disgrace to the camp, to the military profession, and deserve no better quarter from their officers than they give to poor peafants, &c.

MARAVEDI, a little Spanifh copper coin, worth somewhat more than a French denier, or half a farthing Englifh.

The Spaniards always count by maravedis, both in commerce and in their finances, though the coin itself is no longer current among them. Sixty-three maravedis are equivalent to a rial of silver; fo that the piaster, or piece of eight rials, contains 504; and the piefe of four pieces of eight, 2016 maravedis.

This number of the convertence varies in the Spanish accounts and calculation; infomuch that a stranger or correspondent would think himself indebted several millions for a commodity that cost but a few pounds.

In the laws of Spain, we meet with several kinds of maravedis; Alphonfine maravedis, white maravedis, maravedis of good money, maravedis Comibenos, black maravedis, and old maravedis. When we find maravedis alone, and without any addition, it is to be understood of those mentioned above. The ref$t are different in value, finerfis of metal, time, &c. Mariana afferts, that this coin is older than the Moors; fo that it came from the Goths; that it was anciently equal to a third part of the rial, and consequently of the prefent maravedi.

Under Alphonfus XI. the maravedi was 17 times, under Henry II. ten times, under Henry III. five times, and under John II. two times and an half, the value of the prefent maravedi.

MARBELLA, a town of Andalufia in Spain, faturated at the mouth of the Rio Verde, 30 miles northeast of Gibraltar, and 28 south-west of Malaga. W. Long. 5° 25'. N. Lat. 35° 25'.

MARBLE, in natural history, a genus of fllifies; being bright and beautiful ftones formed of small feparate concritions, moderately hard, not giving fire when rubbed, but generally made to polish by the agitation the softer parts are worn off, and calcing in a fire. — The word comes from the French marbre, and that from the Latin marmorus, of the Greek μαρμάριον to shine or glitter.


The varieties of marble, numerous as they are, have been improperly augmented by virtuosos, and some who collect specimens for the fake of gain. The Italians are particularly curious in this way; and most of the names imposed upon marbles are given by them. Every marble brought from an unknown place is called by them antico, when distinguished by a number of bright colours, it is called brocatello or brocatellato. When they want some of the originals to complete a whole set of marbles, they either substitute others which have the nearest resemblance to them; or, lastly, they paint white marbles according to their own fancy, and impose them on the world as natural. The finest solid modern marbles are those of Italy, Blankenburg, France, and Flanders. It has also been lately discovered, that very fine marble is contained in some of the Weftern islands of Scotland. Those of Germany, Norway, and Sweden, are of an inferior kind, being mixed with a kind of fealy limestone; and even several of those abovementioned are partly mixed with this fubfance, though in an inferior degree. Crofted, or broken, marbles are an infcription of white marble in Sweden, which, from the specimens he had seen, promifed to be excellent.

The specific gravity of marble is from 2780 to 2800; that of Carriera, a very fine Italian marble, is 2717. — Black marble owes its colour to a flight mixture of iron. Mr. Bayen found fome which contained 5 per cent of the metal; notwithstanding which, the lime prepared from it was white, but in time it acquired an ochry or reddifh-yellow colour.

Marble, when chemically examined, appears to consist of calcarceous earth united with much fixed air; and is like limestone or chalk, capable of being converted into a strong quicklime. — Dr. Black derives the origin of marbles, as well as limestone and marble, from the fame source, viz. from the calcarceous matter of shells and lithophyta. In one kind of limestone known by the name of Portland-ftone, and confifting of round grains united together, it was fuppofed to be composed of the spawn of fith; but comparisons of other phenomena have explained it. It is plain that it has been produced from a calcarceous sand, which is found on the fbroe of some of the iflands in the fouthern climates. By the conftant agitation the softer parts are worn off, and the harder parts remain in the form of particles that are highly polished, and which are afterwards gradually made into acid menfure and calcinating in a flight fire. — It is plain that it has been produced from a calcarceous sand, which is found on the fbroe of some of the iflands in the fouthern climates. By the conftant agitation the softer parts are worn off, and the harder parts remain in the form of particles that are highly polished, and which are afterwards gradually made into acid menfure


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titles of shells have been found in the province of Tu­
rin in France: and indeed there is no place where they
have not been found. The Lithophyta likewise seem
be a very fruitful source of this kind of earth. In
the cold climates, where the moderate degree of heat
is not so productive of animal-life, we have not such
an opportunity of observing this; but in the hot climates,
the sea, as well as the land, swarms with innumerable
animals; and, at the bottom, with those that produce
the corals and madrepores. We learn from the history
of a ship that was sunk in a storm in the Gulf of
Mexico, that the vault there is of those bodies. Ab-
out 20 years after, they attempted to dive into it to
gett a quantity of silver: but they found great dif-
ticulty in getting it, from the ship being overgrown
with coral. Sir Hans Sloane, in the Philosophical Tran-
scriptions, and in his history of Jamaica, observes, that
the ship's timber, the iron, and money, were all con-
creted by the growth of the calcareous matter. So in
a tract of many thousands of years the quantity of it
should be very great, and this is going on through a
very extensive portion of the bottom of the sea, it will
produce very extensive as well as mafsly collections
of calcareous matter.

According to Sir William Hamilton,† many va-
ried and precious stones are the produce
of volcanoes.

Artificial Marbles. The fucco, whereof they make
statues, busts, bas-relievs, and other ornaments
of architecture, ought to be marble pulverized, mixed in
a certain proportion with plaster; the whole well lifted,
worked up with water, and dended like common plaster. See
Stucco.

There is also a kind of artificial marble made of
the flaky felenites, or a transparent fonce resembling
plaster; which becomes very hard, receives a tolerable
polish, and may deceive a good eye. This kind of fe-
lenites resembles Muscovy tale.

There is another kind of artificial marble formed by
corrosive tinctures, which, penetrating into white
marble to the depth of a line or more, imitate the va-
rious colours of other dearer marbles.

There is also a preparation of brimstone in imitation
of marble.

To do this, you must provide yourself with a flat
and smooth piece of marble; on this make a border
or wall, to encompass either a square or oval table,
which may be done either with wax or clay. Then
having several sorts of colours, as white lead, vermi-
lion, lake, umber, malmcst, smalt, Prussian blue
&c. melt on a low fire some brimstone in several
glazed pipkins; put one particular sort of colour into
each, and stir it well together; then having before
boiled the marble all over within the wall, with one
colour quickly drop spots upon it of larger and less size:
after this, take another colour and do as before,
and so on till the stone is covered with spots of all the
colours you design to use. When this is done, you are
next to consider what colour the mafs or ground of
your table is to be; if of a grey colour, then take fine
lifted allies, and mix it up with melted brimstone; or
if red, with English red ochre; if white, with white-
lead; if black, with lamp or ivory black. Your brim-
sone for the ground must be pretty hot, that the col-
loured drops on the stone may unite and incorporate
with it. When the ground is poured even all over,
you are next, if judged necessary, to put a thin wain-
foot board upon it: this must be done whilst the brim-
sone is hot, making also the board hot, which ought
to be thoroughly dry, in order to caufe the brimstone
to flock the better to it. When the whole is cold,
take it up, and polish it with a cloth and oil, and it
will look very beautiful.

Elastic Marbles, an extraordinary species of fossil
which has surprized all the naturalists who have seen
it. There are several tables of it preferred in the
house of Prince Borghefe at Rome, and shewn to the
curious. F. Jacquer a celebrated mathematician, has
given a description in the Literary Gazette of Paris,
but the naturalists cannot be contented with it. If
permission was given to make the requisite experi-
ments, this curious phenomenon might be better illu-
nitated. There are five or six tables of that marble;
their length is about two feet and a half, the breadth
about six inches, and the thickness a little less than
three. They were done upon the tomb of Agrippa,
in the field of Mondragone; the grain is of Car-
rare marble, or perhaps of the finest Greek. They
seem to have suffered some attack of fire; though the
first degree of pulverization observable in the angles,
can, perhaps, scarcely be called that of imperfect cal-
cination. They are very dry, do not yield to exter-
nal impression, and the hammer, like other con-
generous marble, are per haps susceptible of a pol-
ish. Being set on end, they bend, oscillating for
ward and forward; when laid horizontally, and raised
at one end, they form a curve, beginning towards the
middle; if placed on a table, and a piece of wood or
any thing else is laid under them they make a fallent
curve and touch the table with both ends. Notwith-
standing this flexibility, they are liable to be broken
if indiscreetly handled; and therefore one table only,
and that not the best, is shown to the curious. For-
merly they were all together in the prince's apartmen-
t on the ground floor.

Colouring of Marble. This is a nice art; and in or-
der to succeed in it, the pieces of marble on which the
experiments are tried, must be well polished, and free
from the least spot or vein. The harder the marble
is, the better will it bear the heat necessary in the op-
eration; therefore slabs of the common stone marble
are very improper for performing these opera-
tions upon.

Heat is always necessary for opening the pores of
marble, so as to render it fit to receive the colours:
but the marble must never be made red-hot; for then
the texture of it is injured, and the colours are burnt,
and lose their beauty. Too small a degree of heat is
as bad as too great; for, in this case, though the marble
receives the colour, it will not be fixed in it,
not strike deep enough. Some colours will strike even
cold; but they are never so well fixed in as when a
j ust degree of heat is used. The proper degree is that
which, without making the marble red, will make the
liquor boil upon its surface. The vessels used to
strike in the colours must be varied according to the
nature of the colour to be used. A lixivium made
with horse's or dog's urine, with four parts of quick-

Marble is excellent for some colours; common ley of wood-ashes is very good for others; for some, spirit of wine is best; and lastly, for others, oil, liquors, or common white-wine.

The colours which have been found to succeed best with the peculiar menstruums, are these: stone-blue dissolved in fixed times the quantity of spirit of wine, or of the urinous lixivium, and that colour which the painters call *littius*, dissolved in common ley of wood-ashes. An extract of saffron, and that colour made of buckthorn berries, and called by painters *lap green*, both succeed well when dissolved in urine and quicklime; and tolerably well when dissolved in spirit of wine. Vermilion, and a very fine powder of cochineal, also succeed very well in the fame liquors. Dragon's-blood succeeds in spirit of wine, as does also a tincture of logwood in the fame spirit. Alkanet-root gives a fine colour: but the only menstruum to be used for it is oil of turpentine; for neither spirit of wine, nor any lixivium will do with it. There is another kind of *fungus draconis*, commonly called dragon's-blood in tears, which, mixed with urine, gives a very elegant colour.

Besides these mixtures of colours and menstruums, there are other colours which must be laid on dry and unmixed. These are, dragon's blood of the purest kind, for a red; gamboge for a yellow; green wax, for a green; common brimstone, pitch, and turpentine, for a brown colour. The marble for these experiments must be made considerably hot, and then the colours are to be rubbed on dry in the lump. Some of these colours, when once given, remain immutable, others are easily changed or destroyed. Thus, the red colour given by the dragon's-blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the polish of the marble not hurt by it.

A fine gold colour is given in the following manner: Take crude sal ammoniac, vitriol, and verdigris, of each equal quantities. White vitriol succeeds best; and all must be thoroughly mixed in fine powder.

The staining of marble to all the degrees of red or yellow, by solutions of dragon's-blood or gamboge, may be done by reducing these gums to powder, and grinding them with spirit of wine in a glass mortar. But, for smaller attempts, no method is so good as the mixing a little of either of these powders with spirit of wine in a silver spoon, and holding it over burning charcoal. By this means a fine tincture will be extracted; and with a pencil dip in this, the finest traces may be made on the marble white cold; which, on the heating of it afterwards, either on sand, or in a baker's oven, will all sink very deep, and remain perfectly distinct on the stone. It is very easy to make the ground-colour of the marble red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whites are to remain with some white paint, or even with white chalk, before the tincture is given, either of which will prevent the colour from penetrating. All the degrees of red are to be given to marble by this gum alone; a slight tincture of it, without the assistance of heat to the marble, gives only a pale flesh colour: but the stronger tinctures give it yet deeper; to this the affinities of heat adds greatly; and finally, the addition of a little pitch to the tincture, gives it a tendency to blackness, or any degree of deep red that may be desired. A blue colour may be given also to marble by dissolving turpulin in lixivium, in lime and urine, or in the volatile spirit of urine; but this has always a tendency to purple, whether made by the one or the other of these ways. A better blue, and used in an earlier manner, is furnished by the Canary turpulin, a sub stance well known among the dyers. This needs only to be dissolved in water, and drawn on the place with a pencil; it penetrates very deeply into the marble; and the colour may be increased by drawing the pencil wetted afresh several times over the same line. This colour is subject to spread and diffuse itself irregularly; but it may be kept in regular bounds, by circling the lines with beds of wax, or any such substance. It is also to be observed, that this colour should always be laid on cold, and no heat given even afterwards to the marble; and one great advantage of this colour is, that it is therefore easily added to marbles already tainted with other colours, and a very beautiful tinge, and lasts a long time. See also CHIMISTRY, No. 732.

Arundel Marbles, marbles with a chronicle of the city of Athens, inscribed on them (as was supposed) many years before our Saviour's birth; presented to the the university of Oxford by Thomas earl of Arundel, whence the name. See Arundelian Marbles.

Marbled China-ware, a name given by many to a species of porcelain or china-ware, which seems to be full of cemented flaws. It is called by the Chinese, who are very fond of it, *fou teh*. It is generally plain white, sometimes blue, and has exactly the appearance of a piece of China which had been first broken, and then had all the pieces cemented in their places again, and covered with the original varnish. The manner of preparing it is easy, and might be imitated with us. Instead of the common varnish of the China-ware, which is made of what they call *oil of stone* and *oil of fervum mixed*. Sometimes, they cover this with a simple thing made only of a sort of coarse agate calcined to a white powder, and separated from the grocer parts by means of water, after long grinding in mortars. When the powder has been thus prepared, it is left moist, or in form of a fort of cream, with the last water that is suffered to remain in it, and this is used as the varnish. Our crystal would serve well as those coarse agates, and the method of preparation is perfectly easy. The occasion of the singular appearance of this fort of porcelain is, that the varnish never spreads stily, but runs into ridges and veins. These often run naturally into a fort of molasses-work, which can scarce be taken for the effect of chance. In the marbled China-ware defined blue, they first give it a general coat of this colour, by dipping the vessel into a blue varnish; and when this is thoroughly dry, they add another coat of this agate-oil.

Playing Marbles, are mostly imported from Holland; where it is said they are made by breaking the stone-alabaster, or other substance, into pieces or chips.
of a suitable size; these are put into an iron mill which
turns by water; there are several portions with raps
within, cut floatways, not with teeth, which turn con-
stantly round with great swiftness; the friction against
the raps makes them round, and as they are formed,
they fall out of different holes, into which dexterous
chance throws them. They are brought from Nuremberg to
Rotterdam, down the Rhine, and from thence dis-
persed over Europe.

MARBLING, the method of preparing and colouring
the marbled paper.

There are several kinds of marbled paper; but the
principal difference of them lies in the forms in which
the colours are laid on the ground; some being dif-
poited in whirls or circumvolutions; some in jagged
lengths; and others only in spots of a round or oval
figure. The general manner of managing each
kind is, nevertheless, the same; being the dipping
the paper in a solution of gum tragacanth, or, as it
is commonly called, gum-dragon; over which the col-
ours, previously prepared with ox-gall and spirit of
wine, are first spread.

The peculiar apparatus necessary for this purpose,
is a trough for containing the gum-tragacanth and
the colours; a comb for disposing them in the figure
typically chosen; and a burnishing stone for polishing
the paper. The trough may be of any kind of wood,
and must be somewhat larger than the sheets of paper
for marbling which it is to be employed; but the
sides of it need only rise about two inches above the
bottom; for by making it thus shallow, the least
quantity of the solution of the gum will serve to fill it.
The comb may be also of wood, and five inches in
length; but should have brass teeth, which may be
about two inches long, and placed at about a quarter
of an inch distance from each other. The burnishing
stone may be of Jasper or agate: but as those stones
are very dear when of sufficient largeness, marble or
glass may be used, provided their surface be polished
to a greater degree of smoothness.

These implements being prepared, the solution of
gum tragacanth must be made, by putting a sufficient
proportion of the gum, which should be white and
clear from all foreign, into clear water, and letting
it remain there a day or two, frequently breaking the
lumps and stirring it till the whole shall appear dis-
solved and equally mixed with the water. The con-
fidence of the solution should be nearly that of strong
gum-water used in miniature-painting; and if it ap-
pear thicker, water must be added; or if thinner,
more of the gum. When the solution is thus brought
to a due state, it must be passed through a linen cloth;
and being then put into the trough it will be ready
to receive the colours.

The colours employed for red are carmine, lake,
rose pink, and vermillion; but the two last are too
hard and glaring, unless they be mixed with rose-
pink or lake, to bring them to a softer cast; and with respect to the carmine and lake, they are too
clear for common purposes; for yellow, Dutch pink
and yellow ochre may be employed. Prussian blue
and verdigris, a mixture of Dutch pink and Prussian blue,
or verditer, in different proportions; — for orange,
the orange-lake, or a mixture of vermilion, or red
lead, with Dutch pink; — for purple, rose-pink and
Prussian blue.

These several colours should be ground with spirit
of wine till they be of a proper fineness; and then, at
the time of using them, a little liquor-gall, or in de-
cault of it the gall of a beast, should be added, by
grinding them over again with it. The proper pro-
portion of the gall must be found by trying them;
for there must be just so much as will cover the spots
of colour, when sprinkled on the solution of the gum-
tragacanth, to join together, without intermixing or
running into each other.

When every thing is thus prepared, the solutions of
the gum-tragacanth must be poured into the trough;
and the colours, being in a separate pot, with a pen-
cil appropriated to each, must be sprinkled on the sur-
face of the solution, by shaking the pencil, charged
with its proper colour, over it: and this must be done
with the several kinds of colour desired, till the surface
be wholly covered.

When the marbling is proposed to be in spots of a
simple form, nothing more is necessary: but where
the whirls or snail-shell figures are wanted, they must
be made by means of a quill; which must be put
among the spots to turn them about, till the effect
be produced. The jagged lengths must be made by
means of the comb above described, which must be
passed through the colours from one end of the trough
to the other, and will give them that appearance: but
if they be desired to be pointed both ways, the comb
must be again passed through the trough in a contrary
direction; or if some of the whirls or snail-shell figures
be required to be added, they may be yet made by
the means before directed.

The paper should be previously prepared for re-
ceiving the colours, by dipping it over-night in water;
and laying the sheets on each other with a weight
over them. The whole being thus ready, the paper
must be held by two corners, and laid in the most
gentle and even manner on the solution covered with
the colours, and there softly pressed with the hand,
that it may bear every where on the solution. After
which it must be railed and taken off with the same
care, and then hung to dry across a proper cord,
subtended near at hand for that purpose; and in that
state it must continue till it be perfectly dry. It
then remains only to give the paper a proper polish;
in order to which, it is first rubbed with a little soap;
and then must be thoroughly smoothed by the glass
polishers, such as are used for linen, and called the
calendar glasses. After which it should be again rubbed
by a burnisher of Jasper or agate; or, in default of them,
of glass ground to the highest polish: for on the per-
fect polish of the paper depends in a great measure its
beauty and value.

Gold or silver powders may be used, where desired,
along with the colour: and require only the same
treatment as them, except that they must be first tem-
pered with gum-water.

Marbling of books or paper is performed thus:
Dissolve four ounces of gum-arabic in two quarts of
fair water; then provide several colours mixed with
water in pots or shells; and, with pencils peculiar to
each
Marcellus (Marcus Claudius), a famous Roman general, who, after the first Punic war, had the management of an expedition against the Gauls. Here he obtained the Spolia opima, by killing with his own hand Viridomarus the king of the enemy. Such successes rendered him popular, and soon after he was entrusted to oppose Hannibal in Italy. He was the first Roman who obtained some advantage over this celebrated Carthaginian, and showed his countrymen that Hannibal was not invincible. The troubles which were raised in Sicily by the Carthaginians at the death of Hieronymus, alarmed the Romans; and Marcellus, in his third consulship, was sent with a powerful force against Syracuse. He attacked it by sea and land; but his operations proved long ineffectual, and the invention and industry of Archimedes were able to baffle all the efforts, and to destroy all the great and tremendous machines and military engines of the Romans during these successive years. The perseverance of Marcellus at last obtained the victory. After this conquest, Marcellus was called upon by his country to conduct a second campaign against Hannibal. In this campaign he behaved with greater vigour than before; he carried the greater part of the towns of the Samnites, which had revolted, were recovered by force of arms, and 3000 of the soldiers of Hannibal made prisoners. Some time after, in an engagement with the Carthaginian general, Marcellus had the disadvantage; but on the marrows a more successful skirmish vindicated his military character and the honour of the Roman soldiers. Marcellus, however, was not sufficiently vigilant against the snares of his adversary. He imprudently separated himself from his camp, and was killed in an ambuscade, in the 60th year of his age, in his 5th consulship, A. U. C. 344. His body was honoured with a magnificent panegyric by the conqueror, and his ashes were conveyed in a silver urn to his father. Marcus Marcellus claims our commendation for his private as well as public virtues; and the humanity of a general will ever be remembered, who, at the surrender of Syracuse, went on the thought that many were going to be exposed to the avarice and rapacity of an indefatigable soldiery, which the policy of Rome and the laws of war rendered inevitable.

Marcgravii, or Margrave, a kind of dignity.
The month of March was always under the protection of Minerva, and always conformed of the Ancients held it an unhappy month for marriage, as well as the month of May.

March, in the military art, is the moving of a body of men from one place to another. Nothing is laid down particularly concerning the marches of the Jewish armies; only thus much we may collect, that they made use of trumpets, to the different sounds of which they prepared themselves by packing up their baggage, putting themselves in readiness, and attending at the standards, to wait the signal for marching. We are told that the army of the Israelites marched in general no more than one league in a day and an half; but this appears to hold good only of their progress through difficult roads: For Pollard says they might, in an open country, march four leagues in a day or more. The Rabins suppose that the Israelites marched in the same order they were placed in their camp. The Greeks, let the posture of their affairs be what it would, never marched against their enemies till favourable omens encouraged the enterprise. An eclipse of the moon, or any untoward accident, or the intervening of what they esteemed an unlucky day, entirely prevented their march. But of all the Greeks the Lacedemonians were the most nice and scrupulous. The heavenly bodies directed all their motions; and it was an invariable maxim with them never to march before the full moon. The Greeks are particularly remarked by Homer for marching in good order and profound silence; whereas the Barbarian forces were all noise, clamour, and confusion. It is needless to say any thing concerning the marches of the Roman armies, more than that they were performed with the greatest order and dispatch, infomuch that their unexpected presence frequently damped the spirits of their enemies. The Roman soldiers were trained to the military pace, that is, to walk 20 miles in five hours; though at the same time they carried burdens of sixty pounds weight.

Of all the mechanical parts of war, in modern times, none is more essential than that of marching. It may be justly called the key which leads to all the bliniate motions and manoeuvres of an army; for they depend entirely on this point. A man can be attacked in four different ways; in the front, on both flanks, and in the rear: but he can defend himself, and annoy the enemy, only when placed with his face towards him. Hence it follows, that the general object of marching is reduced to three points only; to march forwards, and on both sides, because it is impossible to do it for any time backwards, and by that means face the enemy wherever he presents himself. The different steps to be made use of are these: flow, fast, and oblique. The first is proper in advancing, when at a considerable distance from the enemy, and when the ground is unequal, that the line may not be broke, and a regular fire kept up without interruption. The second is chiefly necessary when you want to anticipate the enemy in occupying some post, in passing a defile, and, above all, in attacking an entrenched army, to avoid being a long while exposed to the fire of the artillery and small arms. The third step is of infinite consequence, both in the infantry and cavalry columns may be opened and formed into lines, and vice versa; lines into columns, by this kind of step, in a lesser space, and consequently in less time, than by any other method whatsoever. In coming out of a defile, you may instantly form the line without preventing the flank to the enemy. The line may be formed, though ever so near to the enemy, with safety, because you face him, and can with ease and safety protect and cover the motion of the troops, while they are coming out of the defiles, and forming. The same thing may be equally executed, when a column is to be formed in order to advance or retire; which is a point of infinite consequence, and should be established as an axiom.

The order of march of the troops must be so disposed, that each should arrive at their rendezvous, if possible, on the same day. The quarter-master-general, or his deputy, with an able engineer, should sufficiently reconnoitre the country, to obtain a perfect knowledge of it and the enemy, before he forms his route.

Before a march, the army generally receives several days' bread. The quarter-masters, camp colour-men, and pioneers, parade according to orders, and march immediately after, commanded by the quarter-master-general, or his deputy. They are to clear the roads, level the ways, make preparations for the march of the army; &c. The general, for instance, beats at 2, the assembly at 3, and the army to march in 20 minutes after. Upon beating the general, the village, and general officer's guards, quarter and rear-guards, join their respective corps; and the army pack up their baggage. Upon beating the assembly, the tents are to be struck, and sent with the baggage to the place appointed, &c.
MARCHAND (John-Louis), a native of Lyons, who shares with the celebrated d’Agues the glory of having carried the art of playing on the organ to the highest degree of perfection. When very young he went to Paris; and happening to be in the chapel of the college of Louis the Great, when they were waiting for the organist to begin divine service, he offered himself in his place. His playing gave such satisfaction, that the Jesuits kept him in the college, and supplied him with every necessary to perfect his talents. Marchand continued to play the organ of their chapel; and though many advantageous places were offered to him, he always refused to accept them. This disinterested conduct was not solely owing to his gratitude; for he was of so independent a disposition of mind, that he was equally careless about reputation and glory. He died at Paris in 1732, at the age of 63. From him we have two books of Pieces for the Harpsichord, much esteemed by the connoisseurs.

MARCHAND (Professor), was from his youth brought up at Paris, in the profession of a bookseller, and in the knowledge of books. He kept a regular correspondence with several learned men, among whom was Bernard the compiler of the Nouvelles de la République des Lettres, and furnished this writer with the literary anecdotes of France. Marchand having embraced the Protestant religion, went to join Bernard in Holland, where he must have been allowed liberty to profess his religious opinions. He continued the trade of bookseller for some time; but afterwards quitted it, that he might dedicate himself wholly to the pursuits of literature. The history of France, together with a knowledge of books and authors, was always his favourite study. In the latter he was so eminently distinguished, that he was consulted from all parts of Europe. He was also one of the principal authors of the Journal Littéraire, one of the best periodical works which have appeared in Holland; and he furnished excellent extracts for the other journals. This valuable and learned man died at an advanced age, the 14th of June 1756; and left the little fortune which he had, to a lottery instituted at the Hague, for the education and instruction of a certain number of poor people. His library, which was excellently chosen for literary history, together with his manuscripts, was left by his last will to the university of Leyden. From him we have, Marchand 1. The History of Printing, a new edition of which has been promised by one of his friends. This work, which is full of notes and critical discussions, appeared in 1740 at the Hague, in 4to. There is such a prodigious display of erudition, and remarks and quotations are heaped together in such confusion, that when you get to the end of the chaos, you know not what conclusion to form concerning the points which have been discussed. Abbe Mercier, abbot of Saint-Leger, de Soifons, gave, in 1775, 4to, a supplement to this history, which is equally curious and accurate. 2. An Historical Dictionary, or Memoirs Critical and Literary, printed at the Hague in 1758, in two small volumes, folio. In this work we meet with historical singularities, literary anecdotes, and a diffusion of points of bibliography: but too great minutenesse prevails in it, the style is deficient in point of purity, and the author is too much carried away by the heat and eagerness of his character. More erudition could not well be collected; especially upon subjects which, at least to the generality of readers, are so uninteresting.

MARCHANTIA, in botany: A genus of the natural order of algae, belonging to the cryptogamia class of plants. The male calyx is peltata, and covered below with monopetalous corolla; the antherae are multiform; the female calyx is sessile, campanulate, and polyperturmis. There are eight species; of which the most remarkable are, 1. The polymorpha, or great star-handed marchantia, is a native of Britain, growing on the banks of rivulets, on shaly moister rocks, the sides of wells, and sometimes bogs. The leaves are about three inches long; from half an inch to an inch broad, lying flat on the ground, and adhering close to it by numerous downy radicles, which grow out of the middle and base of the leaf on the under side. These leaves are situated on their edges, their upper surface of a dark, shining, green color, reticulated with numerous, minute, rhomboidal, or lozenge-like scales; variously divided into obtuse lobes, and in the middle by a blackish purple vein; their under side is of a paler green, and their substance coriaceous, and nearly opaque. There are three varieties, from one of which is produced a yellow powder, showing a most curious and wonderful mechanism when examined under the microscope. The leaves have a strong aromatic smell, and acid taste; and are recommended in a decoction of skimmed milk, as good in the jaundice and other disorders of the liver. 2. The conica, or conic-mushroom marchantia, with warty leaves, grows on moist shady banks by the sides of rivulets. These leaves are broad, flat, about two inches long, dichotomous, obtusely lobed, and lie upon one another. Their surface is of a pale-green glossy colour; curiously tesselated with rhomboidal and hexagonal tubercles, each having a white vessele or wart in the centre, with a puncture on its head. The leaves have a peculiar strong fragrant smell, and acid aromatic taste. They are supposed to possess the same attenuating qualities as the first, but in a higher degree. They are recommended as an antiscorbutic, and for thinning the blood.

MARCHE, a province of France, bounded on the north...
north by Berry, on the east by Auvergne, on the west by Angoumois, and on the south by Limosin. It is about 55 miles in length, and 25 in breadth, and is pretty fertile in corn and wine.

MARCHENA, an handsome, ancient, and confiderable town of Spain, in Andalucia, with the title of a duchy, and a suburb as large as the town, seated in the middle of a plain, particularly fertile in olives, though very deficient of water. W. Long. 5. 20. N. Lat. 37. 20.

MARCHERS, or LORDS-MARCHERS, were those noblemen that lived on the marches of Wales or Scotland; who, in times past, according to Cambden, had their laws, and petatalem vitiis, &c. like petty kings, which are abolished by the flat. 27 H. 8. c. 26. and 1 Edw. 6. c. 10. In old records the lords marches of Wales were styled Marchiaus de Marchia Wallia. See 1 & 2 P. & Bl. c. 15.

MARCHIA (marchia), from the German march, i. e. lines, or from the French marque, viz. sigannu, (being the notorious distinction between two countries or territories), are the limits between England and Wales, or between England and Scotland, which last are divided into west and middle marches, 4 Hen. 5. c. 7. 22 Edw. 4. c. 8. 24 Hen. 8. c. 9. And there was formerly a court called the court of the marches of Wales, where pleas of debt or damages, not above the value of 50 pounds were tried and determined; and if the council of the marches held pleas for debts above that sum, &c. a prohibition might be awarded. Hill. 14. Car. 1. Cro. Car. 38.

MARCHET, or MARCETTA, a pecuniary fine, anciently paid by the tenant to his lord, for the marriage of one of the tenant's daughters. This custom obtained, with some difference, throughout all England and Wales, as also in Scotland; and it still continues to obtain in some places. According to the custom of the manor of Dinover in Caernarthenshire, every tenant at the marriage of his daughter pays ten shillings to the lord; which, in the British language, is called gwabr-marched i. e. maid's fee.

In Scotland, and the north parts of England, the suitum was, for the lord to tie the first night with the bride of his tenant; but this usage was abrogated by king Malcolm III. at the instance of his queen; and, instead thereof, a mark was paid by the bridegroom to the lord; whence it was called marche matritis. See BOROUGH-ENGLISH.

MARCIANA SILVA (anc. geog.), a forest situated between the Rauraci and the Danube, before it comes to be navigable; a part of Hrecenia. Now Schwartzwald, or Black Forest, in the south-west of Sabaia, near the rife of the Danube and Neckar.

MARCIANUS, a native of Thrace, born of an obscure family. After he had for some time served in the army, as a common soldier, he was made private secretary to one of the officers of Theodotus. His winning address and uncommon talents raised him to higher stations; and on the death of Theodotus II. A.D. 450, he was invested with the imperial purple in the east. The subjects of the Roman empire had reason to be satisfied with their choice. Marcianus showed himself active and resolute; and when Attila, the barbarous king of the Huns, ascended the empe-
MARCITES, or MARCIUS, a seat of heroes in the second century, who also called themselves the perfecti, and made profession of doing every thing with a great deal of liberty and without any fear. This doctrine they borrowed from Simon Magnus, who however was not their chief; for they were called Marcus from one Marcus, who conferred the priesthood, and the administration of the sacraments, on women.

MARCO POLO, PAOLO, or POLO. See PAULO.

MARCOMANNI, an ancient people of Germany, who seem to have taken their name from their situation on the limits or marches, to the east of the Higher Rhine, and the north of the Danube. Clavetius allots to them the duchy of Wurttemburg, a part of the patinate between the Rhine and the Neckar, and a part of Swabia, lying between the springs of the Danube and the river Brignitz: they afterwards removed to the country of the Boli, whom they expelled and forced to withdraw more to the east, occupying what is now called Bohemia. (Strabo, Vel.

MARCOSIAS, or COLOBARIANIS, an ancient seat in the church, making a branch of the Valentinians.

St Irenæus speaks at large of the leader of this sect, Marcus, who it seems was reputed a great magician. The Marcianians had a great number of apocryphal books which they held for canonical, and of the same authority with ours. Out of thefe they picked several idle fables touching the infancy of Jesus Christ, which they put off for true histories. Many of these fables are still in use and credit among the Greek monks.

MARCULUS, among the Romans, a knocker or instrument of iron to knock at the doors with.

MARCUS ( Aurelius Antoninus). See ANTONIUS.

MARDIKERS, or TOPASSES, a mixed breed of Dutch, Portuguese, Indians, and other nations, incorporated with the Dutch at Batavia, in the East Indies.

MARE, the female of the horse kind. See the article EQUUS, and Horse.

Before a mare is covered, she should be in the house about six weeks, during which time she should be well fed with good hay and oats well fitted; and in order to render her conception the more certain, near a quart of blood may be taken from each side of her neck, about five or six days before covering. Another method to bring a mare in season and make her retain, is to give her, for the space of eight days before you bring her to the horse, about two quarts of hempseed in the morning, and as much at night; and if she refuses to eat it, to mingle it with a little bran or oats, or else to let her fast for a while; and if she fail also eat of it, it will greatly contribute to generation.

Mares go with foal 11 months, and as many days as they are years old; and therefore the proper time for covering them is in the beginning of June, that they may feel the Myolph swing, when there will be plenty of grass, which will afford the mares a great abundance of milk for nourishing their foals. After covering, let her, for three weeks or a month, have the same diet as before, and be kept clean in the stable, with her feet well pared and thin feed: If she cannot readily bring forth, hold her nostrils so as to flop her taking wind; and if that will not do, dissolve madder, to the quantity of a walnut, in a pint of ale and give it her warm. In case she cannot void her fecundinal, or after-burden, boil two or three handfuls of fennel in running water; then put half a pint of that liquor into as much fack, or, for want thereof, into a pint of ale, with a fourth part of salad-oil, mixed together, and pour it lukewarm into her nostrils, holding them close for some time. Otherwise, give her green wheat, or rye, the last of which is best.

If the mare has but little milk, boil as much as you can get from her with the leaves of lavender and fpike, and bathe the udder with it warm, till the knobs and knobs are dissolved. She should now drink only white water, which is bare put in water; give her also sweet mashes: and a month after foaling, let her have a mash with some brimstone or savin in it.

MAREOTIS, a lake in Egypt near Alexandria. Its neighbourhood was famous for wine; though some make the Mareticium vinum grow in Epirus, or in a certain part of Libya, called also Mareotis, near Egypt.

MARETS (Jean de), a Parisian, one of the finest geniuses of the 17th century, became at last a visionary and a fanatic. He was a great favourite of cardinal Richelieu, and polished an employment of genius under him; for he was called upon to relax and divert him, after the fatigue of business, by facetious conversation. He used, in order to triumph over the virtue of women, when they objected to him the interest of their salvation, to lead them into atheistical principles. He was a member of the French academy from its first erection. He wrote several dramatic pieces, which were well received. He attempted an epic poem; but after spending several years about it, dropped the design to write books of devotion. He likewise wrote romances; but not such virtuous ones as used to be written at that time. He was a declared enemy of the Jansenists. His visions are well described by the Meillen de Port Royal. He promised the king of France, by the explication of prophecies, the honour of overthrowing the Mahometan empire. In his last years he wrote something against Boileau's Satires.

MARETS (Samuel de), one of the most celebrated divines of the reformed church, was born in Picardy, in 1599. In 1620, he was settled in the church of Laon; but, in 1624, accepted a call to that of Sedan: in 1642, he obtained a professorship at Groningen; and, from that time to his death, exerted himself so much in the service of that university, that it was reckoned one of the most flourishing in the Netherlands. His System of Divinity was found to be too methodical, that it was made use of at other academies; and at the end of it may be found a chronological table of all his works. Their number is prodigious; and their variety
Margaret. variety shows the extent of his genius. He was moreover engaged, in many disputes and controversies, and died in 1673.

MARGARET (Sr.), a celebrated virgin who, as is supposed, received the crown of martyrdom at Antioch in the year 271: the manner of her death is not known. The ancient martyrologists make no mention of her name, and she did not become famous till the 11th century. There is no more foundation for what is said concerning her relics and girdles than for the stories which are told of her life. A festival, however, is still held in honour of her memory on the 20th of July: See Baillot's Lives of the Saints for that day.

Her actions (says this author) have been so falsified and altered, in the opinion even of Metaphrastus, that the Romish church have not thought proper to insert any of them into their breviary. The Orientals pay reverence to her by the name of Saint Palagia or Saint Nicaea, and the western church by that of Saint Germain or Saint Margaret.

Margaret, the daughter and heiress of Floris count of Holland, who is famous on account of a story repeated by a hundred compilers even of the present century. Having refused charity to a woman whom she at the same time accused of adultery, she was, as a punishment from God, brought to bed (A.D. 1276) of 365 children, partly boys and partly girls. The boys, it is added, were all named John, and the girls Elizabeth. This story is represented in a large painting in a village not far from the Hague; and by the side of the painting are two large basins of brads, on which it is pretended the 365 children were presented to be baptized. But if a picture is sufficient authority for the truth of any thing, it is impossible to tell how many fables would be fully attested. It has been remarked, that the most ancient annals are altogether silent concerning this fact; and that it is related only by modern writers, who besides do not agree with one another concerning either the date of time, or the life of the countess, or the number of the children; and in short, that Nasius, who was at that time bishop of Utrecht, was called John, and not Guit, as the chronicles declare. Several learned men have endeavoured to trace the truth which could have given rise to a relation so extraordinary. M. Struik fixed upon the epistles of the mother and son, which appeared to him worthy of some attention; and in conformity to the dates which they bear, he supposed that the countess was brought to bed on Good-Friday, 1276, which was the 26th of March. Now, at the year then began on the 25th of the same month, there were only two days of the year elapsed when the countess was brought to bed, which circumstance caused it to be said that she had brought into the world as many children as there were days in the year. In fact only two children are mentioned in history, John and Elizabeth. The fable thus explained is only a common event, wherein there is nothing of the marvellous, but in consequence of a double meaning in the exprefion. Later writers, who have not examined this circumstance, have ascribed 365 children to the countess. (Journal des Savans, February, 1758, on the General History of the United Provinces.)

Margaret (countess of Richmond and Derby), the learned and pious mother of Henry VII. was born at Betchiev in Bedfordshire, in 1441, and was the sole heiress of John Beaufort duke of Somerset, grandson to John of Gaunt. Her mother was the heiress of Lord Beauchamp of Powick. While yet very young, the great duke of Suffolk, minifter to Henry VI. or rather to Queen Margaret, fought her in marriage to his son; and she was at the same time solicited by the king for his half-brother Edmund earl of Richmond. To the latter she gave her hand. Henry VII. was the sole-fruit of this marriage, his father dying when he was but 15 weeks old. Her second husband was Sir Henry Stafford, knight, second son to the duke of Buckingham; by whom she had no issue. Soon after his death, which happened in the year 1482, she fought consolation in a third husband, Thomas Lord Stanley, who, in the first year of her son's reign, was created earl of Derby. He died in the year 1504, without issue, being then high constable of England. She survived her lord not quite five years, dying at Willingdon in June 1509, in the 69th year of her age. She was buried in Henry VII.'s chapel; on the south side of which was erected to her memory an altar-tomb of black marble, with her statue of brafs.

From her funeral sermon preached by her confesser bishop Fisher, who, says Ballard, knew the very secrets of her soul, we learn, that she possessed almost all things that were commendable in a woman, either in mind or body. She understood the French language perfectly, and had some knowledge of the Latin. She was devout even to austerity, in humility romantic, profuse in the encouragement of learning, and singularly chaste; but this last virtue became conspicuous only towards the latter end of a third marriage. In her last husband's days (says Baker), she obtained a licence of him to live chaste, whereupon she took upon her the vow of celibacy. A boon (says Mr Wapole), as seldom requested, I believe, of a third husband, as it probably would be easily granted. Her life, from the turbulence of the times, and vicissitude of her son's fortune, must necessarily have been subject to infinite di Quiets, which however she is said to have supported with singular fortitude.—She wrote 1. The mirror of gold for the sinful soul, translated from a French translation of a book called Speculum aureum peccatorum. Emprinted at London, in Flete-streete, at the sign of St George, by Richard Pynson, quarto, with cuts on vellum. 2. Translation of the fourth book of Dr Gereson's treatife of the imitation and following the blessed life of our most merciful Saviour Christ. Printed at the end of Dr Wm. Atkinson's English translation of the three first books, 1504. 3. A letter to the king; in Howard's collection. 4. By her son's order and authority, she also made the Orders for great estates of ladies and noble women, for their precedence, and wearing of barbes at funerals, over the chin and under the same.

Margaret, the daughter of Waldemar III. king of Denmark, styled the Scyffi of the North; she succeeded her father in the throne of Denmark, her husband in that of Norway, and the crown of Sweden was given her as a recompence for delivering the Swedes from the tyranny of Albert their king. Thus...
MARGARITA. or Pearl-island, an island of South America, the middle of which is feated in W. Long. 64° 2'. N. Lat. 11° 30'. It was discovered by Columbus, and is about 35 leagues in compass. The soil is very fertile in maize and fruits, and abundance in pasture and verdant groves, yet is totally destitute of fresh water, which the inhabitants are obliged to bring from the continent. When the Spaniards first landed here, they found the natives busy in fishing for oysters. Columbus ordered some of the savages aboard his ship, who were so far from being terrified, that they very soon became familiar with the Spaniards. The latter at first imagined that the savages offered them food; but on opening the shell's, they found they contained valuable pearls. Upon this discovery they immediately landed, and found the natives ready to part with their pearls for the merril truffles. In process of time the Spaniards built a castle called Monpade, and employed prodigious numbers of Guinean and negroes in the pearl-fishery; cruelly forcing them to tear up the oysters from the rocks to which they stuck, during which time many of them were destroyed by the sharks and other voracious fishes. In 1520, this island was invaded by the Dutch, who demolished the castle upon it: since which time it has been in a manner abandoned by the Spaniards; and is now principally inhabited by the natives, to whom some particular indulgences were granted by the court of Spain, on account of their ready submission to Columbus.

MARGARITA, the Pearl, in natural history. See Pearl, and Mya.

MARGARITINAR, are glass ornaments, made at Venice of small glass tubes of different colours, which are blown at Murano, and which the women of the lower class wear about their arms and necks. The largest sort are used for making rosaries. This work is performed with great dispatch, the artisan taking a whole handful of those tubes at once, and breaking them off one after another with an iron tool. These short cylinders are mixed with a kind of ashes, and put over the fire in an iron pan; and when the two ends begin to melt, by stirring them about with an iron wire, they are brought to a round figure; but care Margate, is taken not to leave them too long over the fire, lest the hole through which they are to be strung should be entirely closed by the melting of the glass. There are several streets at Venice de Vigna entirely inhabited by people whose sole occupation is to make and string these margaritini.

MARGATE, a sea-port town of Kent, on the north side of the island of Thanet, near the North-foreland. It is noted for shipping vast quantities of corn (most, if not all, the product of that island) for London, and has a salt-water bath at the port-house, which has performed great cures in nervous and paralytic cases, and numbness of the limbs. It lies in St. John's parish, which is a member of the port of Dover, at the distance of 14 miles, and 12 from Canterbury, and 72 from London: and in the summer season is frequented for sea-bathing, having become one of the principal watering-places for the Idle, the opulent, and the invalid, where they meet with every requisite accommodation; and the adjacent country abounds with most extensive prospects and pleasant rides. E. Long. 1° 30'. N. Lat. 51° 24'.

MARRETTAS, Marhettas, Marattas, or Mahrattas; a people of India, and by far the most considerable of all the Hindoo powers. The Marhattas boast a very high antiquity; profess the religion of Brahma; speak a dialect of the Sanscrit language, in which they have introduced all the technical terms of Mogul administration; use a character of their own in writing, though not very different from some of the other tribes around them; and are divided into four castes or classes of people, with the various subdivisions of professional distinction found over the rest of Hindoostan, but with this remarkable difference, that among the Marhattas every individual may, as in fact he occasionally does, follow the life of a soldier.

As a nation inhabiting immemorially the country properly denominated Marhatt or Merhat, and comprehending the greater part of the Pahowa's present dominion in the Decan, they were completely subdued, and afterwards for many centuries depopulated, first by the Paruss, then by the Moghul conquerors of Dilli. At length, towards the end of Alemger's reign, they united, rebelled, and under the famous Sivajee S. Swarajee, a leader of their own tribe, laid the foundations of their present vast empire, which has risen gradually on the ruins of the Mahomedan power, as related under the article Hindostan, p. 351 par. 6.

Sivajee was succeeded by his son Rajah Sahoon, who considerably extended the Marhatta dominions. When Rajah Sahoon grew old and infirm, and the fatigues of government began to press heavily upon him, he appointed Bishnar Balajee Bahman born at Goknum, and leader of about 25,000 horse, to the office of Pahowa or vicegerent.

Rajah Sahoon died without issue, but left nephews by his brother. The courage and wisdom of Balajee had gained him, during the latter years of the old Rajah, the affection and esteem of all the nation. But under an appearance of modesty and self-denial, his prevailing passion was ambition; and the sentiments
The Marhattas, of gratitude and loyalty were absorbed in the desire to command. He made use of the influence he had acquired under his benefactor to firmly to establish his own power, that he not only retained the high office of Paihwla during his life, but transmitted it to his polity. The Marhattas, gradually forgetting a prince they knew nothing of, became accustomed to obey his vicegerent only, yet a certain respect for the royal race, or the dread of the consequence of violating the strong prejudice which the nation still retains in favour of the family of its founder, have served perhaps to preserve it; and the descendants of Rajah Shou's nephews yet exist, but are kept in captivity in the palace at Sattarah. The eldest is styled Ram Rajah, or sovereign; his name is on the seal and coin of the Marhatta state; but his person is unknown, except to those who immediately surround him. He resides in his splendid prison, encompassed with the appendages of eastern grandeur, but debared of all power, and kept totally ignorant of business. The feat of government was transferred from the ancient royal residence of Sattarah to Poonah; and the usurper, as well as his successors, seem still to have acted under the supposed authority of the deposed prince, by their assuming no other title or character than that of Paihwla or prime-minister. From this change, the empire of the Ram-Rajah has been distinguished only by the appellation of the Paihwship, or otherwise the Government of Poonah, from the name of its present capital.

Biloonat Balajee was succeeded as Paihwla by his eldest son Balajee Row (called also Nana Sahab or Nah N-w), who left three sons, the eldest of whom, Balajee Pundir, sometimes called Nanab Pundit, succeeded him. The two others were Rogobab or Ragobat Row, and Shambeer Row.

Balajee Pundit left two sons: Mahadava Row, who was Paihwla twelve years; and Narrain Row, who succeeded him.

During the latter part of life of Mahadava Row, his uncle Rogobab was confined to the palace at Poonah, for reasons with which we are not acquainted. Mahadava Row died without issue; and upon the accession of Narrain his brother, a youth of about 19 years of age, Rogobab in vain applied to be released from his confinement. He is therefore suspected of having entered into a conspiracy with two officers in his nephew's service, Somair Jing and Yulubh Gardie, in order to procure that by force which he could not obtain by treaty. The correspondence between the conspirators was carried on with so much secrecy, that the court had not the least intimation or suspicion of their design, till every avenue leading to the palace had been secured, and the whole building surrounded by the troops under the command of those two officers. It is said, that on the first alarm, Narrain Row, suspecting his uncle, ran to his apartment, threw himself at his feet, and implored his protection; "You are my uncle (said he), spare the blood of your own family, and take possession of a government which I am willing to resign to you."

Somair and Yulubh entered the room whilst the young Paihwla was in this impertinent posture. Rogobab, with apparent surprise and anger, ordered them to withdraw; but as they either knew him not to be Marhattas, sincere, or thought they had proceeded too far to retreat, they stabbed Narrain with their poignards whilst he clung to his uncle's knees.

The office of Paihwla being now vacant, the chiefs of the nation then at Poonah were assembled, and Rogobab being the only survivor of the family of Biloonat Balajee, to whom the Marhattas in those parts are enthusiastically attached, he was named to fill it. Being naturally of a warlike temper, he resolved to undertake some foreign expedition; for besides gratifying his passion for the field, he probably hoped, by the splendour of his exploits, to draw off the attention of the public from inquiring into the late catastrophe.

A pretence for war was not difficult to be found. He renewed the claim of his nation to the chiefs, and marched his army towards Hydrobad, the capital of the Nizam. The vigour of his measures procured him an accommodation of his demand; and he was proceeding to enforce a similar one upon the Carnatic, when he received intelligence which obliged him to return hastily to Poonah.

Although the Marhatta chiefs had acknowledged Rogobab as Paihwla, yet they and the people in general were much disatisfied with his conduct. The murderers of Narrain Row had not only escaped punishment, but, as was reported, had been rewarded. The crime was unexamined, and the perpetrators were beheld with uncommon horror and detestation. The Paihwla had hitherto so fully polished the love of the people, that, till then, guards were considered unnecessary about the person of a man whose character rendered him inviolable. Every one therefore had free access to his palace, and he relied with confidence for his safety upon the affections of those who approached him.

These reflections operated powerfully upon the minds of the Marhattas; but perhaps no violent consequences would have ensued, had it not been discovered, soon after the departure of Rogobab from Poonah, that the widow of Narrain Row, Ganga Beec, was pregnant. This determined their wavering resolutions. Frequent conciliations were held among the principal men then in the capital; and it was finally resolved to abjure the allegiance they had sworn to Rogobab, and declare the child, yet unborn, to be the legal successor of the late Paihwla.

A council of regency was immediately appointed to govern the country until the child should become of age; and it was agreed to reserve their deliberations, in case it should prove a female or die, till the event should render them necessary. They who principally conducted these measures, and whose names will on that account be remembered, were Stekaram Baboo and Balajee Pundit, called also Nanah Pher Nevees, from his having been long the principal secretary of the Marhatta state. Nine other Marhatta leaders approved of these measures, and swore to maintain them.

As the first step towards the execution of their plan, the widow of Narrain Row was conveyed to Pondicherry, a fort of great strength, situated on a high mountain, about 25 miles from Poonah. As soon as Rogobab received intimation of this revolution, he marched...
Marathas. ed back towards the capital. But discontent had already infested his troops; some of the chiefs retired to their estates, and others joined the standard of the regents. He however risked a battle with an army of the revolutionists commanded by Trimbee Row, in which the latter was slain; but though he obtained a victory, the strength of the confederates daily increased, while his own troops were diminished by continual defections. He therefore found it necessary to retire to Ugein, and to solicit the affiance of the Maratha chiefs Sindia and Holkar; but meeting with a refusal, he went to Surat, and applied for succour to the English.

Rahobah's success in this application was the cause of two wars with the Maratha state; which, after much waste of blood and treasure, the English were obliged to conclude by relinquishing his claim, and acknowledging as legal Pailhwa the son of Narrain Row, who was born about seven months after the death of his father. See India, p. 121 and 152; also Hindostan, p. 21.

The Maratha dominions, as already observed, are governed by a number of separate chiefs, all of whom acknowledge the Ram Rajah as their sovereign; and all, except Moodajee Boonfallah, own the Pailhwa as his vicerecter. The country immediately subject to the Pailhwa, including all the hereditary territories that were left by the Rajah Sabou to the Ram Rajah, and those that have been acquired and added to them since in his name, extends along the coast nearly from Goa to Cambay; on the south it borders on the possessions of Tippoo Saib; eastward on those of the Nizam, and of the Maratha Rajah of Berar, and towards the north on those of the Maratha chiefs Sindia and Holkar.

Moodajee Boonfallah, Rajah of Berar, possesses besides Berar, the greatest part of Orissa (see Hindostan, p. 523, par. 6.) This prince being descended from the line of the Ram Rajah, owes the power of the Pailhwa, by whom a branch of his family is kept in ignominious confinement, with ill-will; has often refused to support his measures; and, on some occasions, has even seemed inclined to act against him.

Next to Moodajee, in point of importance, must be ranked Madajee Sindia, a bold and aspiring chief, who possesses the greatest part of the extensive bournary or government of Malva, together with part of the province of Candeifhe. The remainder is under the dominion of Holkar. Both he and Sindia pretend to be descended from the ancient kings of Malva. Sindia resides chiefly at Ugein, near the city of Mandu, once the capital of their kings; and Holkar at Indore, a town little more than 50 miles west of it. The dominions of these, and of some chiefsof less consequence, extend as far as the river Jumna.

The measures pursued by the Marathas for some years left little room to doubt that they aspired at the sovereignty of all Hindostan, or at least at the expulsion of the Mohomedan princes: But in this last design they appear to have succeeded, and to have gained a great accession of territory, through the arms of Sindia, both by the capture of the cities of Agra and Delhi, with their territorial dependencies, and the consequent captivity of the unfortunate monarch who ruled there as the last imperial representative of the great Moghol race of Timur. "The whole of the dominion thus newly established is vast in extent, stretching near 1200 miles along the frontiers of Tippoo and the Nizam in a north-east direction, from Goa on the Malabar coast to Balsore in Orisha adjoining to Bengal; and from thence north-westly 1000 miles more, touching the confines of the British and allied states, on the borders of the Ganges and Jumna, to the territory of the Sicks at Panipat, rendered famous in 1761 for the last memorable defeat sustained by the Marathas in their ambitious contest for empire with the united declining power of the Mahomedans. From this place, in another course, with great encroachment on the old eastern boundary of the Rajput country of Ajmere, it runs about 260 miles to the little Hindoo principality of Kota, and thence north-westly 540 miles farther to the extreme point of the foubah of Gujerat at Daurka, including the whole of that fertile province: From whence, along the two coasts of Cambay and Malabar to Goa, the distance may be reckoned 800 miles. Thus the overgrown empire of the Marathas may be said to extend east 19 degrees of longitude, near the parallel of 22 degrees north latitude, from the mouths of the Indus to those of the Ganges, and about 13 degrees of latitude north, from the Kittenah to Panipat; comprehending at least an area of 400,000 square geographical miles, being confidently more than a third part of Hindostan, including the Decan, and equal perhaps in dimensions to all the British and allied states in India, with those of Golconda and Myfore, taken together."

Maria, of Sancta Maria, an island of the Indian Ocean, lying about five miles east from Madagascar. It is about 27 miles long and five broad; well watered, and surrounded by rocks. The air is extremely moist, for it rains almost every day. It is inhabited by 500 or 600 negroes, but seldom visited by ships.

Maria (St.), a considerable town of South America, in the audience of Panama, built by the Spaniards after they had discovered the gold mines near it, and soon after taken by the English. It is seated at the bottom of the Gulf of St Michael, at the mouth of a river of the same name; which is navigable, and the largest that falls into the gulf. The Spaniards come here every year in the dry season, which continues three months, to gather the gold-dust from the sands of the neighbouring streams; and carry away great quantities. W. Long. 138° 30'. N. Lat. 7° 6'.

Maria (St.), a handsome and considerable town of Spain, in Andalusia, with a small castle. It was taken by the English and Dutch in 1702, for the archduke of Austria. It is seated on the Guadetara, at the mouth of which is a tower and a close battery. W. Long. 5° 33'. N. Lat. 36° 35'.

Marian Islands. See Ladrone Islands.

Maria (John), a learned Spanish historian, born at Talavera in the diocese of Toledo. He entered among the Jefuits in 1554, at 17 years of age; and became one of the most learned men of his time. He was a great divine, a good humanist, and profoundly versed in ecclesiastical as well as profane history. He taught...
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MAN

Marianus Mariguilis, an Irish monk, was related to the Venerable Bede, and wrote a chronicle which is esteemed. He died in the abbey of Fuld in 1086, aged 58.

MARIONE, or St. Mary le Bone, or rather Bone, from the neighbouring brook, a parish of Middlesex, on the north-west side of London. The manor appears to have belonged anciently to the bishop of London. In 1338, it was granted to the town and city of London, and is now in the hands of the common hangman, for his assisting in that work; that it is lawful to murder tyrants.

A work on the faults of the government of the society of Jesuits, which has been translated into Spanish, Latin, Italian, French, &c.

MARIANUS, scoropus, an Irish monk, was related to the Venerable Bede, and wrote a chronicle which is esteemed. He died in the abbey of Fulda in 1086, aged 58.

MARIGUILLA, an island of North America, and one of the leafl of the Caribbean, lies in N. Lat. 16° 52' and W. Long. 61° 5', from London, at the distance of four leagues from Guadaloupe, to the south. The soil, produce, and climate, are pretty much the same as the other Caribbean. Columbus discovered it on his second American voyage in 1493, and called it by the name of his ship Maria Galanta, or Gallant Mary. It is about six leagues long, and between three and four broad. Viewed at a distance from on board a ship, it appears like a floating island, because, as it is for the most part flat, the trees seem to swim; but a nearer inspection shows it to be intersected by some rising grounds, which give a fine variety to the landscape. The French settled here in 1648, and it was taken by the English in 1691, but the French soon got possession of it again. It was again taken by the British in 1759, but afterwards restored at the peace 1763. This island was thought, on its first discovery, to want water; but a charming running stream has in time been discovered, no less convenient than refreshing and wholesome, on the banks of which are some wealthy planters, and excellent plantations of sugar.

A little village in a small bay is the capital of the island, and here the commandant resides. The whole island is very capable of improvement; the soil being almost equally good, and the land rising too where too high. The coast affords many little bays, and safe anchorage and shelter to ships.

MARINE, a general name for the navy of a kingdom or state; as also the whole economy of naval affairs; or whatever respects the building, rigging, arming, equipping, navigating, and fighting ships. It comprehends also the government of naval armaments, and the state of all the persons employed therein, whether civil or military.

The history of the marine affairs of any one state is a very comprehensive subject, much more that of all nations. Those who would be informed of the maritime affairs of Great Britain, and the office it has made at sea in all ages, may find abundance of curious matter in Selden's 'Maris Glorium'; and from his time to ours, we may trace a series of facts in Ledward's and Burchet's, Naval History, but above all in the Lives of the Admirals, by the accurate and judicious Dr. Campbell.

MARINES, or MARINE FORCES, a body of soldiers raised for the sea-service, and trained to fight either in a naval engagement or in an action afloat.

The great service of this useful corps was manifested frequently in the course of the war before last, particularly at the siege of Belchite, where they acquired a great character, though lately raised and hardly exercised in military discipline. At sea they are incorporated with the ship's crew, of which they make a part; and many of them learn in a short time to be excellent seamen, to which their officers are ordered by the admiralty to encourage them, although no sea-officer is to order them to go aloft against their inclination. In a sea-fight their small-arms are of very great advantage in scouring the decks of the enemy; and when they have been long enough at sea to stand firm when the ship rocks, they must be infinitely preferable to seamen if the enemy attempts to board, by razing a battalion with their fixed bayonets to oppose him.

The sole direction of the corps of British marines is vested in the lords commissioners of the admiralty; and in the admiralty is a distinct apartment for this purpose. The secretary to the admiralty is likewise secretary to the marines, for which he has a salary of L. 300 a year; and he has under him several clerks for the management of his department.

The marine forces of Great Britain in the time of peace are stationed in three divisions; one of which is quartered at Chatham, one at Portsmouth, and another at Plymouth. By a late regulation, they are ordered to do duty at the several dock-yards of those ports, to prevent embezzlement of the king's stores, for which a captain's guard mounts every day; which certainly requires great vigilance, as so many abuses of this kind have
have been committed, that many of the inhabitants, who have been long used to an infamous traffic of this kind, expect these conveyances at certain periods as their due, and of course renew this regulation in the highest degree as an infringement of their liberties.

The marine corps are under the command of their own field-officers, who discipline them, and regulate their different duties.—His late majesty in 1760 formed a new establishment of marine officers, entitled the general, lieutenant-general, and three colonels of marines (one for each division), to be taken from officers in the royal navy. The two first are always enjoyed by flag-officers, the last by post-captains only. This establishment was formed to reward such officers who distinguished themselves in the service of their country.

Marine-adjutant, is the training up soldiers for sea service, in such exercises as the various positions of the firelock and body, and teaching them every manoeuvre that can be performed on board ships of war at sea. See Exercise.

Marine-Chair, a machine invented by Mr Irwin for viewing the satellitiae of Jupiter at sea, and of course determining the longitude by their eclipses. An account of it is given in the Journal Estranger for March 1760. At an account of its accuracy was published the year following by M. de L'ile astronomer in the imperial academy of Peterbourgh: but notwithstanding the commendations bestowed upon it by this gentleman, it hath never come into general use: and therefore we may conclude, that it is much inferior to the inventions of Mr Harrison for the same purpose. See Harrison and Longitude.

Marine-furnace, is the name of a machine contrived by Mr H. de Scumecas for measuring the way of a ship in the sea. This machine is in the form of the letter Y, and is made of iron or any other metal. At each end of the lines which constitute the angle or upper part of that letter, are two pallets, not much unlike the figure of the log, one of which falls in the form of the prows of the other rite. The falling or pendal pallet meeting a resistance from the water, as the ship moves, has by that means a circular motion under water, which is faster or slower according as the vessel moves. This motion is communicated to a dial within the ship, by means of a rope fastened to the tail of the Y, and carried to the dial. The motion being thus communicated to the dial, which has a bell in it, it strikes exactly the number of geometrical paces, miles, or leagues, which the ship has run. Thus the ship's distance is attained; and the forces of tide and currents may also be discovered by this instrument, which, however, has been very little used.

Marine-acid, a name given to one of the component parts of sea-salt. An account of various methods of procuring this acid from common salt, of most of its chemical properties, and of several uses it may be put to in the arts, is given under the articles Chemistry, Colour-making BLEACHING, &c. M. Chaptal observes, that the marine acid cannot be obtained by distilling salt with powdered flints. He made the experiment by mixing ten pounds of flints with two pounds of sea-salt, but obtained only a mass of the colour of litharge, and the flames were not perceptibly acid. Clay will decompose this salt for once, but not in the smallest degree if used a second time; which shows that in all probability the decomposition is owing to a portion of vitriolic acid contained in the clay.

In France there is a very impure kind of soda named Blanquette, which, according to M. Chaptal's analysis, contains 21 pounds of sea-salt out of 25; and yet, when treated with vitriolic acid, affords little or no spirit of salt, but abundance of volatile spirit of sulphur. Our author ascribes this to the quantity of charcoal contained in the blanquette, which unites with the vitriolic acid and volatilizes it; and his conjectures appeared to be right; because, if the exhalation destroyed by calculation, the blanquette yields marine acid in proportion to the quantity of common salt it contains.

Under the article BLEACHING we have taken notice of the properties of the dephlogisticated acid of sea-salt in whitening cloth; but though this has been often attempted, it does not appear likely to come into practice, nor does even the offer of a premium seem to encourage the bleachers of Britain to make any serious endeavour to introduce it. This we can only account for in two ways: 1. From the very noxious and suffocating fumes attending the operation, by which the health, and even the life of those who prepare this acid in an unskilful manner, as well as of the bleachers that make use of it, are greatly endangered. 2. From the excessive waste of vapour in the ordinary mode of preparation, which renders the liquid too dear for ordinary use.

To avoid these inconveniences, it has been recommended by chemists to force the vapour violently into larger quantities of water, and by compressing the fumes to a great degree, to render the liquid extremely strong, and then dilute it when it is to be used. By this means, however, the vapour forces out at the joints of the distilling vessell in such a manner that no late can keep it in; at the same time that the liquor being impregnated with an over-proportion of gas, lets go the superfluous quantity as soon as the preparation is taken off, thereby losing its power, and annoying with its noxious and indeed poisonous fumes every one who comes near it. The trouble attending this preparation may be easily judged from the following description of the process given by M. Chaptal.

"To extract the acid (says he), I place a large glass alembic, of one single piece, upon a sand-bath. To the alembic I adapt a small receiver; and to the receiver three or four small bottles nearly filled with distilled water, and arranged according to the method of Mr Woulfe. I dispose the receiver and bottles in a cistern, the places of junction being luited with fat lute, and secured with rags soaked in the lute of lime and whites of eggs. Lastly, I surround the bottles with pounded ice. When the apparatus is thus disposed, I introduce into the alembic half a pound of mang-nafe of Ceynships, and pour upon it, at several repetitions, three pounds of fuming maria ice acid. The quantity of acid which I pour at once is three ounces; and at each time of pouring, a considerable effervescence is raised. I do not pour a new quantity until nothing more comes over into the receivers. This method of proceeding is inditeemably necessary when the operator is diligent of making his procress with a definite quantity of materials; for if too large a quantity..."
The oxygenated muriatic acid is a crysralization of it, which takes place at three degrees of temperature below the freezing point of Reaumur. The forms which have been observed are those of a quadrangular prism, truncated very obliquely, and terminated by a lozenge. He has likewise observed hollow hexahedral pyramids on the surface of the liquor.

"To make use of the oxygenated acid in the arts, and in order to concentrate a greater quantity in a given volume of water, the vapour made to pass through a solution of alkaline salt. A white precipitate is at first formed in the liquid; but a short time afterwards the deposition diminishes, and bubbles are disengaged which are nothing but the carbonic acid. In this case two salts are formed, the oxygenated muriate and the ordinary muriate. The mere impression of light is sufficient to decompose the former, and to convert it into common salt. This lixivium contains indeed the oxygenated acid in a stronger proportion. The extractive fluid of the acid is much weakened. It may be employed for various uses with the same success, and with great facility; but the effect is very far from corresponding with the quantity of oxygenated acid which enters into this combination, because the virtue of a great part is destroyed by its union with the alkaline basis. — The oxygenated muriatic acid has an excessively strong smell. It acts directly on the larynx, which it irritates, excites coughing, and produces violent headaches."

The apparatus recommended by Mr Berthollet is on the same plan with M. Chapel's, though the scale is much larger. Both are evidently troublesome; and cannot by any means be introduced into ordinary practice, where the preparation, as well as the method of using the liquor must be left to workmen of little understanding and less attention. For these it is necessary to have an apparatus which may not readily be broken, which requires little trouble or dexterity in the using, and which may prepare great quantities at once. The principal difficulty is the condensation of the fumes. To attempt violently to force steam of any kind into water is always improper, and seldom answers any purpose, unless when for chemical experiments the liquids are wanted of extraordinary strength. Water naturally attracts a certain proportion of every kind of vapour; and when once this natural attraction is satisfied, it is vain to attempt to force more into it. In proportion to the quantity of surface exposed to the steam, water will imbibe it in shorter or longer time; and therefore a broad shallow vessel is always preferable to a round or narrow deep one where dilutions of this kind are to be performed.

It must also be observed, that the vapour with which the water is to be impregnated, ought not to rush out of the distilling vessel with too great haste; as in this case a great quantity will unavoidably be lost, by reason of the water not having time to absorb it all. To avoid this, matters should be managed in such a manner, that, without sensibly interrupting the operation the vapour may rise from the distilling vessel gradually, and without sudden explosions: by which means the water will imbibe as fast as the vessel distils for a certain time; and in order to preserve all the vapour, there ought to be several receivers, one above the other, communicating by pipes, so that the vapour which does not condense in one may do so in the other. The following apparatus may be used with success:

1. For the distilling vessel. A large bottle of common brown earthenware, such as is represented on the margin, is undoubtedly the cheapest, and most eligible distilling-vessel that can be made use of; as it is insensible to break, and may be used for a long time without being corroded. It may be placed in a sand-bath or in case it is luted, it may be put on an open fire, which, however, ought not to be raised to any great height.

2. The receivers ought to be large square cisterns of earthenware, covered over on the inside with white wax, on which the acid has no effect; and they may be placed, for the greater convenience, one above the other, with cocks so fitted, that the water of the upper cistern may be discharged into the lower ones as occasion requires. The lowermost cistern must also be furnished with a cock, for running off the liquor into the vessel in which the cloth is to be steeped.

3. The bottle must be furnished with a glass tube to convey the steam from it into the receiver; but to prevent any of the acid from getting in among the liquor designed for bleaching, it will be necessary to have a small cock interposed between it and the receivers which will also prevent the liquor from being dirtied by any fudden swell of the mixture in the bottle.

4. It will be convenient, and which may be easily accomplished in most bleaching-houses, to have a small stream of clear water running into it, higher than the level of the uppermost receiver, by which means they can all be filled to a sufficient depth with very little trouble. The apparatus then will be as represented on Plate CCLXXX, where A is the bottle containing the mixture; B the sand pot, furnace, door, and affin hole; C the glass tube to convey the steam into the cask.
The residuum of the distillation is a solution of manganese in common spirit of salt, from which the metal may be precipitated by cautley volatile alkali, and the liquid will afford sal ammoniac: the precipitate, by being calcined again till it grows black, may be used as fresh manganese; but considering the low price of this mineral, we can scarce recommend this process as worth the trouble. It is certain, however, that a great part of the marine-acid will remain undecomposed, even after we have added as much manganese as will excite any effervescence. This may be temporarily recovered by pouring into the distilling vessel a small quantity of oil of vitriol. This expels the marine acid from the manganese with which it is united, and renders it again capable of acting upon more; but when the addition of a small quantity of this acid has no effect in producing the proper gas, we may then be sure that the operation is totally finished. The residuum is now a combination of manganese with vitriolic acid, and may be decomposed by volatile alkali, so that it can still be of use to the makers of spirit of hart's-horn and sal ammoniac.

Thus we see, that by a very easy process, without the smallest danger to the health of the workman, an unlimited quantity of dephtlogificated spirit of salt may be prepared of a sufficient strength to answer every useful purpose; and it is evident from the foregoing description of the processes, that the most is made of the materials, so that we can scarce expect a cheaper method. The practice of mixing together the salt, oil of vitriol, and manganese, all together in the distilling vessel, is by no means to be commended; for thus the matter always runs into a hard lump, which cannot be got out without breaking the vessel; and the vapour is, besides, forced out with such rapidity, that great part of it is unavoidably lost.

The next and most important consideration is the method of using the liquor after it is distilled. And here, as the volatility of the gas is the principal obstacle to the preservation of its strength, it is indispensably necessary to have it to run from a covered spout into a covered vessel where the cloth is placed. It is likewise a matter of importance to have the cloth spread among the liquid in such a manner that the power of the gas may be equally diffused over its whole surface; for if it lies in fold upon one another, it will undoubtedly be spotted, let us do as we will.

To prevent this in the most effectual manner, it is necessary to roll the cloth as is done by dyers to make their colours strike equally; for this operation we may account a kind of dying white; and the same precautions are undoubtedly necessary to make this colour equal as any other. It is probable, that vessels and rollers might be so constructed, that a number of pieces of cloth might be whitened all at once; and the operation of drying the rollers might be performed by a machine driven by water.

With regard to the use of this liquid itself, it must be observed, that though very cheap when made as above directed, yet water itself is still cheaper; and whatever can be done by mere water, ought to be previously done to the cloth before it is immersed in the dephtlogificated liquor. With this view it ought to undergo a long continued but gentle falling, a stream
The cloth, when treated in this manner for a considerable time, will be very nearly as well whitened as that which has been boiled in alkali. Boiling in water has not an effect nearly equal to that of gentle beating while the cloth is immered in water, neither are violent strokes so useful as those which are gentle; and it might undoubtedly be worth while to contrive a machine for the purpose of giving this gentle fulling, which, without injuring the texture of the cloth, might be continued for a long time, and would be advantageous either on the old or new plan of bleaching.

If this method of fulling should not be adopted, that of *streaming* the cloth, or simmering it for some time in a stream of running water, would be of very considerable use as a preparation; but boiling with alkali far seems more advantageously to be omitted till after the cloth has undergone two or three operations in the dephlogisticated liquor; because this liquid, even when very weak, will cleanse considerably, and extract a great quantity of fordes, which would load the alkali and destroy its force.

Having prepared the cloth in some of the methods above-mentioned, it is to be put into the vessel designed for whitening, put over the roller, and a quantity of the liquid let into it. As the cloth whitens, the liquor gradually loses its fineness, and soon becomes incapable of giving any additional whitenees. This may be perceived by having a small door in the side of the vessel, which may be opened occasionally, and a bit of the cloth pulled out through it and looked at. When the first quantity of liquid, therefore, appears to have no more effect, it must be allowed to run off, into another vessel; but is not yet to be thrown away, because it is still much more powerful than water, and will have a considerable effect upon cloths which have undergone the aqueous preparation.

After the first quantity of liquid is run off, another must be admitted from the lowermost reservoir, and is to be used in the same manner with the former; only it will not be somewhat longer before its strength is exhausted. When this is the case, a third quantity is to be employed, and so on till we find that the effect of the liquid is beginning to diminish. The cloth must then be taken out, fulled, and thoroughly cleaned of the acid by water, before the next operation, which is boiling with alkali. The liquimium ought to be of considerable strength, that the liquor may easily be evaporated, and part of the alkali recovered by a process related under the article *Phosphates*; but as the cloth will necessarily retain a considerable quantity of this strong liquimium, it must be wrung out by a proper instrument for that purpose, and the liquid which falls from it saved and returned again into the kettle. The cloth, still retaining a quantity of alkali which could not be wrung out, must be thrown into a caustion of boiling water, and allowed to remain there for a quarter of an hour; after which it is to be taken out and wrung as before. The water of the second cauldron will be slightly alkaline, and may be used as a preparation for cloth, or for filling up the vessel containing the strong alkali as it evaporates.

Before the cloth is returned into the dephlogisticated liquor, it is absolutely necessary that the alkali felt be entirely taken off it, which can only be speedily done by fulling, streaming, or at least steeping in repeated quantities of water. When all this is done, it will most probably be of a darker colour than before; but this will go off in a few minutes, and the cloth will become much whiter than ever. The remainder of the operation is only a repetition of the processes already described, and for which no other directions are requisite than that both alkali and acid, the latter especially, always loosen a quantity of fordes, which, unless washed off, soon prevents their own operation. As soon, therefore, as the cloth is taken out of either the alkaline, or acid liquor, there is a necessity for using every method consistent with the safety of its texture to clear it of this loose matter, which will allow the liquor into which it is next plunged to have the greater effect. It must be remembered, however, that the nearer the cloth approaches to perfect whiteness, the lesser effect has either of the liquids upon it; and therefore there is a necessity either for increasing the strength of the dephlogisticated acid, or allowing it a longer time; but the latter is by much the preferable method: and, after all, it would be far from being improper to expose the cloth for a few days to the air, which will essentially prevent any change of colour afterwards, as frequently happens to cloths bleached after this manner.

Could a ready method be fallen upon to bleach flax by itself, it would be greatly in favour of the linen manufacture; as the strength of the threads are vastly increased by this method. The great difficulty in this operation, arises from the filamentous nature of the flax; by which, when put into any liquid, it becomes matted together in such a manner as not to be separated afterwards by any means whatever so as to be spun with the same ease as before. The fairer and better dressed the lint is, the greater is this difficulty; and to obviate it, there seems to be no other possible method but that of using flax just as it comes from the mill, without any other dressing. Thus, indeed, the tow must be bleached as well as the flax: but when we consider, that thus it may be spun into much finer and stronger yarn than otherwise could be done, we cannot suppose this to be any disadvantage.

Another obstacle is the difficulty the liquid has in getting into the heart of the flax; so that the outside will be well whitened, when the inside is scarce altered. For this no other remedy seems adequate, besides the dividing it into many small parcels, tying them together in pairs, putting them over rods as candle-makers do their candles, and thus suspending them for a time in the liquid. They must be dipped in an hot solution of alkali in the same manner, afterwards for a considerable time in fresh water, to take out all the alkali; after which, they are to be again put into the acid liquor, and treated exactly as directed for the cloth. Thus, in two or three days, the flax will attain a surprising whitenees. It is then to be dressed and treated exactly as other flax, but must be dried without any kind of wringing or pre­
Mr Chaptal observes, that this acid may be applied to the whitening of paper and old prints; and by its means (he says) they obtain a whiteness which they never had before. Common ink disappears by its action, but it has no effect upon printer's ink. It thickens oils, and calcines metals to sublimate,-it acts, likewise, very vigourously upon metallic calces, forming with them salts more readily than other acids.

M. Chaptal observes, that the combination of the marine acid with vegetable alka, named ferbifugatulf of Styvius, is found, though in small quantities, in fever water, plaster, and the ashes of tobacco. "The existence of this salt (says he) in the ashes of tobacco, might with justice have surprized me, as I had reason to expect the mutate of soda, which is employed in the operation called watering. Was the soda metamorphosed into pot-ash by the vegetable fermentation? This may be determined by direct experiments."

MARINER, the same with a sailor or seaman. See these articles.

Method of preserving the health of MARINERS. See SEAMEN.

MARINER'S COMPASS. See COMPASS.

ST MARINO, a small town and republic of Italy, situated in E. Long. 13° 44' N. Lat. 44° 21'. This small republic consists only of a mountain, and a few hillocks, that lie scattered about the bottom of it. The number of the inhabitants is about 5000. The mountain yields good wine, but they have no other than rain or snow water. The founder of the republic was a Dalmatian, and a mariner, who upwards of 1500 years ago turned hermit, and retired to this mountain. Here he devoted and suffered, and in consequence of that, his reputation for sanctity, was such, that the princes of the country made him a prefent of the mountain; on which many, out of veneration for the saint, soon after took up their abode. Thus was the foundation laid of the town and republic, which still bears the name of the saint. The town stands on the top of the mountain, and there is only one way by which it can be come at. In the whole territory are only three castles, three convents, and five churches. The largest of the churches is dedicated to the saint, and contains his ashes, and his statue. He is looked upon as the greatest saint, next to the blessed Virgin; and to speak disrespectfully of him is accounted blasphemy, and punished as such. The republic is under the protection of the pope. All that are capable of bearing arms are exercised, and ready at a minute's call. In the ordinary course of government, the administration is in the hands of the council of 60, which, not withstanding its name, consists only of 40: one half of the members of which are of the noble families, and the other of the plebeian; on extraordinary occasions, however, the senate, in which every house has its representative, is called together. The two principal officers are the capitaneos, who are chosen every half year; and next to them is the commissary, who judges in civil and criminal matters, and is joined in common with the capitaneos; both he and the physician must be foreigners, and both have their faculties out of the public flock. When any person, after due summons, neglects to attend at the council according to their statute-book, he is to be fined in about a penny English; and when an ambassador is to be sent to any foreign state, he is to be allowed only 6 days.

MARINO (John Baptist), a celebrated Italian poet, born at Naples in 1569. His father, who was an able civilian, obliged him to study law; at which being disqualified, he left his parents, and retired to the house of the Sieur Manzi, who was a friend to all persons of wit. He at length became secretary to Matthew of Capua, great admiral of the kingdom of Naples, and contracted a friendship with Taio. A short time after, he went to Rome, and entered into the service of cardinal Aldobrandini, nephew to pope Clement VIII. He took him with him to Savoy. Marino was in great favour with the court of Turin; but afterwards created himself many enemies there, the most furious of whom was the poet Gaspard Marfou, who, attempting to shoot him with a pistol, wounded one of the duke of Savoy's favourites. Marino being obliged to leave Turin, went to Paris at the desire of queen Mary de Medicis, and published there his poem on Adonis. He afterwards went to Rome, where he was made prince of the academy of the humoristi; from thence to Naples, where he died while he was preparing to return home. He had a very lively imagination, but little judgment; and, giving way to the points and conceits then in vogue, his authority, far from correcting the false taste of the Italians, served rather to keep it farther from reformation. His works, which are numerous, have been often printed.

MARINUS, an engraver who flourished about the year 1650, and resided principally at Antwerp. His plates, Mr Strutt observes, are executed in a very singular style, with the graver only: The strokes are very fine and delicate, and crotched over each other in a lozenge-like form, which he filled up with thin, long dots. His prints though generally very near, want the style of the master in the determination of the folds of the draperies and the outline of the human figure; the extremities of which are heavy, and not marked with precision. Fine impressions from his best plates are, however, much sought after by collectors: those especially after Rubens and Joardens are held in very high estimation.

MARIONIS, (anc. geog.) a town of Germany; now Hamburg, a famous trading city on the Elbe, in Lower Saxony, in the duchy of Holstein. Another Marionis (Ptolemy), thought to be Wismar, a town of Lower Saxony, in the duchy of Mecklenburg.

MARIOTTI (Edmé), a eminent physician and mathematician, was born in Burgundy, and was made a member of the academy of sciences. He died in 1684. His works, which are much esteemed, were printed at Leyden in 1717, 2 vols 400.

MARJORAM, in botany. See ORIGANUM.

MARITAGIUM, in the feudal custom, marita­gium (a contradistinction from matrimonium), signifies the marriage and espousals, or the ceremony by which the parties are joined together.
The power which the lord or guardian in chivalry had of disposing of his infant ward in marriage, for while the infant was in ward, the guardian had the power of tendering him or her a suitable match without disparagement or inequality: which if the infants refused, they forfeited the value of the marriage, duosem maritagens, to their guardian; that is, so much as a jury would assess; or any one would bonafide give to the guardian for such an alliance; and if the infants married themselves without the guardians consent, they forfeited double the value, duetem valorem maritagens.

MARITIME, something relating to, or bounded by, the sea. Thus a maritime province or country is one bounded by the sea; and a maritime kingdom is one that makes a considerable figure, or that is very powerful at sea. Hence, by maritime powers among the European states, are understood great Britain and Holland.

MARITIME State, in British polity, one of the three general divisions of the laity: (See Laity). This state is nearly connected with the military; though much more agreeable to the principles of a free constitution. The royal navy of England hath ever been its greatest defence and ornament; it is its ancient and natural strength; the floating bulwark of the land; an army from which, however strong and powerful, no danger can ever be apprehended to liberty; and accordingly it has been affiduously cultivated from earliest ages. To so much perfection was their naval reputation arrived in the 12th century, that the code of maritime laws, which are called the laws of Oleron, and are received by all nations in Europe as the ground and foundation of all their marine constitutions, was controllably compiled by king Richard I. at the isle of Oleron on the coast of France, then part of the possessions of the crown of England. And yet so vastly inferior were their ancients in this point to the present age, that even in the maritime reign of queen Elizabeth, Sir Edward Coke thinks it matter of boast, that the royal navy of England then consisted of three and thirty ships. The present condition of their marine is in great measure owing to the salutary provisions of the statutes called the navigation act; whereby the constant increase of English shipping and seamen was not only encouraged, but rendered unavoidably necessary. By the statute 3 Rich. II. c. 3. in order to augment the navy of England, then greatly diminished, it was ordained, that none of the king's liege people should ship any merchandise out of or into the realm, but only in ships of the king's ligeance, on pain of forfeiture. In the next year, by statute 5 Ric. II. c. 8. this wise provision was enervated, by only obliging the merchants to give English ships (if able and sufficient) the preference. But the most beneficial statute for the trade and commerce of Britain is that navigation act, the rudiments of which were first framed in 1650, with a narrow partial view; being intended to mortify their own sugar islands, which were disaffected to the parliament, and still held out for Charles II. by stopping the ginnel trade which they then carried on with the Dutch, and at the same time to clip the wings of those their opulent and aspiring neighbours.

This prohibited all ships of foreign nations from trading with any English plantations, without licence from the council of state. In 1651, the prohibition was extended also to the mother-country: and no goods were suffered to be imported into England, or any of its dependencies, in any other than English bottoms; or in the ships of that European nation of which the merchandise imported was the genuine growth or manufacture. At the Restoration, the former provisions were continued, by stat. 12 Car. II. c. 18, with this very material improvement, that the master and three-fourths of the mariners shall also be English subjects.

Many laws have been made for the supply of the royal navy with seamen; for their regulation when on board; and to confer privileges and rewards on them during and after their service.

1. For their supply. The principal, but the most odious, though often necessary method for this purpose, is by impressing; see IMPRESSING. But there are other ways that tend to the increase of seamen, and manning the royal navy. Parishes may bind out poor boys apprentices to the masters of merchantmen, who shall be protected from impressing for the first three years; and if they are impressed afterwards, the masters shall be allowed their wages; great advantages in point of wages are given to volunteer seamen, in order to induce them to enter into his majesty's service; and every foreign seaman, who during a war, shall serve two years in any man of war, merchantman, or privateer, is naturalized into the state. About the middle of king William's reign, a scheme was put on foot for a regilder of seamen to the number of 30,000, for a constant and regular supply of the king's fleet; with great privileges to the registered men; and, on the other hand, heavy penalties in case of their non-appearance when called for; but this registry, being judged to be rather a badge of slavery, was abolished by stat. 9 Ann. c. 21.

2. The method of ordering seamen in the royal fleet, and keeping up a regular discipline there, is directed by certain express rules, articles, and orders, first enacted by the authority of parliament soon after the Restortion; but since new-modelled and altered, after the peace of Aix-la-Chapelle, to remedy some defects which were of fatal consequence in conducting the preceding war. In these articles of the navy almost every possible offence is set down, and the punishment thereof annexed: in which respect the seamen have much the advantage over their brethren in the land-service, whose articles of war are not enacted by parliament, but framed from time to time at the pleasure of the crown. Yet from whence this distinction arose, and why the executive power, which is limited so properly with regard to the army, should be so extensive with regard to the navy, should be an apparent reason; unless it proceeded from the perpetual establishment of the navy, which rendered a permanent law for their regulation expedient, and the temporary duration of the army, which sufficed only from year to year, and might, therefore with less danger be subjected to discretionary government. But whatever was apprehended at the first formation of the ministry, the regular renewal of the standing force at the entry
MARIUS, the famous Roman general, and seven times consul, who filled his great military reputation by savage barbarities. He was born at Arpinum, of obscure and illiterate parents. He forsook the meaner occupations of the country for the camp; and signified himself under Scipio, at the siege of Numantia. The Roman general saw the courage and intrepidity of young Marius, and foretold the era of his future greatness.

By his seditions and intrigues at Rome, while he exercised the inferior offices of the state, he rendered himself known; and his marriage with Julia, who was of the family of the Caesars, contributed in some manner to raise him to consequence. He was sent into Africa as lieutenant to the consul Metellus against Jugurtha; and after he had there ingratiated himself with the soldiery, and raised enemies to his friend and benefactor, he returned to Rome and canvassed for the consulship. The extravagant promises he made to the people, and his malevolent animosities about the conduct of Metellus, proved successful. He was elected and appointed to finish the war against Jugurtha. He showed himself capable in every degree to succeed to Metellus. Jugurtha was defeated, and afterwards betrayed into the hands of the Romans by the perfidy of Bocchus. No sooner was Jugurtha conquered, than new honors and fresh trophies awaited Marius. The provinces of Rome were suddenly invaded by an army of 300,000 barbarians; and Marius was the only man whose activity and boldness could resist so powerful an enemy. He was elected consul, and went against the Teutones. The war was prolonged, and Marius was a third and fourth time invested with the consulship. At last two engagements were fought, and not less than 200,000 of the barbarian forces of the Ambrones and Teutones were slain in the field of battle, and 90,000 made prisoners. The following year, A. U. C. 651, was also marked by a total overthrow of the Cinibri, another horde of barbarians, in which 140,000 were slaughtered by the Romans, and 60,000 taken prisoners. After such honourable victories, Marius with his colleague Catullus entered Rome in triumph; and for his eminent services he received the appellation of the third founder of Rome. He was elected consul a fifth time; and as his intrepidity had delivered his country from its foreign enemies, he sought employment at home, and his restless ambition began to raise seditions, and to oppose the power of Sylla. This was the foundation of a civil war. Sylla refused to deliver up the command of his forces, with which he was empowered to prosecute the Mithridatic war; and he resolved to oppose in person the authors of a demand which he considered as arbitrary and improper. He advanced to Rome, and Marius was obliged to save his life by flight. The unfavourable winds prevented him from seeking a safer retreat in Africa, and he was left on the coast of Campania, where the emissaries of his enemy soon discovered him in a marsh, where he had plunged himself in the mud, and left only his mouth above the surface for respiration. He was violently dragged to the neighbouring town of Minturnae; and the magistrates, all devoted to the interest of Sylla, passed sentence of immediate death on their magnanimous prisoner. A Gaul was commanded to cut off his head in the dungeon; but the stern countenance of Marius disarmed the courage of the executioner: and when he heard the exclamation of Tunc, homo, audes occidere Catsum Mariunn, the dagger dropped from his hand. Such an uncommon adventure moved the compassion of the inhabitants of Minturnae. They released Marius from prison; and favoured his escape to Africa, where he joined his son Marius, who had been among the princes of that country in his capa. Marius landed near the walls of Carthage, and he received no small consolation at the sight of the venerable ruins of a once powerful city, which like himself had been exposed to calamity, and felt the cruel vicissitude of fortune. This place of his retreat was soon known; and the governor of Sylla, to conciliate the favour of Sylla, compelled Marius to fly to a neighbouring island. He soon after learned that Cinna had embraced his cause at Rome, when the Roman senate had stripped him of his consular dignity, and belowed it upon one of his enemies. This intelligence animated Marius; he felt fail to affit his friend only at the head of 1000 men. His army, however, was soon increased, and he entered Rome like a conqueror. His enemies were inhumanly sacrificed to his fury; Rome was filled with blood; and he, who once had been called the father of his country, marched through the streets of the city, attended by a number of assassins, who immediately slaughtered all those whose salutations were not answered by their leader. Such were the signals for bloodshed. When Marius and Cinna had sufficiently gratified their resentment, they made themselves consuls; but Marius, already worn out with old age and infirmities, died sixteen days after he had been invested with the consular dignity for the seventh time, A. U. C. 666. Such was the end of Marius, who rendered himself conspicuous by his victories and by his cruelty. As he was brought up in poverty and among peasants, it will not appear wonderful that he always betrayed rulility in his behaviour, and despised in others those polished manners and that studied address which education had denied him. He hated the conversation of the learned only because he was illiterate; and if he appeared an example of sobriety and temperance, he owed these advantages to the years of obscurity which he passed at Arpinum. His countenance...
nance was stern, his voice firm and imperious, and his disposition untractable. He was in the 70th year of his age when he died; and Rome seemed to rejoice at the fall of a man whose ambition had proved fatal to so many of her citizens. His own qualifications were those of a great general; and with these he rendered himself the most illustrious and powerful of the Romans, because he was the only one whose ferocity seemed capable to oppose the barbarians of the north.

C. Marius, the son of the great Marius, was as cruel as his father, and shared his good and his adverse fortune. He made himself consul in the 11th year of his age, and murdered all the senators who opposed his ambitious views. He was defeated by Sylla, and fled to France, where he killed himself.

Marius (Maximus), a native of Gaul; who, from the mean employment of a blacksmith, became one of the Generals of Gallienus, and at last caused himself to be fated emperor. Three days after this elevation, a man who had shared his poverty without partaking of his more prosperous fortune, publicly affiliated him, and he was killed by a sword which he himself had made in the time of his obscurity. Marius has been often celebrated for his great strength; and it is confidently reported, that he could have ascended a mountain by a single leap.

St Mark wrote his gospel at Rome, where he resided for several years, and was afterwards, with great pomp, translated to Alexandria, under the order of Serapis, celebrated, and venerated by all the inhabitants. He died when he was 80 years old, aged 75. His works are of the following kinds: 1. \textit{Pies de Théâtre}, 4 vols 12mo. 2. \textit{Homere travestis}, 12mo; which is not supposed to have done much honour to his table. 3. \textit{Le Spectateur Français}, 2 vols 12mo. 4. \textit{De Philosophie Indécent}, 12mo. 5. \textit{Pie de Mariana}, 2 vols 12mo; one of the best romances in the French language. 6. \textit{Le Psallans Parvenus}, 12. 7. \textit{Éclairer}; inferior to the former.

M. MAR (St.) was by birth a Jew, and descended from the tribe of Levi. He was converted by some of the apostles, probably by St Peter, whom he was a constant companion in all his travels, supplying the place of an amanuensis and interpreter. He was by St Peter sent into Egypt, fixing his chief residence at Alexandria, and the places thereabout: where he was so successful in his ministry, that he converted multitudes both of men and women. He afterwards removed westward, towards the parts of Libya, going through the countries of Marmoria, Pentapolis, and others thereabout; where, notwithstanding the barbarity and idolatry of the inhabitants, he planted the gospel. Upon his return to Alexandria, he ordered the affairs of that church, and there suffered martyrdom in the following manner. About Easter, at the time the solemnities of Serapis were celebrated, the idolatrous people, being excited to vindicate the honour of their deity, broke in upon St Mark, while he was performing divine service, and, binding him with cords, dragged him through the streets, and thrust him into prison, where in the night he had the comfort of a divine vision. Next day the enraged multitude ufed him in the same manner, till, his spirits failing, he expired under their hands. Some add, that they burnt his body, and that the Christians decently interred his bones and ashes near the place where he used to preach. This happened in the year of Christ 68. Some writers assert, that the remains of St Mark were afterwards, with great pomp, translated to Alexandria. However, he is the tutelar saint and patron of that republic, and has a very rich and s iderachurch erected to his memory. This apostle is author of one of the four gospels inscribed with his name. See the following article.

\textit{St Mark's Gospel}, a canonical book of the New Testament, being one of the four gospels.

St Mark wrote his gospel at Rome, where he accompanied St Peter in the year of Christ 44. Tertullian and others pretend, that St Mark was no more than an amanuensis to St Peter, who dictated this gospel to him; others affirm, that he wrote it after St Peter's death. Nor are the learned less divided as to the language it was written in; some affirming that it was composed in Greek, others in Latin. Several of the ancient heretics received only the gospel of St Mark; others, among the Catholics, rejected the 12 last verses of this gospel. The gospel of St Mark is properly an abridgement of that of St Matthew.

\textit{St Mark the Evangelist's Day}, a festival of the Christian church, observed April 25.

\textit{Canons of St Mark}, a congregation of regular canons founded at Mantua by Albrecht Spinola, a priest, towards the end of the 12th century. Spinola made a rule for them, which was approved, corrected, and confirmed by several succeeding popes. About the year 1450 they were reformed, and followed only the rule of St Augustine. This congregation having flourished by the space of 400 years, declined by little and little, and is now become extinct.

\textit{Knights of St Mark}, an order of knighthood in the republic of Venice, under the protection of St Mark the evangelist. The arms of the order are, gules, a lion winged or; with this device, \textit{Pax tibi \textit{Marc] E[van]gelista}. This order is never conferred but on those who have done signal service to the commonwealth.

\textit{Mark}, or \textit{More}, in commerce, denotes a weight used in several states of Europe, and for several commodities, especially gold and silver. In France, the mark is divided into eight ounces, 64 drachms, 192 deniers or penny-weights, 160 ells, 300 maills, 640 sols, or 4008 grams. In Holland, the mark weight is al-
so called Troy weight, and is equal to that of France. When gold and silver are sold by the mark, it is divided into 25 carats.

Mark is also used in Britain for the money of account, and in some other countries for a coin. See Money Table.

The English mark is two thirds of a pound Sterling, or 13s. 4d. and the Scots mark is of equal value in Scots money of account, viz. 13d.

MARKET, a public place in a city or town, in which live-cattle, provisions, or other goods, are fet to sale; and also a privilege, either by grant or prescription, by which a town is enabled to keep a market.

Court of the Clerk of the Market, in England, is incident to every fair and market in the kingdom, to punish misdemeanors therein; and account of piepierre is to determine all disputes relating to private or civil property. The object of this jurisdiction (see Rat. 17. Car. II. cap. 19. 22 Car. II. cap. 8. 23 Car. II. cap. 13.) is principally the cognizance of weights and measures, to try whether they be according to the true standard thereof or no: which standard was anciently committed to the custody of the bishop, who appointed some clerke under him to inspect the abuse of them more narrowly; and hence this officer, though usually a layman, is called the clerk of the market.—If they be not according to the standard, then, beside the punishment of the party by fine, the weights and measures themselves ought to be burnt. This is the lowest court of criminal jurisdiction in England.

MARKHAM (Gervase), an English author, was the son of Robert Markham of Gotham, Esq.; in Nottinghamshire, and bore a captain's commission under Charles I. in the civil wars. He was esteemed both a good soldier and a good scholar. He was particularly master of the French, Italian, and Spanish. He wrote, 1. The tragedy of Herod and Antipater, which was printed in 1622. 2. Many volumes upon husbandry and horsemanship. 3. A piece on the art of fowling. 4. The soldiers' accidence and grammar.

MARKLAND (Jeremiah), one of the most learned scholars and penetrating critics of the age, was born in 1602, and received his education in Christ's hospital. He became first partly known by his Epistola Critica, addressed to bishop Hale. In this he gave many proofs of extensive erudition and critical sagacity. He afterwards published an edition of Statins, and some plays of Euripides; and assisted Dr Taylor in his editions of Lysias and Demosthenes, by the notes which he communicated to him. He has also very happily elucidated some passages in the New Testament, which may be found in Boyer's edition of it; and was author of a very valuable volume of remarks on the epistles of Cicero to Brutus, and of an excellent little treatise under the title of Quaestio Grammatica. He died in 1775, at Milton, near Dorking in Surrey; and was a man not more valued for his universal reading than beloved for the excellency of his heart and primitive simplicity of manners.

MARLBOROUGH, a town of Wilts in England, situated near the source of the Kenet, at the foot of a chalky hill, 75 miles from London. It has its name from its chalky soil, which was formerly called marle. It was a Roman station. In the year 1627, a parliament was held in the castle here, which made those laws called Marlborough statutes. There are full some small remains of its walls and ditch. The town, which is an ancient borough by preceptum, sends two members to parliament. It is governed by a mayor, 2 aldermen, 24 burgesses, a town-clerk, 2 bailiffs, 12 freemen at mace, &c. It confines chiefly of one broad street, with piazzas all along one side of it, two parish-churches, and several commodious inns, it being the grand thoroughfare from London to Bath and Bristol. To the south are some relics of a priory, particularly the gate-house; and the site of a Roman Castrum, the foundations of which have been discovered there, with Roman coins. The ditch is still in some parts 22 feet wide; and towards the river, without the garden walls, one angle of the Castrum is very visible with the rampart and ditch entire. The mount at the west end of the town, which was the keep or main-guard of the castle, is converted into a pretty jiloal walk; at the top of which is an octagon summer-houe. This town has often suffered by fire, particularly in 1690, whereupon the parliament passed an act to prevent its houses from being thatched. The markets here are Wednesdays and Saturdays; and it has five fairs. Here is a charity-school, which was erected in 1712, for 44 children.

MARLBOROUGH (duke of). See CHURCHILL.

MARLBOROUGH-Fort, an English factory on the west coast of the island of Sumatra in Asia; seated three miles west of the town of Bencodun. E. Long. 101. 12. S. Lat. 4. 21.

MARLE, a kind of calcareous earth, very much used in agriculture as a manure. See AGRICULTURE no. 216, 217.

Marle is dug in many places of Great Britain and Ireland. In digging torf in Ireland, they meet with horns and other curious fossils. The marle always lies in the bottoms of low bogs, and is found by boring with augers made for that purpose. It usually lies at five, seven, or nine feet depth. The obtaining it in many places is attended with great considerable expense in draining off the water. The manner of digging it is this: They employ six able labourers and a supernumerary; and these cut up a hole of 12 feet square, which is supposed a pit that this number of men can manage in one day. Two men dig, two throw it up, and two throw it by, and the supernumerary man supplies defects on all occasions. For the first three feet they dig through a fuzzy earth, fit for making turf or fuel. Under this lies a stratum of gravel of about half a foot; under this often, for three feet more, there is a more kindly moss, which would make better fuel. This lower stratum is always full of foiffle wood, which is usually to found that the spade cuts as easily through it as through the earth it lies in. Under this, for the thickness of about three inches is found a series of leaves, principally of the oak. These appear very fair to the eye, but fall to pieces on being touched; and this stratum is sometimes interrupted by vast heaps of feed, which seem to be broom or furze feed. In some places there appears berries of different kinds, and in others several species.
of sea-plants; all lying in the same confused manner as the oak leaves. Under this vegetable stratum there lies one of blue clay, half a foot thick, and usually full of sea shells. This blue clay is not so tough as common clay; but is thrown carelessly up, and used as marle in some places. Under this always appears the true marle; the stratum of which is usually from two to four feet thick, and sometimes much more. This marle looks like buried lime, and is full of shells, which are usually of small size, and of the periwinkle kind; but there are several other sorts at times found among them. Among this marle, and often at the very bottom of it, are found great numbers of very large horns of the deer kind, which are vulgarly called elk's horns. Thence, where they join to the head, are thick and round; and at that joining there grows out a branch, which is about a foot long, and seems to have hung just over the creatures eyes: it grows still round for about a foot above this; and then spreads out abroad, and terminates in broad, long and round, terminating with a small bend. The labourers are obliged to work in a hurry in all these pits, so that they seldom bring out the horns whole. There are also, at times, found the leg-bones and other parts of the skeletons of the same beasts; but this more rarely, only a few together, and but in few places.

Dr Black is of opinion, that all kinds of marle derive their origin from the calcareous matter of shells and lophyra.

Shell-marle, says he, is composed of the shells of aquatic animals, which are sometimes very entire, and often decayed or mixed down with other earthy substances. Examining this matter as occurring in different places, it may be distinguished into fresh water marle, and the marle of sea-shells. Of the first we have an example in the Meadow at Edinburgh. Wherever the soil is turned up to the depth of six inches, a quantity appears. It is composed of the shells of a small fresh-water snail or whirl. This animal, when alive, is not easily discernible, the shell being much of the same obscure colour as the floes covered with the water. But we can observe a great number of them in all running brooks, and other collections of fresh water; and as the animal dies, the shells are deposited where the water stagnates in very great quantity. That composed of sea-shells, constitutes greater collections that are found in innumerable places now far removed, from the sea. That most particularly described by Réaumur is a collection of this kind in the province of France, and at Turpin. That part of the country where it is found is composed to contain 80 square miles of surface; and whenever they dig to a certain depth, they find this collection of shells: the country at present is 108 miles from the sea. They find the marle eight or nine feet below the surface, and they dig it to the depth of 20 feet. It is still deeper, but they find it too expensive to search for it. He supposes it to be only 18 feet deep; and even at this depth the quantity will appear enormous. It will amount to 140 millions of cubic fathom of shells that are mostly decayed and broken into fragments, and mixed with other marine productions, as millipores, madripores, and other coralline bodies, which are all productions of the sea.

MARLINE, in sea affairs, are tarred white skins, or long wreaths or lines of untwisted hemp, dipped in pitch or tar, with which cables or other ropes are wrapped round, to prevent their fretting or rubbing in the blocks or pulleys through which they pass. The same serves in artillery upon ropes used for rigging guns, usually putting in small parcels called rai.nts.

MARLOE (Christopher), an English dramatic author, was a student in the university of Cambridge; but afterwards turning player, he trod the same stage with the inimitable Shakespeare. He was accounted an excellent poet even by Ben Johnson himself. He wrote six tragedies, one of which called Luft's Demi.

MARLY, a palace belonging to the kings of France, between Versailles and St. Germain; seated in a valley, near a village and a reef of the same name. It is noted for its fine gardens and water-works, there being a curious machine on the river Seine, which not only supplies them with water, but also those of Versailles. It is 10 miles N. W. of Paris. L. Long. 29, 11. N. Lat. 49, 52.
MARMORA, the name of four islands of Asia, in the fca of the fame name. The largelft is about 30 miles square; it contains corn, wine, and fruits. The fea of Marmora is a large gulph, which communicates both with the Archipelago and the Black Sea by that of Constantinople, being 120 miles in length and 50 in breadth; and all ships must pass through it that fail to Constantinople from the Mediterranean. It was anciently the Propontis.

MARMORICA, a country of Africa anciently inhabited by the Libyans. It was bounded on the north by Egypt, on the west by Cyrenaica, on the south by Sahara, or the desert of Libya Interior, and on the north by the Mediterranean; and was reckoned a part of Egypt. There is no distinct history of the country.

MAROBUDUM (anc. geo.), the royal residence of Marobaudus, king of the Marcomanni; and hence the appellation. Now thought to be Prague, the capital of Bohemia.

MAROLLES (Michel de), born in 1600, was the fon of Claude de Marolles, whom French memoirs make a military hero. Michel, however, was of a different composition. He entered early into the ecclesiastical state, and by the interest of his father obtained two abbey. He was formed with an extreme ardour for truth, which never abated all his life long: for, from 1649, when he published a translation of Lucan, to 1682, the year of his death, he was constantlfy employed in writing and printing. He attached himself unfortunately to the translating of ancient Latin writers; but, being devoid of all classical taste and spirit, they sunk miserably under his hands, the poets especially. He was certainly, however, a man of great learning, and discovered all his life a love for the arts. He was one of the first who paid any attention to prints; and collected about 100,000, which make at this day one of the ornaments of the French king's cabinet. He composed memoirs of his own life, which were published by his father, G. F. de Marolles, in 2 vols. They contain, like soO much of things, some interesting facts, but an infinity of minute and insipid nothing.

MARONITES, in ecclesiastical history, a sect of eastern Christians, who follow the Syrian rite, and are subject to the pope; their principal habitation being on mount Libanus.

Mothev informs us, that the doctrine of the Monothelites, condemned and exploded by the council of Constantinople, found a place of refuge among the Maronites, a people who inhabited the mountains Libanus and Antilibanus, and who, about the conclusion of the seventh century, were called Maronites, after Maro their first bishop; a name which they still retain. None (he says) of the ancient writers give any certain account of the first person who instructed these mountaineers in the doctrine of the Monothelites: it is probable, however, from several circumstances, that it was John Maro, whose name they had adopted; and that this ecclesiastic received the name of Maro from his having lived in the character of a monk in the famous convent of St Maro, upon the borders of the Maronites, before his settlement among the Maronites of mount Libanus. One thing is certain, from the testimony of Tyrius and other unexceptionable witnesses, as also from the most authentic records, viz. that the Maronites retained the principles of the Monothelites until the 11th century, when, abandoning and renouncing the doctrine of one will in Christ, they were readmitted in the year 1182 to the communion of the Roman church. The most learned of the modern Maronites have left no method unemployed to defend their church against this accusation; they have laboured to prove, by a variety of testimonies, that their ancestors always persevered in the Catholic faith, in their attachment to the Roman pontiff, without ever adopting the doctrine of the Monothelites, or Monothelites. But all their efforts are insufficient to prove the truth of these assertions to such as have any acquaintance with the history of the church and the records of ancient times; for to all such the testimonies they allege will appear absolutely fictitious and defiance of authority.

Faustus Nairons, a Maronite who settled at Rome, has published an apology for Maron and the rest of his nation. His tenet is, that they really took their name from the Maron, who lived about the year 400, and of whom mention is made in Chrysostom, Theodoret, and the Menologium of the Greeks. He adds, that the disciples of this Maron spread themselves throughout all Syria; that they built several monasteries, and, among others, one that bore the name of their leader; that all the Syrians who were not tainted with heresy took refuge among them; and that for this reason the heretics of those times called them Maronites.

Mothev observes, that the subjection of the Maronites to the spiritual jurisdiction of the Roman pontiff was agreed to with this express condition, that neither the popes nor their emissaries should pretend to change or abolish any thing that related to the ancient rites, moral precepts, or religious opinions, of this people: for in reality there is nothing to be found among the Maronites that favours of overy, if we except their attachment to the Roman pontiff; who is obliged to pay very dear for their friendship. For, as the Maronites live in the utmost distress of poverty, under the tyrannical yoke of the Mahometans, the bishop of Rome is under the necessity of furnishing them with such subsidies as may appease their oppressors, procure a subtlety for their bishop and clergy, provide all things requisite for the support of their churches, and the uninterrupted exercise of public worship, and contribute in general to lessen their misery. It is certain that there are Maronites in Syria who still hold the church of Rome with the greatest veneration and obedience; nay, what is still more remarkable, great numbers of that nation residing in Italy, even under the yoke of the pontiff, opposed his authority during the last century, and threw the court of Rome into great perplexity. One body of these non-conforming Maronites retired into the valleys of Piedmont, where they joined the Waldenses; another, above 600 in number, with a bishop and several ecclesiastics at their head, fled into Corsica, and implored the protection of the republic of Genoa against the violence of the Inquisition.
The Maronites have a patriarch, who resides in the monastery of Cannubin, on mount Libanus, and assumes the title of patriarch of Antioch, and the name of John, as if he seemed de facto to be confided to the successor of that apostle. He is elected by the clergy and the people, according to the ancient custom; but, since their reunion with the church of Rome, he is obliged to have a bull of confirmation from the pope. He keeps a perpetual celibacy, as well as the rest of the bishops his suffragans: as to the rest of the ecclesiastics, they are allowed to marry before ordination; and yet the monastic life is in great esteem among them. Their monks are of the order of St Anthony, and live in the most obscure places in the mountains, far from the commerce of the world.

As to their faith, they agree in the main with the rest of the eastern church. Their priests do not fast masts finely; but all say it together, standing round the altar. They communicate in unleavened bread; and the laity have hitherto partaken in both kinds, though the practice of communicating in one has of late been getting footing, having been introduced by little and little. In Lent they eat nothing, unless it be two or three hours before sun-rising: their other fasts are very numerous.

To Maroon, to put one or more sailors afloat upon a deolate island, under pretence of their having committed some great crime. This detestable expedient has been repeatedly practised by some inhuman commanders of merchant-ships, particularly in the West Indies.

Marot (Clement), the best French poet of his time, was born at Cahors in 1495; and was the son of John Marot, valet de chambre to Francis I., and poet to queen Anne of Brittany. He enjoyed his father's place of valet de chambre to Francis I., and was page to Margaret of France wife to the duke of Alençon. In 1521 he followed that prince into Italy, and was wounded and taken prisoner at the battle of Pavia; but at his return to Paris was acceded of hereafter, and thrown into prison from whence he was delivered by the protection of king Francis I. He at length retired to the queen of Navarre, then to the duchess of Ferrara, and in 1526 returned to Paris: but declaring openly for the Calvinists, he was obliged to fly to Geneva; which he at length left, and retiring to Piedmont, died at Turin in 1544, aged 50. His verses are agreeably filled with natural beauties. La Fontaine acknowledged himself his disciple, and contributed greatly to revere and to vogue the works of this ancient poet. Marot, besides his other works, has translated part of the Psalms into verse, which was continued by Beza, and is still sung in the protestant churches abroad.—Michael Marot, his son, was also the author of some verses; but they are not comparable to those of John, and much left to those of Clement Marot. —The works of the three Marots were collected and printed together at the Hague in 1731, and 3 vols 4to, and in 6 vols 12mo.

Marburg, a strong and considerable town of Germany, in the Upper Rhine, and in the landgrave of Hesse-Cassel, with an university, a castle, a palace, a handsome square, and a magnificent town-house. It is seated on the river Lahn, in a pleasant country, 15 miles south of Waldeck, and 47 south-west of Cassel. E. Long. 8. 53. N. Lat. 50. 42.

Marburg, a handsome town of Germany, in Lower Saxony, seated on the river Drave, 35 miles south-west of Gratz, and 60 north-east of Laubach. E. Long. 16. 10. N. Lat. 46. 42.

Marquard (Freihar), an eminent German civilian, born at Augsburg in 1565. He studied at Bourges, under the learned Cujas; and acquired great skill in polite literature, and in the laws. At his return to Germany, he became counsellor to the elector Palatine; and professor of law at Heidelberg; and was afterwards sent by the elector Frederic IV. as his minister, into Poland, to Mentz, and several other courts. He died at Heidelberg in 1614. He wrote many works which are esteemed; the principal of which are, 1. De re monstioria veterum Romanorum, et hodierni a p. Germaniis imperii. 2. Rerum Bohemiarum scriptores. 3. Rerum Germanicarum scriptores. 4. Corpus historiae Franciae, &c.

Marque, or Letters of Marque, in military affairs, are letters of reprimand, granting the subjects of one prince or state liberty to make reprimands of those of another. —They are called from the German marke, "limit, frontier;" as being jus consiliwm in alterius p: mercatus seu limites transacti, ibique jus faciendi; as being a right of passing the limits or frontier of another prince, and doing one's own justice.

Letters of marque are extraordinary commissions granted by authority for reparation to merchants taken and deploved by strangers at sea; and reprimands is only the retaking, or taking of one thing for another. —The form in these cases is: The inferior must first apply to the lord privy-seal, and he shall make out letters of request under the privy-seal; and if, after such request of satisfaction made, the party required does not, within convenient time, make due satisfaction or restitution to the party grieved, the lord chancellor shall make him out letters of marque under the great seal; and by virtue of these he may attack and seize the property of the aggressor nation, without hazard of being condemned as a robber or pirate.

Marquesas Islands, the name of certain islands in the South Sea, lying between 8° and 10° degrees of south latitude, and between 139° and 140° degrees of west longitude. They are five in number, viz. La Magdalena, St Pedro, La Dominica, Santa Christhina, and Hood Island. All the natives of these islands may be supposed to be of the same tribe. Those spots that are fit for culture are very populous; but as every island is very mountainous, and has many inaccessible and barren rocks, it is to be doubted whether the whole population of this group amounts to 50,000 persons. The Spaniards, who first visited here, found the manners of this people gentle and inoffensive; but these qualities did not prevent those who landed from wantonly butchering several of the natives at Magdalena.

The inhabitants of these islands collectively, says Captain Cook, are, without exception, the finest race of people in the South Sea. For symmetry of shape, and regular features, they perhaps surpass all other nations. Not a single deformed or ill-proportioned person was seen on the island; all were strong, tall, well-formed, and remarkably active. The men are about
Marquesas. five feet six to ten inches high; their teeth are not so good, nor are their eyes so full and lively, as those of many other nations; their hair is of many colours, but none red; some have it long, but the most general custom is to wear it short, except a bunch on each side of the crown, which they tie in a knot; their countenances are pleasing, open, and full of vivacity; they are of a tawny complexion, which is rendered strung, and cost of gold, except that of the other islands which they had visited; they were inferior to the men in stature, but well proportioned: their general colour was brown: no punctures were observed upon them: they wore a single piece of cloth made of the mulberry bark, which covered them from the shoulders to the knees.

The principal head-dress used in the islands, and what appears to be their chief ornament, is a sort of broad fillet, curiously made of the fibres of the hulks of cocoa-nuts; in the front is fixed a mother-of-pearl shell, woven round to the size of a tea-cup, before that another smaller, of very fine tortoise-shell, perforated into curious figures, also before, and in the centre of that is another round piece of mother-of-pearl, about the size of half a crown; and before this another piece of perforated tortoise-shell, the size of a shilling. Besides this decoration in front, some have it also on each side, but in small pieces; and all have fixed to them the tail-feathers of crows, or tropic-birds, which when the fillet is tied on stand upright, so that the whole together makes a very sprightly ornament. They wear round the neck a kind of ruff or necklace made of half a crown; and before this another piece of cocoanut-shell, which they tie in a knot; their eyes are their eyes set so deeply, that they cannot be seen with ear-rings. The king had not much adoration from the inhabitants of the Marquesas and those of the Society islands seem to be in their different degrees of cleanliness: the former do not bathe two or three times a-day, nor wash their hands and face before and after every meal, as the latter do; and they are besides very slovenly in the manner of preparing their meals. Their diet is chiefly vegetable; though they have dogs and fowls, and catch abundance of fish at certain times. Their drink is pure water, cocoa-nuts being scarce here.

It was not long before the propensity of the natives was discovered, to be rather to receive than give; for when they had taken a nail as the price of a bread-fruit, the article so purchased could not be obtained from them. To remove this dishonest disposition, Captain Cook ordered a musket to be fired over their heads, which terrified them into fair dealing.

Soon after the natives had gathered courage enough to venture on board the ship, one of them unfortunately stole an iron Lancaster from the gauger, with which he sprang into the sea, and, notwithstanding its weight, swam with it to his canoe, and was making to the shore with all speed. A musket was fired over his head to frighten him back, but to no effect; he still continued to make off with his booty; the whistling of another ball over his head was ineffective: an officer, left patient of such an injury and went on board and quietly sent him back to the ship. Captain Cook had given orders to fire over the
M A R  [ 582 ] M A R

Marquetry, the canoe, but not to kill any one; he was in a boat, Marquetry, and came up with the canoe soon after. There were

two men in her; one fat bailing out the blood and wa-

ter in a kind of hysterical laugh; the other, a youth of about 14 or 15 years of age, who afterwards proved to be the son of the deceased, fixed his eyes on the dead body with a fierce and dejected countenance. This act of severity, however, did not change the orders of the ship, and a traffic was carried on to the satisfaction of both parties; bread-fruit, bananas, plan-

men of the

man of the

palm brella. Of a kind of mountain, to weep and mourn for

the dead. Notwithstanding they were then among the re-

lations of a man who had been killed by them, not the least tokens of animosity or revenge were discernible among the natives.

The weather being extremely hot, the inhabitants made use of large fans to cool themselves, of which great numbers were purchased; these fans were formed of a kind of tough bark, or grafts, very firmly and curiously plated, and frequently whitened with shell lime. Some had large feathered leaves of a kind of palm, which answered the purpose of an umbrella.

The natives at length became so familiar as to mount the sides of the ship in great numbers. They frequently danced upon deck for the diversion of the sailors: their dances very much resembled those of Otelieites; their music too was very much the same.

A sailor having been inattentive to his duty, received several blows from Captain Cook; on seeing which, the natives exclaimed, ta-ae ah-i-i-tina, "he beats his brother." From other instances that had occurred, it was clear that they knew the difference between the commander and his people, but at the same time they conceived them all brethren; and, says Mr. Foster, 'to me the most natural inference is, that they only applied an idea to us in this cafe, which really existed with regard to themselves; they probably look on themselves as one family, of which the eldest born is the chief or king.'

MARQUETRY, inlaid work; a curious kind of work, composed of pieces of hard fine wood of different colours, fastened, in thin slices, on a ground, and sometimes enriched with other matters, as tortoise shell, ivory, tin, and brass.

There is another kind of marquetry made, instead of

wood, of glasses of various colours; and a third, where nothing but precious stones and the richest marbles are used; but these are more properly called mosaics-work. See Mosaics.

The art of inlaying is very ancient; and is supposed to have passed from the east to the west, as one of the spoils brought by the Romans from Asia. Indeed it was then but a simple thing; nor did it arrive at any

tolerable perfection till the 15th century among the Marquetry.

Itians; it seems, however, to have arrived at its height in the 17th century among the French.

Till John of Veron, a contemporary with Raphael, the finest works of this kind were only black and white, which are what we now call Marquetry; but the religious, who had a genius for painting, flamed his woods with dyes or boiled oils, which penetrated them. But he went no farther than the representing buildings and perspectives, which require no great variety of colours. Those who succeeded him, not only improved on the invention of dying the woods, by a secret which they found of burning them without consuming, which served exceedingly well for the shadows, but had also the advantage of a number of fine new woods of naturally bright colours, by the discovery of America. With these affinities the art is now capable of imitating any thing; whence some call it the art of painting in wood.

The ground whereon the pieces are to be ranged and glued, is ordinarily of oak or fir well dried; and to prevent warping, is composed of several pieces glued together. The wood to be used, being reduced into leaves, of the thickest part of a line, is either flained with some colour, or made black for shadow; some effect by putting it in sand extremely heated over the fire, others by steeping it in lime-water and sublimate, and others in oil of sulphur. Thus coloured, the contours of the piece are formed according to the parts of the design they are to represent.

The last is the most difficult part of marquetry, and that wherein most patience and attention are required. The two chief instruments used herein are the saw and the vice; the one, to hold the matters to be formed; the other, to take off from the extremes, according to occasion. The vice is of wood, having one of its chaps fixed; the other movable, and is opened and shut by the foot, by means of a cord fastened to a trellede. Its structure is very ingenious, yet simple enough.

The leaves to be formed (for there are frequently three or four of the same kind formed together) are put within the chaps of the vice, after being glued on the outermost part of the design whose profile they are to follow; then the workman presses the trellede, and thus holding fast the piece, with his saw runs over all the outlines of the design. By thus joining and forming three or four pieces together, they not only gain time, but the matter is likewise the better enabled to sustain the efforts of the saw; which, how delicate soever it may be, and how lightly soever the workman may conduct it, without such a precaution would be apt to raise splinters, to the ruin of the beauty of the work.

When the work is to consist of one single kind of wood, or of tortoise-shell, or on a copper or tin ground, or vasa vera, they only form two leaves on one another, i.e. a leaf of metal, and a leaf of wood or shell; this they call sawing in counter-parts: for by filling the vacuities of one of the leaves by the pieces coming out to the other, the metal may serve as a ground to the wood, and the wood to the metal.

All the pieces thus formed with the saw and marked to know them again, and the shadow given in the man-
The whole is put into a press to dry, planed over, and polished with the fin of the sea-dog, wax, and chave-grafs, as in simple veneering, with this difference, however, that in marquetry the fine branches, and several of the more delicate parts of the figures, are touched upon and finished with a graver.

It is the cabinet-makers, joiners, and toy-men among us who work in marquetry; they are the enamellers and stone cutters who deal in mosaic-work: the instruments used in the former are mostly the same with those used by the ebonsists.

Marquis, a title of honour, next in dignity to that of duke. His office is to guard the frontiers and limits of the kingdom, which were called the Marches, from the Teutonic word marche, a 'limit': as, in particular, were the marches of Wales and Scotland, while they continued hostile to England. The persons who had command there, were called lords marsherc, or marquesses; whose authority was abolished by statute 27 Hen. VIII. c. 27. though the title had long before been made a mere design of honour, Robert Vere, earl of Oxford being created marquis of Dublin by Richard II. in the eighth year of his reign. A marquis is created by patent: his mantle is double ermine; and his coronet has pearls and strawberry-leaves intermixed round, of equal height.

Mar, that part of Aberdeenshire in Scotland, situated between the river Dee and Don.

Marracci (Lewis), a very learned Italian, was born at Lucca in Tuscany in 1612. After having finished his juvenile studies, he entered into the congregation of regular clerics of the mother of God, and distinguished himselfearly by his learning and merit. He taught rhetoric seven years, and passed thence to several offices of his order. He applied himself principally to the study of languages, and attained of himself the knowledge of the Greek, the Hebrew, the Syrian, the Chaldee, the Arabic; which at last he taught some time at Rome, by the order of pope Alexander VII. Pope Innocent XI. chose him for his confessor, and placed great confidence in him. He would have advanced him to ecclesiastical dignities, if Marracci had not opposed him. Marracci died at Rome in 1709, aged 87. He was the author of several pieces in Italian; but the grand work, which has made him deservedly famous above Europe, is his edition of the Alkoran, in the original Arabic, with a Latin version, notes, and curiosities of his own. It was beautifully printed in 2 vols folio at Padua in 1698. The Latin version of the Alkoran, by Marracci, with notes and observations from him and others, and a synopsis of the Mahometan religion, by way of introduction, was published by Heineccius at Leipzig in 1721, in 8vo. Marracci had also a hand in the "Biblia Sacra Arabica, sacrae congregations de propaganda fide juxta edition, ad usum ecleciastical orientalium," Rome 1671, in 3 vols folio.

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MARRACCI (Lewis), a very learned Italian, born at Lucca in Tuscany in 1612. After having finished his juvenile studies, he entered into the congregation of regular clerics of the mother of God, and distinguished himself early by his learning and merit. He taught rhetoric seven years, and passed through several offices of his order. He applied himself principally to the study of languages, and attained of himself the knowledge of the Greek, the Hebrew, the Syrian, the Chaldee, the Arabic; which at last he taught some time at Rome, by the order of pope Alexander VII. Pope Innocent XI. chose him for his confessor, and placed great confidence in him. He would have advanced him to ecclesiastical dignities, if Marracci had not opposed him—Marracci died at Rome in 1709, aged 87. He was the author of several pieces in Italian; but the grand work, which has made him deservedly famous above Europe, is his edition of the Alkoran, in the original Arabic, with a Latin version, notes, and curiosities of his own. It was beautifully printed in 2 vols folio at Padua in 1698. The Latin version of the Alkoran, by Marracci, with notes and observations from him and others, and a synopsis of the Mahometan religion, by way of introduction, was published by Heineccius at Leipzig in 1721, in 8vo. Marracci had also a hand in the "Biblia Sacra Arabica, sacrae congregationis de propaganda fide juxta edition, ad usum ecleciastical orientalium," Rome 1671, in 3 vols folio.

Marriage, a contract, both civil and religious, between a man and a woman, by which they engage to live together in mutual love and friendship for the ends of procreation, &c. See Moral Philosophy.
Marriage, edicta (Cod. defec. nupt.), the survivor, upon marrying a second time, could not give the person he married a portion more than equal to that of each the children. In the primitive church the refusal to chastity was carried so high, that a second marriage was accounted no other than a lawful whoredom, or a species of bigamy; and there are some ancient canons which forbid the ecclesiastics from being present at second marriages.

Marriage, by the Moslem law, was subject to several restrictions; thus by Levit. chap. xviii. ver. 16. a man was forbid to marry his brother's widow unless he died without issue; in which case it became en joyed as a duty. So it was forbid to marry his wife's sister, while she was living, ver. 18.; which was not forbidden before the law, as appears from the instance of Jacob.

The ancient Roman law is silent of this; and Papianus is the first who mentions it, on occasion of the marriage of Caracalla. The lawyers who came after him stretched the bonds of affinity so far, that they placed adoption on the foundation of its foot with nature.

Affinity, according to the modern canons, renders marriage unlawful to the fourth generation, inclusive; but this is to be understood of direct affinity, and not of that which is secondary or collateral. Affini massae affinis, non est affinis ment. It is farther to be observed, that this impediment of marriage does not only follow an affinity contracted by lawful marriage, but also that contracted by a criminal commerce; with this difference, that this last does not extend beyond the second generation; whereas the other, as has been observed, reaches to the fourth.

In Germany they have a kind of marriage called margaratie, wherein a man of quality contracting with a woman of inferior rank, he gives her the left hand in lieu of the right; and stipulates in the contract that the wife shall continue in her former rank or condition; and that the children born of them shall be of the same, so that they become bastards as to matters of inheritance, though they are legitimate in effect. They cannot bear the name of arms of the family. None but princes and great lords of Germany are allowed this kind of marriage. The universities of Leipzig and Jena have declared against the validity of such contracts; maintaining that they cannot prejudice the children, especially when the emperor's consent intervenes in the marriage.

The Turks have three kinds of marriages, and three sorts of wives; legitimate, wives in kind, and slaves. They marry the first, hire the second, and buy the third.

Among all the savage nations, whether in Asia, Africa, or America, the wife is commonly bought by the husband from her father or those other relations who have an authority over her; and the conclusion of a bargain for this purpose, together with the payment of the price, has therefore become the usual form or solemnity in the celebration of their marriages. The Hebrews also purchased their wives by paying down a competent dowry for them; and Aristotle makes it one argument to prove that the ancient Grecians were an uncivilized people, because they used to buy their wives; and in proportion as they paid aside their barbarous manners they left off this practice.

The English law considers marriage in no other light than as a civil contract, the holiness of the matrimonial state being left entirely to the ecclesiastical law, to which it pertains, to punish or annul incestuous or other unlawful marriages; and marriage being a civil contract to be good and valid, where the parties at the time of making it were willing and able to contract, and actually did contract, in the proper forms and solemnities required by law. The disabilities for contracting are of two sorts: first such as are canonical, and therefore sufficient by the ecclesiastical laws to void the marriage in the spiritual court; such as pre-contract, contaguality, or relation by blood; and affinity, or relation by marriage, and some particular corporal infirmities. But these disabilities in law do not make the marriage ipso facto void, but voidable only by sentence of separation; and marriages are esteemed void to all civil purposes, unless such separation is actually made during the life of the parties. Thus when a man had married his first wife's sister, and after her death the bishop's court was proceeding to annul the marriage and baflardize the issue, the court of king's bench granted a prohibition quad boc; but permitted them to proceed to punish the husband for incest.

By 32 Hen. VIII. c. 38. it is declared that all persons may lawfully marry but such as are prohibited by God's law, &c. And that nothing (God's law excepted) shall impeach any marriage but within the Levitical degrees: these are enumerated in the 19th chapter of Leviticus, and are illustrated by Lord Coke in this manner: a man may not marry his mother, or father's sister, mother's sister, sister, daughter, daughter of her son or daughter, father's wife, uncle's wife, father's wife's daughter, brother's wife, wife's sister on her wife's daughter, and daughter of his wife's son or daughter. And a woman must not marry her father, father's brother, mother's brother, brother's son, son of her husband's son or daughter, mother's husband, aunt's husband, sister's husband, widow's brother, and son of her husband's son or daughter. By the civil law first cousins are allowed to marry, but by the canon law both first and second cousins are prohibited. Therefore when it is vulgarly said that first cousins may marry but second cousins cannot, this probably arose by confounding these two laws; for first cousins may marry by the civil law, and second cousins cannot by the canon law. But by the foregoing stat. 32 Hen. VIII. c. 38. it is clear, that both first and second cousins may marry. By the same statute all impediments arising from pre-contracts to other persons were abolished, and declared of none effect unless they have been consummated with bodily knowledge, in which case the canon law holds such contract to be a marriage de facto. But this branch of the statute was repealed by 2 & 3 Ed. VI. c. 25. How far the act of 26 Geo. II. c. 32. (which prohibits all suits in ecclesiastical courts to compel a marriage in consequence of any contract) may collaterally extend to revive this clause of Henry VIII. 's statute, and abolish the impediment of pre-contract, judge Blackstone leaves to be considered by the courts. We shall here observe, that on a promise of marriage, if it be mutual on both sides, damages may be recovered in case either party refuse to marry; and no time for the marriage is agreed on, if the plaintiff avers...
Marriage. [585]

Marriage. - That he offered to marry the defendant who refused it, an action is maintainable for the damages; but no action shall be brought upon any agreement except it is in writing, and signed by the party to be charged. The canonical hours for celebrating marriage are from 8 to 12 in the forenoon.

The other sort of disabilities are those which are created, or at least enforced, by the municipal laws. These civil disabilities make the contract void ab initio by rendering the parties incapable of forming any contract at all. The first legal disability is a prior marriage, or having another husband or wife living; in which case, besides the penalties consequent upon it as a felony, the second marriage is to all intents and purposes void. See Bigamy and Polygamy.

The next legal disability is want of age: therefore if a boy under 14, or a girl under 12 years of age, marries when either of them comes to the age of consent, they may disallow and declare the marriage void without any divorce or sentence in the spiritual court. However, in English law it is so far a marriage, that if at the age of consent they agree to continue together, they need not be married again. Another incapacity arises from want of consent of parents or guardians. By several statutes, viz. 6 & 7 W. III. c. 6. 7. 8. W. II. i. 35. 10. Ann. c. 19. penalties of 100 l. are laid on every clergyman who marries a couple either without publication of banns, which may give notice to parents or guardians, or without a licence, to obtain which the consent of parents or guardians must be sworn to. And by 4 & 5 Ph. & M. c. 1. whoever marries any woman child under the age of 16 years, without consent of parents or guardians, shall be subject to fine or five years imprisonment; and her estate during her husband's life shall be enjoyed by the next heir. Thus also in France the sons cannot marry without consent of parents till 30 years of age, nor the daughters till 25; and in Holland the sons are at their own disposal at 25, and the daughters at 20. And by the marriage act, viz. 26 Geo. II. c. 53. it is enacted, that all marriages celebrated by licence (for banns suppose notice), where either of the parties is under 21, not being a widow or widower, without being by licence, and the father, or if he be not living, of the mother or guardians, shall be absolutely void. However, provision is made where the mother or guardian is non compos, beyond fee, or unreasonably froward, to dispense with such consent at the discretion of the lord chancellor; but no provision is made in case the father should labour under any mental or other incapacity. A fourth incapacity is want of reason. It is provided by 15 Geo. II. c. 30. that the marriage of lunatics and forms under phrenities (if found lunatics under a commission or committed to the care of trustees by an act of parliament) before they are declared of found mind by the lord chancellor, or the majority of such trustees, shall be totally void. Lastly, the parties must not only be willing and able to contract, but must actually contract themselves in due form of law to make a good civil marriage. Any contract made per verba de praesenti, or in words of the present tense, and in case of cohabitation per verba de futuro also between persons able to contract, was before the late act deemed a valid marriage in many purposes, and the parties might be compelled in the spiritual courts to celebrate it in facie ecclesiae. But these verbal contracts are now of no force to compel a future marriage. Nor is any marriage at present valid that is not celebrated in some parish church, or public chapel, unless by dispensation from the archbishop of Canterbury. It must also be preceded by publication of banns or by licence from the spiritual judge. A marriage in pursuance of banns must be solemnized in one of the churches or chapels where the banns were published. No parson, vicar, &c. shall be obliged to publish banns of matrimony, unless the persons to be married shall seven days before the time required for the first publication, deliver to him a notice in writing in their true names, and of the house or houses of their respective abodes within such parish, &c. and of the time that they have dwelt in such house or houses. And the said banns shall be published upon three Sundays preceding the solemnization of marriage during the time of public service: in case the parents or guardians or either of the parties shall be under the age of 21 years, shall openly and publicly declare, or cause to be declared in the church or chapel where the banns shall be so published, at the time of such publication, their dissent to such marriage, such publication of banns shall be void. And when the parties dwell in divers parishes, the curate of the one parish shall not solemnize marriage between them without a certificate of the banns being twice asked from the curate of the other parish. A marriage in pursuance of a licence (except a special licence) must be solemnized in such church or chapel where the licence is granted; and no licence of marriage shall be granted by any archbishop, bishop, &c. to solemnize any marriage in any other church, &c. than in the parish church, &c. within which the usual place of abode of one of the parties shall have been for four weeks immediately before the granting such licence. By the same statute all marriages shall be solemnized in the presence of two credible witnesses at the least, besides the minister, who shall sign their attestation thereof; and immediately after the celebration of every marriage, an entry thereof shall be made in the parish-register, expounding that the said marriage was thus solemnized, and it both or either of the parties be under age, with consent of the parents or guardians, as the case shall be, signed by the minister, and also by the parties married, and attested by the two witnesses present. It is held to be also essential to a marriage, that it be performed by a person in orders; though the intervention of a priest to solemnize this contract is merely juris positivi, and not juris naturalis et divini; it being said that Pope Innocent III. was the first who ordained the celebration of the marriage in the church, before which it was totally a civil contract. And in the times of the grand rebellion, all marriages were performed by the justices of the peace; and these marriages were declared valid without any fresh solemnization, by 12 Car. II. c. 32. But as the law now stands, we may upon the whole collect, that no marriage by the temporal law is ipso facto void that is celebrated by a person in orders; in a parish church, a public chapel, or elsewhere, by a special dispensation; in pursuance of banns or a licence; between single persons; consisting of sound mind, and the age of 21 years; or
**Marriage**

of the age of 14 in males and 12 in females, with consent of parents or guardians, or without it, in case of widowhood. And no marriage is voidable by the ecclesiastical law after the death of either of the parties; nor during their lives, unless for the canonical impediments of precontract, if that indeed still exists, of contangibility; and of affinity or corporal imbecility subsisting previous to the marriage.

By 26 Geo. II. c. 33, the substance of which has been already recited, if any person shall solemnize marriage in any other place than a church, &c. where banns have been usually published, unless by special licence, or without publication of banns, unless licence of marriage be first obtained from some person having authority to grant the same, every such person knowingly offending shall be guilty of felony, and transported for 14 years; the prosecution to be within three years. By the same statute, to make a false entry into a marriage register; to alter it when made; to forge or counterfeit such entry, or a marriage licence, or aid and abet such forgery; touting the same marriage as true, knowing it to be a counterfeit; or to destroy or procure the destruction of any register in order to vacate any marriage, or subject any person to the penalties of this act; all these offences, knowingly and wilfully committed, subject the party to the guilt of felony without benefit of clergy. But this act doth not extend to the marriages of the royal family; nor to Scotland; nor to any marriages among the people called Quakers, or among persons professing the Jewish religion, where both the parties are Quakers or Jews respectively; nor to any marriages beyond the seas.

In Scotland, the parties living together as man and wife, or declaring themselves so before witnesses, makes a valid though informal marriage. See Law, Part III. n° 160.

For the proportions which marriages bear to births, and births to burials, in several parts of Europe, Mr. Derham gives us the following table.

<table>
<thead>
<tr>
<th>Names of Places</th>
<th>Marriages to Births, as</th>
<th>Births to Burials, as</th>
</tr>
</thead>
<tbody>
<tr>
<td>England in general</td>
<td>1 to 4.63</td>
<td>1.12 to 1</td>
</tr>
<tr>
<td>London</td>
<td>1 to 4</td>
<td>1.10 to 1</td>
</tr>
<tr>
<td>Hampshire, from 1569 to 1658</td>
<td>1 to 3.7</td>
<td>1.26 to 1</td>
</tr>
<tr>
<td>Tiverton in Devonshire from 1656 to 1664</td>
<td>1 to 3.9</td>
<td>1.6 to 1</td>
</tr>
<tr>
<td>Cranbrook in Kent, from 1580 to 1649</td>
<td>1 to 6</td>
<td>1.6 to 1</td>
</tr>
<tr>
<td>Anyho, in Northamptonshire, for 118 years</td>
<td>1 to 4.6</td>
<td>1.8 to 1</td>
</tr>
<tr>
<td>Upminster in Essex, for 100 years</td>
<td>1 to 3.7</td>
<td>1.2 to 1</td>
</tr>
<tr>
<td>Frankfort on the Maine, in 1695</td>
<td>1 to 2</td>
<td>1.9 to 1</td>
</tr>
<tr>
<td>Old, Middle, and Lower March, in 1698</td>
<td>1 to 3.7</td>
<td>1.5 to 1</td>
</tr>
<tr>
<td>Dominions of the Elector of Brandenburg, in 1698</td>
<td>1 to 3.7</td>
<td>1.6 to 1</td>
</tr>
<tr>
<td>Paris, in 1670, 1671, 1672</td>
<td>1 to 4.7</td>
<td>1.6 to 1</td>
</tr>
</tbody>
</table>

The following table, similar to the preceding, is formed from the observations collected and referred to by Dr. Price.

<table>
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<th>Marriages to Births, as</th>
<th>Births to Burials, as</th>
</tr>
</thead>
<tbody>
<tr>
<td>London, annual medium from 1716 to 1736</td>
<td>18,000 to 26,529, or 1 to 1.4, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Northampton, ditto, from 1741 to 1770</td>
<td>15,710 to 22,956, or 1 to 1.4, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Norwich, ditto, from 1740 to 1769</td>
<td>155 to 191, or 1 to 1.2, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Shrewbury, ditto, from 1762 to 1768</td>
<td>1057 to 1206, or 1 to 1.8, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Manchester and Salford, exclusive of dissenters, Ditto, from 1758 to 1779</td>
<td>301 to 329, or 1 to 1.69, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Ditto, ditto, including dissenters, from 1768 to 1772</td>
<td>8109 to 1038, or 1.14, &amp;c. to 1</td>
<td></td>
</tr>
<tr>
<td>Lincolneshire, ditto, from 1752 to 1771</td>
<td>1 to 3.7</td>
<td>126 to 105, or 1 to 1.2</td>
</tr>
<tr>
<td>Madeira, ditto, from 1759 to 1766</td>
<td>1 to 4.68</td>
<td>2201 to 1293, or 1.7 to 1</td>
</tr>
<tr>
<td>Boston in New England, from 1731 to 1752</td>
<td>338 to 309, or 1 to 1.13, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Christiana in Norway, in 1765</td>
<td>11,024 to 6929, or 1.5 to 1</td>
<td></td>
</tr>
<tr>
<td>Paris, mean of some of the last years</td>
<td>1 to 4.3</td>
<td>19,100 to 19,400, or 1 to 1.01, &amp;c.</td>
</tr>
<tr>
<td>Vienna, annual medium from 1757 to 1769</td>
<td>3800 to 3600, or 1 to 1.1, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Amsterdam, ditto, for some of the last years</td>
<td>4300 to 8000, or 1 to 1.7, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Copenhagen, ditto</td>
<td>2700 to 3300, or 1 to 1.2, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Berlins, ditto, for five years, ending at 1759</td>
<td>3855 to 5054, or 1 to 1.3, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Breslau, ditto, from 1753 to 1774</td>
<td>1589 to 1256, or 1 to 1.5, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Rome, ditto from 1759 to 1761</td>
<td>1252 to 1507, or 1 to 1.2, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Veand in Switzerland, ditto, for 10 years before 1766</td>
<td>5717 to 7153, or 1 to 1.2, &amp;c.</td>
<td></td>
</tr>
</tbody>
</table>

For an account of the numbers of males and female infancy born children and chyrmoms, and of boys and girls under ten, of married men and married women, and of widows and widowers, who died for a course of years at
MARRIAGE.

Marriage at Vienna, Breslau, Dresden, Leipzig, Ratifon, and some other towns in Germany, see Phil. Trans. Abr. Vol. VII. Part IV. p. 36, &c.

The reader may find many curious calculations and remarks relating to this subject in Dr Price’s excellent work, intitled, Observations on Reversionary Payments. From the preceding table it appears, that marriages, one with another, do each produce about

ments. Volume VII. Page IV.

nothing like it in any other great

healthy country situation, every wedding produces

Paris, less than the proportion of children derived from

other seldom produce less than four children each; generally between four and five, and sometimes above five; but in towns seldom above four, generally between three and four, and sometimes under three. It is necessary to observe here, that though the proportion of annual births to weddings has been considered as giving the true number of children derived from each marriage, taken all marriages over one another; yet this is only true, when, for many years, the births and burials have kept nearly equal. Where there is an excess of the births occasioning an increase, the proportion of annual births to weddings must be less than the proportion of children derived from each marriage; and the contrary must take place where there is a decrease: and by Mr King’s computation, about one in an hundred and four persons marry; the number of people in England being estimated at five millions and a half; whereas about forty-one thousand annually marry.

In the district of Vaud in Switzerland, the married are very nearly a third part of the inhabitants. Major Graunt and Mr King disagree in the proportions between males and females, the latter making 14 married women to 13 married men in London; in other cities and towns, and in the villages and hamlets, 100 males to 99 females; but Major Graunt, both from the London and country bills, computes, that there are in England 14 males to 13 females; whence he justly infers, that the Christian religion, prohibiting polygamy, is more agreeable to the law of nature than Mahometanism and others that allow it. This proportion of males to females Mr Derham thinks pretty just, being agreeable to what he had observed himself. In the hundred years, for instance, of his own parish-register of Upminster, though the burials of males and females were nearly equal, being 633 males and 623 females in all that time; yet there were baptised 709 males and but 675 females, which is 13 males to 13.7 females.

From a register kept at Northampton for 28 years, from 1741 to 1770, it appears, that the proportion of males to females that were born in that period is 2361 to 2288, or nearly 12.5 to 12. However, though more males are born than females, Dr Price has sufficientlyshown, that there is a considerable difference between the probabilities of life among males and fe-

males in favour of the latter; so that males are more marriage short-lived than females; and as the greater mortality of males takes place among children, as well as among males at all ages, the fact cannot be accounted for merely by their being more subject to untimely deaths by various accidents, and by their being addicted to the excesses and irregularities which shorten life. Mr Kerkeboom informs us, that, during the course of 126 years in Holland, females have in all accidents of age lived about three or four years longer than the same number of males. In several towns of Germany, &c. it appears, that of 7270 married persons who had died, the proportion of married men who died to the married women was 3 to 2; and in Breslau for eight years, as 5 to 3. In all Pomerania, during nine years from 1748 to 1756, this proportion was nearly 15 to 11. Among the ministers and professors in Scotland, 20 married men die to 12 married women, at a medium of 27 years, or in the proportion of 5 to 3; so that there is the chance of 5 to 2, and in some circumstances even a greater chance, that the woman shall be the survivor of a marriage, and not a man; and this difference cannot be accounted for merely by the difference of age between men and their wives, without admitting the greater mortality of males. In the district of Vaud in Switzerland, it appears, that half the females do not die till the age of 40 and upwards, though half the males die under 36. It is likewise an indubitable fact, that in the beginning of life, the rate of mortality among males is much greater than among females.

From a table formed by Dr Price, from a register kept for 20 years at Gainsborough, it appears, that of those who live to 80, the major part, in the proportion of 49 to 53, are females. Mr Deparcieux at Paris, and Mr Wargent in Sweden, have farther observed, that not only women live longer than men, but that married women live longer than single women. From some registers examined by Mr Maret in Switzerland, it appears, that of equal numbers of single and married women between 15 and 25, more of the former died than of the latter, in the proportion of 2 to 1.

With respect to the difference between the mortality of males and females, it is found to be much less in country parishes and villages than in towns; and hence it is inferred, that human life in males is more brittle than in females, only in consequence of adventitious causes, or of some particular debility, that takes place in polished and luxurious societies, and especially in great towns.

From the inequality above stated between the males and females that are born, it is reasonable to infer, that one man ought to have but one wife; and yet that every woman without polygamy may have a husband: this surplusage of males above females being spent in the supplies of war, the seas, &c. from which the women are exempt.

Perhaps, says Dr Price, it might have been observed with more reason, that this provision had in view that particular weakness or delicacy in the constitution of males, which makes them more subject to mortality: and which concomitantly renders it necessary that more of them should be produced, in order to preserve in the world a due proportion between the two sexes.

That this is a work of Providence, and not of chance
Marriages. change, is well made out by the very laws of chance by Dr Arbuthnot; who supposes Thomas to lay against John, that for 12 years running more males shall be born than females; and giving all allowances in the computation to Thomas's side, he makes the odds against Thomas, that it does not so happen, to be near five millions of millions of millions to one; but for ages of ages, according to the world's age, to be near an infinite number to one.

According to Mr Kedreboom's observations, there are about 225 children born from 100 marriages.

Mr Kedreboom, from his observations, estimates the duration of marriages, one with another, as in the following Table.

<table>
<thead>
<tr>
<th>Ages</th>
<th>Survivors</th>
<th>Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>60</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>70</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>80</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>90</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>


Dr Price has shown, that on Dr Moivre's hypothesis, or that the probabilities of life decrease uniformly (see Complement of Life) the duration of survivorship is equal to the duration of marriage, when the ages are equal: or, in other words, that the expectation of two joint lives, the ages being equal, is the same with the expectation of survivorship; and, consequently, the number of survivors of 2 (which is the same, supposing no second marriages) of widows and widowers, alive together, which will arise from any given set of such marriages constantly kept up, will be equal to the whole number of marriages: or half of them (the number of widows in particular) equal to half the number of marriages. Thus the expectation of two joint lives, both 40, is the third of 46 years, or their complement, i.e. 15 years and 4 mouths: and this is also the expectation of the survivor. That is, supposing a set of marriages between persons all 40, they will one with another last just this time, and the survivors will last the same time. In adding together the years which any great number of such marriages, and their survivorships, have lasted, the sums would be found to be equal. It is observed farther, that if the number expressing the expectation of single or joint lives, multiplied by the number of single or joint lives whose expectation it is, be added annually to a society, or town, the sum gives the whole number living together, to which such an annual addition would in time grow; thus, since 19, or the third of 57, is the expectation of two joint lives whose common age is 29, or common complement 57; 20 marriages every year between persons of this age would in 57 years grow to 20 times 19, or 380 marriages always existing together.

The number of survivors also arising from these marriages, and always living together, would in twice 57 years increase to the same number. Moreover, the particular proportion that becomes extinct every year, out of the whole number constantly existing together of single or joint lives, must, wherever this number undergoes no variation, be exactly the same with the expectation of the lives at the time when their existence commences. Thus, if it were found that a 10th part of all the marriages among any body of men, whose numbers do not vary, are dissolved every year by the deaths of either the husband or wife, it would appear, that 19 was at the time they were contracted, the expectation of these marriages. Dr Price observes, that the annual average of weddings among the ministers and professors in Scotland for the last 27 years has been 31; and the average of married persons for 17 years ending in 1767, had been 667. This number, divided by 31, gives 21, the expectation of marriage among them; which, he says, is above 25 years more than the expectation of marriage would be, by Dr Halley's table, on the supposition, that all first, second, and third marriages, may be justly considered as commencing one with another so early as the age of 30; and he has proved, that the expectation of two equal joint lives is to the expectation of a single life of the same age as 2 to 3; consequently, the expectation of a single life at 30, among the ministers in Scotland, cannot be less than 32.15. If we suppose the mean ages of all who marry annually to be 23 and 25, the expectation of every marriage would be 19 years; or one with another would be all extinct in 19 years: the marriages which continue beyond this term, though fewer in number, enjoying among them just as much more duration as those that fall short of it enjoy less. But it appears from the observations and tables of Mr Muret, that, in the district of Vaud (dividing half the number of married persons, viz. 38,328, by the annual medium of weddings, viz. 808), the expectation of marriage is only 23° years: so much higher are the probabilities of life in the country than in towns, or than they ought to be, according to Dr Moivre's hypothesis.

Marriage (Matrimonium), in law, signifies not only the lawful joining of a man and wife, but also the right of bequeathing a ward or a widow in marriage, as well as the land given in marriage.

Dissolution of Marriage. See Divorce.

Forcible Marriage. See Forcible Marriage.

Frank Marriage. See Frank.

Sale of Marriage, in law, is one of the first and principal matrimonial causes, when one of the parties boasts or gives out, that he or she is married to the other, whereby a common reputation of their matrimony may ensue. On this ground the party injured may libel the other in the spiritual court; and unless the defendant undertakes and makes out a proof of the actual marriage, he or she is enjoined perpetual silence on that head; which is the only remedy the ecclesiastical courts can give for this injury.

Marriage Settlement, is a legal act, previous to marriage, whereby a jointure is secured to the wife after the death of the husband. These settlements seem to have been in use among the ancient Germans, and their kindred nation the Gauls. Of the former Tacitus gives us this account: Dux eum non suo marito, sed noster maritus afferit: inter ipsos parentes et progenius, et manus probat (De Mor. Germ. c. 18.) And Caesar, De Bell. Gallic, lib. vi. c. 18, has given us the terms of a marriage settlement among the Gauls, as nicely calculated as any modern jointure: Vixi,quantus pecunia ab usuquis dati nomine acceptavit, tantatem suis bonis, aemulatione factis, cum dotibus communicantibus. Hujus omnis pecuniae constitutio ratione habitat, si fraudulente servavit.
MARRIAGE

**Duty of Marriage** is a term used in some ancient customs, signifying an obligation on women to marry. To understand this, it must be observed, that old maids and widows about sixty, who held fees in body, or were charged with any personal or military services, were anciently obliged to marry, to render those services to the lord by their husbands, or to indemnify the lord for what they could not do in person. And this was called *duty or service of marriage.*

**Pleas of Encouraging Marriage.** Dr. Halley observes, that the growth and increase of mankind is not so much flattered by any thing in the nature of the species, as it is from the cautious difficulty most people make to adventure on the state of marriage, from the prospect of the trouble and charge of providing for a family; nor are the poorer sort of people herein to be blamed, who, besides themselves and families, are obliged to work for the proprietors of the lands that feed them; and of such does the greater part of mankind consist. Were it not for the backwardness to marriage, there might be four times as many births as we find; for by computation from the table given under the article Mortality, there are 15,000 persons above 16 and under 45, of which at least 7000 are women capable of bearing children; yet there are only 1238, or little more than a fifth part of these, that breed yearly; whereas, they all married, it is highly probable that four of six should bring forth a child every year, the political consequences of which are evident. Therefore, as the strength and glory of a kingdom or state consists in the multitude of subjects, celibacy above all things ought to be discouraged, as by extraordinary taxing or military service: and, on the contrary, those who have numerous families should be allowed certain privileges and immunities, like the *juv trium liberorum* among the Romans; and especially, by effectually providing for the subsistence of the poor.

**Marrow,** in anatomy, a soft oleaginous substance contained in the cavity of the bones. See Anatomy, No. 3.

**Marrubium, White Horehound.** A genus of the gymnospermia order, belonging to the Didynamia class of plants; and in the natural method ranking under the 42d order, *Verticilales.* The calyx is falcate-shaped, rigid, and ten-ribbed; the upper lip of the corolla bifid, linear, and straight. There are nine species, the most remarkable of which is the vulgar, a native of Britain, growing naturally in waste places, and by way fides near towns and villages, but not common. It has a strong and somewhat musty smell, and bitter taste. It is reputed attendant and relvolent; an infusion of the leaves in water, sweetened with honey, is recommended in mathematical and phthisical complaints, and most other diseases of the brain and lungs.

**Mars.** In astronomy, one of the five planets, and of the three superior ones; its place being between the earth and Jupiter. See Astronomy, No. 40.

**Mars,** in pagan worship, the god of war. He was, according to some, the son of Juno and Jupiter; while others say that he was the son of Juno alone, who, being displeased at Jupiter's having produced Minerva from his brain, without female aid, in revenge conceived without the assistance of the other sex, by touching a flower shown to her by Flora in the plains of Olenus, and became the mother of this formidable deity. The amours of Mars and Venus, and the manner in which Vulcan caught and exposed them to the laughter of the other gods, have been described by several of the ancient poets. He is represented as having several wives and mistresses, and a considerable number of children. He was held in the highest veneration by the Romans; both from his being the father of Romulus their founder, and from their inclination to conquer; and had magnificent temples erected to him at Rome.

**Mars** is usually represented in a chariot, drawn by furious horses. He is completely armed; and extends his spear with the one hand, and grasps a sword, imbrued in blood, with the other. He has a fierce and savage aspect. Discord is represented preceding his car; and Clamour, Fear, and Terror appear in his train. The victims sacrificed to him were the wolf, the horse, the wood-pecker, the vulture, and the cock.

**Mars,** among chemists, denotes iron; that metal being supposed to be under the influence of the planet Mars.

**Marais** (Cesar Chistea du), was born at Maruelles 1676. He attached himself at an early period to the life of the order of the congregation of the oratory; but the situation was too narrow for his genius, and he soon left it. At Paris he married, became advocate, and entered on this new profession with great success and approbation. Disappointed, however, in his expectations of making a speedy fortune, he abandoned the law also. About this time the peculiar humour of his wife occasioned a separation. We next find him as governor to the son of the president de Maftons; and when the premature death of the father deprived him of the fruits of his industry, he engaged with the famous Law in the same capacity. After the fall of this extraordinary projector, he completed the education of the Marquis de Beaufremont's children, and reared pupils worthy of his genius and industry. Although he was accused of a tendency to a Delphin, and though there was good reason for the accusation; yet he never inferred into the minds of his scholars any principle inconsistent with sound morality, or with the Christian religion. When he left M. de Beaufremont's family, he took a boarding house, in which, after a method of his own, he educated a certain number of young men. Unexpected circumstances obliged him to abandon this useful undertaking. He was even constrained to give some occasional lessons for the bare necessities of life. Without fortune, without hope, and almost without resource, he was reduced to extreme indigence.
Marsais.  digence. In this situation he was found by the authors of the Encyclopédie, and made a partner in conducting that great work. Among many other excellent pieces, the article Grammar breathes the spirit of found philosophy. His principles are clear and solid. He discovers an extreme knowledge of the subject, great accuracy in the rules, and great propriety in the application. M. le Comte de Laraguais was so much affected with the diftrefles, and so much convinced of the merit of Du Marsais, that he procured him a pension of one thousand livres. Du Marsais died at Paris on the 11th June 1756, in his eighticth year, after having received the sacrament. The compliment which he paid to the priest on this occasion has been confidered by some as rather equivocal. But there is no neceffity to deprive religion of this triumph, or philosophy of that honour which conviction and penitence are confidered by fome as rather equivocal. But there is no neceffity to deprive religion of this triumph, or philosophy of that honour which conviction and penitence must confer on it. "The faith of a great genius (fays Bayle, who is intitled to credit on this fubjecl) is not totally extinguished: It is like a spark under the ashes. Reflection and the prcfcpt of danger call forth its exertions. There are certain situations in which philosophers are as full of anxiety and remorse as other men." Whatever were the laft sentiments of Du Marsais, it cannot be denied that in the vigour of health he furnished feveral examples of irreligion, and to these have been added many absurd stories. The superiority of Du Marsais's talents confifted in exactness and perspicuity. His ignorance of the world, and of the customs of mankind, together with the greatest latitude in expreffing whatever he thought, gave him that frank and unguarded simplicity which is often the chief ingredient of genuine humour. Fontenelle used to fay of him, "that he was the moft lively SFimpleton, and as a man of wit the moft fimple, he ever knew." He was the Fontaine of philosophers. In confequence of this character, he was a nice judge of what was natural in every production, and a great enemy to all kind of affectation. His principal works are, 1. Exposition de la doctrine de l'Eglife Gallicane par rapport auxTextes de la cour de Rome, 12mo. This accurate work was begun at the deire of the prefident of the lodge, and did not appear till after the death of the author. 2. Exposition d'une méthode raifonnée pour apprendre la langue Latine, 12mo, 1722, rare. This method appears conformable to the natural unfolding of the powers of the mind, and on that account renders the acquisition of the language lefs difficult; but it was liable to two great objections to vulgar and unenlightened understandings, namely, its novelty, and the cenfure which it conveyed against the former method. 3. Traité des tropez, 1730, 8vo; again printed in 1771, 12mo. This work is intended to explain the different significations of the fame word. It is a master-piece of logic, of accuracy, of perspicuity, and precision. The observations and the rules are illustrated by striking examples calculated to show both the use and the abuse of the rhetorical figures. It is wonderful at the fame time that this excellent book had very little sale, and is scarceiy known. A gentleman who wanted to compliment the author on this extraordinary performance, told him that he had heard a great deal of his Histoire des Tropes, and begged to know in what particular part of the world the nation flouritlied. 4. Les veritable principes de la Grammaire raifonnée pour apprendre la langue Latine, 1729, 4to. There was only the preface of this work published, in which he introduced the greatest part of his method raifonnée. 5. Lettre de l交付able du Pere Foucauld, arranged after the manner of the original plan, 1731, 12mo. 6. Une repofte manuftrite a la Critique de l'histoire des oracles par le Pere Bailly. There are only imperfect fragments of thefe papers to be found.—7. Logique, ou réfleotions fur les opérations de l'esprit. This is a short tract, which neverthelefs contains every thing necessary to be known on the art of reasoning. It was reprinted at Paris, in two parts, together with the articles which he had furnished for the Encyclopédie, 1762. We shall altogether omit several other performances, calculated to diftribute the principles of Deism of profanity; which, though they are published in his name, may be dubious, and at any rate deserve not to be drawn from that oblivion into which they have fallen.

Marsal, a town of France, in Lorraine, remarkable for its salt-works; feated in a marsh on the river Selle, of difficult access, which, together with the fortifications, render it an important place. E. Long. 6.43. N. Lat. 48° 46'.

Marsala, an ancient and ftong town of Sicily, in the valley of Mazara. It is well peopled, and built on the ruins of the ancient Lilybœum. E. Long. 12.37. N. Lat. 37° 52'.

Marsam, or Mount Marsam, a town of France, in Gascogne, and capital of a small territory of the fame name, fertile in wine; feated on the river Mi­duce, in W. Long. o. 39. N. Lat. 44° 0'.

Marsaquiver, or Marsaquiver, a ftong and ancient town of Africa, on the coast of Barbary, and in the province of Beni-Arax, in the kingdom of Tremfen, with one of the best harbours in Africa. It was taken by the Spaniards in 1732. It is feated on a rock near a bay of the sea, in W. Long. o. 10. N. Lat. 35° 40'.

Marseilles, a ftong fea-port, and the richet town of Provence, in France. Here is a good harbour, where the French galleys are stationed; for it will not admit large men of war. The entrance of the harbour, which is extremely narrow and surrounded by lofty mountains, protefs and sheltered ves­sels during the most violent storms. The port itself forms a delightful walk even in the middle of winter, as it is open to the southern sun, and crowded with vast numbers of people not only of all the European nations, but of Turks, Greeks, and natives of the coast of Barbary. The whole feene is one of the moft agreeable that can be imagined, if the chains of the galley slaves heard among the hum of buiftines did not tincture it with the hateful idea of slavery. The galley slaves themselves, nude and neglected, are peaceable in their respective stations; and it is said that no others shall ever be contrived to supply their place, as they have long ceased to be of any utility to the state, and are fecfely even navigable in severe weather. Marseilles pretends to the moft remote antiquity; a colony of Phocians, in ages unknown, having given it birth. It is divided into the Old Town and the New; which are separated by a ftreet, bordered with trees on each side. The Old Town is one of the moft ill built of any in Europe. The New has sprung up since the commencement of the 18th century, and has all that
that regularity, elegance, and convenience, which distinguished the present times. It is said to contain 100,000 inhabitants, and is one of the most trading towns in France. Without the walls is the castle of Notre-Dame, which is very well fortified. It is a bishop's see, and there is a French academy, having been noted at all times for men of learning. In 1660, Louis XIV. built the citadel and fort St John to keep the inhabitants in awe, because they pretended to be free. The priests had a very fine obelisk here, and in the arsenal not long ago, there are arms for 40,000 men. In the House of Discipline they weave gold, silver, and silk brocades. The drugs are brought thither from all parts of the world. It is feated on the north shore of the Mediterranean, in E. Long. 4. 27. N. Lat. 43. 18. The surrounding country is rocky and barren, but covered for several miles on all sides with villas and summer houses, which commerce has erected.

MARSH (Narcissus), an exemplary Irish prelate, born at Hancote in Wiltshire in 1658. He was made principal of St. Alban's hall, Oxford, in 1673, but removed to the provostship of Dublin college in 1676. He was promoted to the bishopric of Leighligh and Ferns in 1682, translated to the archbishopric of Cashel in 1690, to Dublin in 1694, and to Armagh in 1703. While he held the see of Dublin, he built a noble library for the use of the public, filled it with choice books, and settled a provision for two librarians. He repaired, at his own expense, several decayed churches, besides buying in sacred and profane literature, in mathematics, natural philosophy, the learned languages, especially the oriental, and in both the theory and practice of music. He published 1. *Institutiones logicae.*—2. *Manuductio ad logicae,* written by Philip de Trieu; to which he added the Greek text of Aristotle and some tables and schemes. 3. An introductory essay on the doctrine of sounds, &c. He died in 1713.

MARSH signifies a piece of ground covered with water, yet so that the grass and other vegetables rise above the surface of the water, and, by their decaying, give rise to putrid effluvia, which are very noxious to the human body.

MARSHAL, or MARSHALL, (marc-scellus), primarily denotes an officer who has the care or the command of horses. Nicod derives the word from pole-marchus, "master of the camp;" Mathew Paris from *Marsis feneceallus,* in the old Gaulish language; *march* signifies "horse;" whence *marshat* might signify "him who commanded the cavalry. Other derivations have been given by different authors; and the name itself has been applied to officers of very different employments.

MARSHAL of France, the highest dignity of preferment in the French armies. The dignity of marshal came to be for life, though at its first institution it was otherwise. They were then only the kings first eccuyers under the constable; but in time they became the constables lieutenants in the command of the army, the constable himself being then become cap-

tain-general. At first they were but two in number; and their allowance was but 500 livres per annum in time of war, and nothing in time of peace: but in the reign of Francis I. a third was added: Henry II. created a fourth. Since it has been various; Louis XIV. increased it to 20. Their office at first was to marshal the army under the constable, and to command in his absence. They did then what the marshal de camp do now; to which last they have given their title, and the least considerable part of their authority.

Earl Marshal of Scotland. His office was to command the cavalry, whereas the Constable commanded the whole army. They feem, however, to have had a sort of joint command, as of old all orders were addressed "to our constable and marshall." The office of earl marshall has never been out of the noble family of Keith. It was referred at the union; and when the heritable jurisdictions were bought, it was in the crown, being forfeited by the rebellion of Geo. Keith, earl marshall, in 1715.

Earl Marshal of England is the eighth great officer of state. This office, until it was made hereditary, always passed by grant from the king, and never was held by tenure or forfeiture (by any subject) as the offices of lord high steward and lord high constable were sometimes held. The title is personal, the office honorary and officiary. They were formerly styled lord marshal only, until king Richard II. June 20. 1397, granted letters-patent to Thomas Mowbray, earl of Nottingham, and to the heirs male of his body lawfully begotten, by the name and style of *earl marshal;* and further, gave them power to bear in their hand a gold truncheon, enamelled with black at each end; having at the upper end of it the king's arms engraved thereon, and at the lower end his own arms.

King James I. was pleased, by letters-patent, dated August 29th 1622, to constitute Thomas Howard, earl of Arundel and Surrery, earl marshal for life; and the next year, the same king granted (with the advice of the privy-council) letters-patent, wherein it was declared, that during the vacancy of the office of lord high constable of England, the earl marshal had the like jurisdiction in the court of chivalry, as both constable and marshall jointly ever exercised. See CHIVALRY (Court of).

On the 19th of October 1672, king Charles II. was pleased to grant to Henry lord Howard, and the heirs-male of his body lawfully begotten, the office and dignity of earl marshal of England, with power to execute the same by deputy or deputies, in full and ample a manner as the same was heretofore executed by Henry Howard, lord Maltravers, late earl of Arundel, Surrery, and Norfolk, grandfater to the said Henry lord Howard; or by Thomas Howard, late duke of Norfolk; grandfather to the said Thomas Howard, late earl of Arundel, Surrery, and Norfolk; or by Thomas Howard duke of Norfolk, grandfather of the said Thomas Howard duke of Norfolk; or by John Mowbray duke of Norfolk, or any other earl marshal of England; with a pension of £ 20 each year, payable out of the Hanaper office in chancery; and on default of the illeue mal of the said Henry lord Howard,
**MARSHAL**

Howard, with limitation to the heirs-male lawfully begotten of the body of the said Thomas Howard, earl of Arundel, &c.; and, on the default of such issue, to descend in like manner to the heirs-male of Thomas late earl of Suffolk; and, on default of his issue-male, to the heirs-male of Lord William Howard, late of Naworth in the county of Cumberland, youngest son to Henry Howard late duke of Norfolk; and on default of his issue-male, to Charles Howard earl of Nottingham, and the heirs-male of his body lawfully begotten.

Field-Marshal, an office of high rank in the European armies. It is now, however, diffused in an English officer, whose business, according to Fleta, is to execute the commands and decrees of the lord steward, and have the custody of prisoners committed by the court of chivalry. Under him are six mar­shals, men, who are properly the king’s bailiffs, and arrest in the verge of the court, when a warrant is backed by the board of green-sloths. The court where causes of this kind, between man and man are tried, is called the Marshalsea, and is under the knight mar­shal. See Marshalsea.

This is also the name of the prison in Southwark; the reason of which may probably be, that the mar­shal of the king’s house was wont to sit there in judgement, or keep his prison.

Marshalsea, under the common law, the verge of the court in this respect extends for 12 miles round the king’s palace of residence. And, as this tribunal was never subject to the jurisdiction of the chief judi­ciary, no writ of error lay from it (though a court of record) to the king’s-bench, but only to parliament, till the statutes of 5 Edw. III. c. 2. and 10 Edw. III. c. 3. which allowed a writ of error before the king in his place. But this court being ambulatory, and obliged to follow the king in all his progresses, so that by the removal of the household actions were frequently discontinued, and doubts having arisen as to the extent of its jurisdiction, king Charles I. in the sixth year of his reign, by his letters-patent, erected a new court of record, called the curia palatii, or palace­court, to be held before the steward of the household and knight-marshall, and the steward of the court, or his deputy; with jurisdiction to hold pleas of all man­ner of personal actions whatsoever, which shall arise between any parties within 12 miles of his majesty’s palace at Whitehall. The court is now held once a week, together with the ancient court of marshalsea, in the borough of Southwark; and a writ of error lies from thence to the court of king’s-bench. But if the cause is of any considerable consequence, it is usually removed on its first commencement, together with the custody of the defendant, either into the king’s-bench or common-pleas by a writ of habeas corpus cum causa: and the inferior business of the court hath of late years been much reduced, by the new courts of confience erected in the environs of London; in consideration of which the four counsels belonging to these courts had salaries granted them for their lives by the flat. 23 Geo. II. c. 27.

**MARSHAM** (Sir John): a very learned English writer in the 17th century. He studied the law in the Middle-Temple, and was sworn one of the six clerks in the courts of chancery in 1638. In the beginning of the civil wars he followed the king to Oxford; for which he was requitted of his place by the parliament at Westminster, and plundered. After the declining of the king’s affairs, he returned to London; compounded, among other royalists, for his real estate; and betook himself wholly to his studies and a retired life, the fruits of which were some excellent works. He wrote Distributa Chronologiae; Chronicis Canon, Egyptiacis, Hebrews, Graecis, &c. He died in 1685.

**MARSHFIELD**, a town of Gloucestershire, 7 miles from Bath, 12 from Chipping-Sodbury, 121 from Bristol, 16 from Gloscester, and 104 from Lon­don, on the road to Bristol, and on the very borders of Wilts. It is a considerable clothing-town, drives
Marfuland

integrity of the tribune aspiring; and Rome, and the were enjoyed by the citizens of Rome. This petition, which they were engaged, and which from though Stilpno was celebrated, the eloquence, and contributions they made from the were allowed by the Romans to be an arm of the sea. Llian families for letters to more profit by grazing than ploughing first firft were allowed by the Romans to be the most intrepid soldiers of their legs when in friendship, and the most formidable of their enemies when at variance; and it was a common saying, that Rome could neither triumph over the Marfi nor without them. They are particularly celebrated for the civil war in which they were engaged, and which from them which has received the name of the Marfian war. The large contributions they made to support the interest of Rome, and the number of men which they continually supplied to the republic, rendered them bold and aspiring; and they claimed, with the rest of the Italian states, a share of the honour and privileges which were enjoyed by the citizens of Rome. This petition, though supported by the interest, the eloquence, and integrity of the tribune Druus, was received with contempt by the Roman senate; upon which, in the 662d year of Rome, the Marfi put themselves at the head of the focial war, one of the most obfinate and dangerous oppositions ever made to the progress of the Roman power. They obtained several victories; but they were at last defeated: though the war was not terminated but by a grant of those privileges for which they contended.

Marshigl, then advanced to the rank of marfhal, being in the fortrefs of Briofac, which surrendered to the duke of Burgundy in 1702, when the place was deemed capable of holding out much longer, was stripped of all his commissions, and had his sword broke over him; and the count d'Arco who commanded was beheaded. Marshigl now fought for conflation in the sciences; as, amid the all the hurry and fatigue of war, he had made all the advantages the most philosophic man could do, who had travelled purely in quest of knowledge. He had a rich collection of every thing proper to the advancement of natural knowledge, instruments astronomical and chemical, plans of fortifications, models of machines, &c. all which he preferred to the senate of Bologna by an authentic act in 1712, forming at the same time out of them what he called the institute of the arts and sciences at Bologna. He also founded a printing-house, and furnished it with the best types for Latin, Greek, Hebrew, and Arabic, which he presented in 1728 to the Dominicans at Bologna, on condition of their printing all the writings of the institute at prime cost: this was called the printing-house of St Thomas Aquinas. His writings on philosophical subjects are numerous and valuable, in Latin, Italian, and French; he died in 1730.

MARSTON (John), an English dramatic writer, who lived in the time of James I. Wood says he was a student in Corpus Christi college, Oxford; but we neither know his family nor the time of his birth.

He contributed eight plays to the stage, which were all acted at Black-friars with applause; and one of them, called the Dutch Courtezan, was once revived since the Restoration, under the title of the Revenge, or a Match in Newgate. There is no account when he died; but we find his works were published after his death by Shakespeare, and may hence reasonably conclude that it happened about the year 1614. He was a chaste and pure writer; avoiding all that obscenity, ribaldry, and sordidness, which too many of the play-writers of that time, and indeed much more so in some periods since, have made the bane of their wit, to the great disgrace and scandal of the stage.

Marsyas (Fab. Hist.), a celebrated musician of Cæcina in Phrygia, son of Olympus, or of Hyagnis, or Euphas. He was so skilful in playing on the flute, that he is generally deemed the inventor of it. According to the opinion of some, he found it when Minerva had thrown it aside on account of the distortion of her face when she played upon it. Marsyas was enamoured of Cybele, and he travelled with her as near as Nyfa, where he had the imprudence to challenge Apollo to a trial of his skill as a musician. The god accepted the challenge, and it was mutually agreed that he who was defeated should be dead alive by the conqueror. The Muses, or (according to Diodorus) the inhabitants of Nyfa, were appointed umpires. Each exerted his utmost skill, and the victory with much difficulty was adjudged to Apollo. The god upon this tied his antagonist to a tree, and flead him alive; (See Apollo.) The death of Marsyas was universally lamented; the Fauns, Satyrs, and Dryads, wept at his fate; and from their abundant tears arose a river of Phrygia, well known by the name of Mar-
The unfortunate Marfyas is often represented on monuments, as tied with his hands behind his back to a tree, while Apollo stands before him with his lyre in his hands. In independent cities, among the ancients, the statue of Marfyas was generally erected in the forum, to represent the intimacy which subsisted between Bacchus and Marfyas as the emblems of liberty. At Celaena, the skin of Marfyas was shown to travellers for some time. It was suspended in the public place, in the form of a bladder or afoot ball.

The sources of the Marfyas were near those of the Pegu, lying in the gulf of Tenar, bounded on the north to the coast of New England, 80 miles from the mouth of the river, 100 miles distant. W. Long. 74. 35. N. Lat. 34.

The Marthas of this book are of the following class, and illustrate the subject of the preceding.

MARTIAL is sometimes used to express preparations of iron, or such as are impregnated therewith; as the martial regular of antimony, &c.

MARTIAL-Court. See Court-Martial.

MARTIAL Law, in England, is the law of war that depends upon the just but arbitrary will and pleasure of the king, or his lieutenant; for though the king doth not make any laws but by common consent of parliament yet, in time of war, by reason of the necessity of it to guard against dangers that often arise, he utter absolute power, to that his words a law. Smith de Repub. Ang. lib. 5. c. 4.

But the martial law (according to Chief Justice Hale), is in reality not a law, but something indulged rather than allowed as a law; and it relates only to members of the army, being never intended to be executed on others, who ought to be ordered and governed by the laws to which they are subject, thought it be a time of war. And the exercise of martial law, whereby any person may lose his life, or member, or liberty, may not be permitted in time of peace, when the king's courts are open for all persons to receive justice.

MARTIALIS (Marcus Valerius), a famous Latin poet, born at Bilibis, now called Bobiera, in the kingdom of Arragon in Spain, was of the order of knights. He went to Rome at the age of 21, and lived there 35 years, under the reign of Galba and the succeeding emperors, till that of Trajan; and having acquired the esteem of Titus and Domitian, he was created tribune. At length, finding that he was neglected by Trajan, he returned to his own country Bilibis, where he married a wife, and had the happiness to live with her several years. He admires and comemorates her much, telling her that the time was sufficient to supply the want of every thing he enjoyed at Rome. "Romanus in mebis fatis pecatus", says he; in the 31st epigram of the 12th book. She appears like a wife to have been a lady of a very large fortune; for, in the 31st epigram of the same book, he extols the magnificence of her house and gardens he had received from her, and says that she had made him a little kind of monarch."

Munera sunt dominio: post septima, huius rei reversus, Has Marcella donos, parvaque regna dedidit.

There are still extant 14 books of his epigrams, filled with points, a play upon words, and obscenities. The style is affected. However some of his epigrams are excellent; many of them are of middling kind; but the greatest part of them are bad: so that Martial never spoke a greater truth, than when he fled of his own works.

Sunt bona, sunt quaedam mediocria, sunt mala plura. There is also attributed to him a book on the spectacles of the amphitheatre; but the most learned critics
MARTIGUES, a sea-port town of France, in Provence, with the title of a principality; situated near a lake 12 miles long and five broad, which is navigable throughout, and from whence they get excellent salt.

E. Long. 20. N. Lat. 45. 38.

MARTIN (St.), was born at Saharica in Pannonia, (at present Stain in Lower Hungary), in the beginning of the fourth century. His father was a military tribune, and himself was obliged to carry arms, although peace and solitude were more agreeable to his inclination. He was remarkable for every virtue, in a profession which is generally considered to give a function to vice. He divided his coat with a naked wretch whom he met at the gate of Amiens; and it is reported, that Jesus Christ appeared to him on the night following, clothed in this half of his coat. Martin was then a catechumen; but he soon afterwards received baptism, and denounced the military profession for the ecclesiastical. After pulling many years in solitude, St Hilary bishop of Poitiers gave him the power to cast out devils. He returned to Pannonia, he persuaded his mother to embrace Christianity; and with great zeal and activity opposed the Arians, who governed the church in Illyria. When he was publicly whipt for giving testimony to the divinity of Christ, he bore the punishment with the constancy and patience of the first martyrs. This illustrious champion for Christianity, when he heard that St Hilary was returned from banishment, went and settled in the neighbourhood of Poitiers. In this retirement, a great number of monks placed themselves under his direction. His virtues became every day more splendid and remarkable, till he was drawn from his solitude, and with the general approbation of the clergy and people elected bishop of Tours in the year 374. To the zeal and charity of a bishop, he joined the humility and poverty of an anchorite. That he might detach himself more from the world, he built the celebrated monastery of Marroux, which still remains, and which is believed to be the oldest abbey in France. It is situated near the city of Tours, on the Loire and a steep rock. In this situation, together with 80 monks, St Martin displayed the most exemplary sanctity and mortification, nor were there any monks better disciplined than those of Marroux. After he had converted his diocese to the Christian faith, he became the apostle of all Gaul. He diffused the doctrines of Christianity among the heathens, destroyed their temples, and (according to the writers of his life) confirmed the truth by an infinite number of miracles. The emperor Valentinian, at that time in Gaul, received him with every mark of respect and honour. The tyrant Maximus, who had revolted against the emperor Gratian, and seized on Spain, England, and Gaul, received him in a manner no less distinguished. The holy bishop attended him at Trier in the year 373, to solicit some favours. Maximus made him sit at his table with the most illustrious personages of his court, and placed him at his right hand. In drinking, the usurper commanded his servants to give him a cup, that he might again receive from him, but this extraordinary prelate gave it to the priest who accompanied him on his journey. This holy boldness, far from displeasing them, gained him the favour of the emperor and of his court. Martin, who was an enemy to heresy, but a friend to mankind, employed his influence with this prince to persuade the Priscillianists, who were prosecuted by Ihnace and by Idace, bishops of Spain. The bishop of Tours would hold no communion with men whose principles of religion inclined them to shed the blood of mankind; and he obtained the life of those whole death they had solicited. On his return to Tours, he prepared himself for the reward of his labours in another world. He died at Candes the 8th of November 397, but according to others on the 11th of November 400. His name is given to a particular opinion concerning the mystery of the holy Trinity. St Martin is the first of the saints confessors to whom the Latin church offered public prayers. His life is written in elegant Latin by Fortunatus, and Sulpicius Severus one of his disciples. Paul of Pierigues and Fortunatus of Poitiers have given us Sulpicius's life of Martin in verse; but they have debased the admirable prose of the author by a wretched poetical imitation. Nicolas Gervais wrote also the life of St Martin, full of many curious and entertaining facts, published at Tours in 1609, in 4to. The tradition at Amiens is, that St Martin performed the act of charity which rendered him so famous, near an ancient gate of the city, of which the ruins are still visible. The following Latin verses, which do more honour to the saint than to the poet, are inscribed on one of the stones:

Hea quodam vellem Martinus divinantis;
Ut facerem idem, nobis exemplificavit.

MARTIN (Benjamin), one of the most eminent artists and mathematicians of the age, was born in 1704. After publishing a variety of ingenious treatises, and particularly a Scientific Magazine under his own name, and carrying on for many years a very extensive trade as an optician and globe-maker in Fleetstreet, the growing infirmities of age compelled him to withdraw from the active part of business. Trusting too fatally to what he thought the integrity of others, he unfortunately, though with a capital more than sufficient to pay all his debts, became a bankrupt. The unhappy old man, in a moment of despair from this unexpected stroke, attempted to destroy himself; and the wound, though not immediately mortal, haffened his death, which happened February 9th 1782, in his 74th year. He had a valuable collection of fossils and curiosities of almost every species; which, after his death, were almost given away by public auction. His principal publications, as far as they have occurred to recollection, are, The Philosophic Grammar; being a view of the present state of experimental physiolog, or natural philosophy, 1735, 8vo. A new, complete, and universal System or Body of Decimal Arithmetic, 1735, 8vo. The young Students Memorial Book, or Patent Library, 1735, 8vo. Description and Use of both the Globes, the Armillary Sphere and Orrery, Trigonometry, 1736, 2 vols 8vo.
New Elements, "inhapitants; After this check, the favages for a long time disappeared entirely; but at last they returned, bringing with them presents to the French, and making excuses for what had happened. They were received in a friendly manner, and the reconciliation sealed with pots of brandy. This peaceable state of affairs, however, was of no long continuance; the French took such undue advantages of their superiority over the favages, that they soon rekindled in the others that hatred which had never been entirely subdued. The favages, whose manner of life requires a vast extent of land, finding themselves more and more straitened, had recourse to stratagem, in order to destroy their enemies. They separated into small bands, and way-laid the French as they came singly out into the woods to hunt, and, waiting till the sportsman had discharged his piece, rushed upon and killed him before he could charge it again. Twenty men had been thus affaminated before any reason could be given for their sudden disappearance; but as soon as the matter was known, the French took a more severe and fatal revenge; the favages were pursued and maltreated, with their wives and children, and the few that escaped were driven out of Martinico, to which they never returned.

The French being thus left sole masters of the island, lived quietly on those spots which best suited their inclination. At this time they were divided into two classes. The first consisted of those who had paid their passage to the island, and these were called inhabitants; and to these the government distributed lands, which became their own, upon paying a yearly tribute. These inhabitants had under their command a multitude of disorderly people brought over from Europe at their expense, whom they called engagés, or bondsmen. This engagement was a kind of slavery for the term of three years; on the expiration of which they were at liberty, and became the equals of those whom they had served. They all confined themselves at first to the culture of tobacco and cotton; to which was soon added that of ecorce and indigo.

The culture of sugar-cane was begun about the year 1650. Ten years after, one Benjamin D’Acois, a Jew, planted some cocoa trees, but his example was not followed till 1664, when chocolate was more commonly used in France. Cocoa then became the principal support of the colonists, who had not a sufficient fund to undertake sugar plantations: but by the inaccessibility of the sea, in 1718, all the cocoa-trees were destroyed at once. Coffee was then proposed as a proper object of culture. The French ministry had received, as a present from the Dutch, two of these trees, which were carefully preserved in the king’s botanical garden. Two young shoots were taken from these, put on board a ship for Martinico, and entrusted to the care of Mr. DeClicieux. The ship happened to be straitened for want of fresh water; and the trees would have perished, had not the gentleman interfered with
Martinico, with them that quantity of water which was allowed for his own drinking. The culture of coffee was then begun, and attended with the greatest and most rapid success. About the end of last century, however, the colony had made but small advances. In 1760, it had only 6597 white inhabitants. The savages, mulattoes, and free negroes, men, women, and children amounted to no more than 507. The number of slaves was but 14,560. All these together made a population of 21,645 persons. The whole of the cattle amounted to 2668 horses or mules, and 9417 head of horned cattle. The island produced a great quantity of cocoa, tobacco, and cotton; had nine indigo hovels, and 185 small sugar-plantations.

After the peace of Utrecht, Martinico began to emerge from that feeble state in which it had so long continued. The island then became the mart for all the windward French settlements. In the ports of it the neighbouring islands fold their produce, and bought the commodities of the mother-country; and in flori, Martinico became famous all over Europe. In 1736, there were on the island 447 sugar works; 11,953; 322 coffee trees, 193,870 of cocoa; 2,068,480 plants of cotton; 39,400 of tobacco, 6750 of arnuto. The supplies for provision consisted of 4,506,124 banana trees; 34,483,000 bunches of bananas; and 247 plots of potatoes and yams. The number of blacks amount ed to 72,000 men, women, and children. Their labour had improved the plantations as far as was consistent with the consumption then made in Europe of American productions; and the annual exports from the island amounted to about 700,000.

The connections of Martinico with the other islands entailed her to the profits of commissio n, and the charges of transport; as the alone was in the possession of carriages. This profit might be rated at the tenth of the produce; and the sum total must have amounted to near 705,000. This funding debt was seldom called in, and left for the improvement of their plantations. It was increased by advances in money, rents, and other necessaries; so that Martinico became daily more and more a creditor to the other islands, and thus kept them in constant dependence; while they all enriched themselves by her affluence.

The connections of this island with Cape Breton, Canada, and Louisiana, procured a market for the ordinary sugars, the inferior coffee, the molasses, and rum, which would not sell in France. In exchange the inhabitants received fish-fins, dried vegetables, deals, and some flour. In the clandestine trade on the coasts of Spanish America, confining wholly of goods manufactured by the nation, the commonly made a profit of 50 per cent. on the value of about 175,000. Two years yearly to the Caraccas, or neighboring colonies.

So many profitable engagements brought immense sums into Martinico. Upwards of 787,000 l. were constant, circulated in the island with great rapidity; and is perhaps the only country in the world, where the specie has been so considerable as to make it a matter of indifference to them whether they dealt in gold, silver, or commodities. This extensive trade brought into the ports of Martinico annually 200 ships from France; 14 or 15 fitted out by the mother-country for the coast of Guinea; 60 from Canada, 10 or 12 from the islands of Margarita and Trinidad; besides the English and Dutch ships that came to carry on a smuggling trade. The private navigation from the island to the northern colonies, to the Spanish continent; and to the windward islands, employed 120 vessels from 20 to 30 tons burden.

The war of 1744 put a stop to this prosperity. Not that the fault was in Martinico itself; its navy, constantly exercised, and accustomed to frequent engagements, which the carrying on of a contraband trade required, was prepared for action. In less than six months, 40 privateers, fitted out at St Peter's, spread themselves about the latitude of the caribbee islands. They signalized themselves in a manner worthy of the ancient tree-booters; returning confidently in triumph and laden with an immense booty. Yet, in the midst of these successes an entire drop was put to the navigation of the colony, both to the Spanish coast and to Canada; and they were constantly disturbed even on their own coasts. The few ships that came from France, in order to compensate the hazards they were exposed to by the loss of their commodities, sold them at a very advanced price, and bought them at a very low one. By this means the produce decreased in value, the lands were ill cultivated, the works neglected, and the slaves perishing for want.

When every thing thus seemed tending to decay, the peace of 1748 restored the freedom of trade, and with it the hopes of recovering the ancient prosperity of the island. The event however did not answer the plans that were taken to attain it. Two years had not elapsed after the cessation of hostilities, when the colony lost the contraband trade she carried on with the American Spaniards. This was owing to the substitution of register-ships to the fleets; and thus were the attempts of the smugglers confined within very narrow bounds. In the new system, the number of ships was undetermined, and the time of their arrival uncertain: which occasioned a variation in the price of commodities unknown before; and from that time the smuggler, who only engaged in this trade from the certainty of a fixed and constant profit, would no longer pursue it, when it did not secure him an equivalent to the risks he ran. But this loss was not so feebly felt by the colony, as the hardships brought upon them by the mother-country. An unskilful administration clogged the reciprocal and necessary connection between the islands and North-America with so many formalities, that in 1755 Martinico sent but four vessels to Canada. The direction of the colonies, now committed to the care of ignorant and avaricious clerks, soon lost its importance, sunk into contempt, and was prostituted to venality. The debts which had been contracted, during a series of calamities, had not yet been paid-off, when the war broke out again. After a series of misfortunes and defeats, the island fell into the hands of the British. It was restored, however, in July 1763, 16 months after it had been conquered; but deprived of all the necessary means of prosperity, that had made it of so much importance. For some years past, the contraband trade carried on to the Spanish coasts was almost entirely lost. The cession of Canada had precluded all hopes of opening again a communication, which had only been interrupted by temporary mistakes. The productions of the
Martinico. the Grenades, St Vincent, and Dominics, which were now become British dominions, could no longer be brought into their harbours; and a new regulation of the mother-country, which forbid her having any intercourse with Guadaloupe, left her no hopes from that quarter.

The colony, thus deprived of everything as it were, and defective, nevertheless contained, at the last survey, which was taken on the first of January 1779, in the compass of 28 parishes, 12,450 white people of all ages and of both sexes; 1,744 free blacks or mulattoes; 20,553 slaves, and 444 fugitive negroes. The number of births in 1766, was in the proportion of one in 10 among the white people, and of one in 25 among the blacks. From this observation, if it were constant, it should seem that the climate of America is much more favourable to the propagation of the Africans than of the Europeans; since the former multiply still more in the labourers and hardships of slavery, than the latter in the midst of plenty and freedom. The consequence must be, that in process of time the increase of blacks in America will far surpass that of the white men; and, perhaps, at last average this race of victors on the descendants of the oppressors.

The cattle of the colony consists of 8283 horses or mules; 12,376 head of horned cattle; 975 hogs; and 13,544 sheep or goats.

Their provisions are, 17,930,596 trenches of caffava; 5,909,048 banana trees; and 400 squares and a half of yams and plantains.

Their plantations contain 11,444 squares of land, planted with sugar; 6,638,597 coffee trees; 871,643 cocoa trees; 1,784,807 cotton-plants; 59,966 trees of coffee; and 61 of araruto.

The meadows or savannahs take up 10,072 squares of land; there are 11,966 in wood, and 8,444 uncultivated or forsaken.

The plantations which produce coffee, cocoa, and other things of less importance, are 1515 in number. There are but 286 for sugar. They employ 116 water-mills, 12 wind-mills, and 184 turned by oxen. Before the hurricane of the 13th of August 1766, there were 302 small habitations and 18 sugar works more.

In 1769, France imported from Martinico, upon 202 trading vessels, 177,116 quintals of fine sugar, and 12,579 quintals of raw sugar; 68,518 quintals of coffee; 11,731 quintals of cocoa; 6048 quintals of cotton; 2518 quintals of cask; 283 cases of rum; 307 hogheads of molasses; 150 pounds of indigo; 2147 pounds of preserved fruits; 47 pounds of chocolate; 282 pounds of rapied tobacco; 494 pounds of rope yarn; 234 skeins of liquor; 234 hogheads of molasses, &c. 451 quintals of wood for dyeing; and 12,120 hides in the hair. All these productions together have been brought into the colony itself, for 536,691l. 96. 10. 4d.

It is true, that the colony has received from the mother-country to the amount of 528,412l. 16s. 6d. of merchandise; but part of this has been sent away to the Spanish coasts, and another part has been conveyed to the English settlements.

The island is 16 leagues in length and 45 in circumference, leaving out the capes, some of which extend two or three leagues into the sea. It is very subject, and intersected in all parts by a number of hills locks, which are mostly of a conical form. Three mountains rise above these smaller eminences. The highest bears the indelible marks of a volcano. The woods with which it is covered continually attract the clouds, which occasion noneous damps, and contribute to make it horrid and inaccessible; while the two others are in the most parts cultivated. From these mountains issue the many springs that water the island. These waters, which flow in gentle streams, are changed into torrents on the lightest form. Their qualities are derived from the soil over which they flow. In some places they are excellent, in others so bad, that the inhabitants are obliged to drink the water they have collected during the rainy season.

Of all the French settlements in the West Indies, Martinico is the most happily situated with regard to the winds which prevail in those seas. Its harbours possess the inexpressible advantage of affording a certain shelter from the hurricanes which annoy the other latitudes.

The harbour of Fort Royal is one of the best in all the windward islands; and so celebrated for its safety, that when it was open to the Dutch, their shipmasters had orders from the republic to take shelter there in June, July, and August, the three months in which the hurricanes are most frequent. The lands of the Lametin, which are but a league distant, are the richest and most fertile in the whole island. The numerous streams which water this fruitful country, convey loaded canoes to a considerable distance from the sea. The protection of the fortifications secured the peaceable enjoyments of so many advantages; which, however, were balanced by a swampy and unhealthy soil. The capital of Martinico was also the rendezvous of the men of war; which branch of the navy has always oppressed the merchantmen. On this account, Fort Royal was an improper place to become the centre of trade, and was therefore removed to St Peter's. This little town, notwithstanding the fires that have four times reduced it to ashes, still contains 1700 houses. It is situated on the western coast of the island, on a bay or inlet, which is almost circular. One part of it is built on the strand along the sea side, which is called the anchorage, and is the place defined for ships and ware-houses. The other part of the town stands upon a very low hill: it is called the Fort from a small fortification that was built there in 1665, to check the seditions of the inhabitants against the tyranny of monopoly; but it now serves to protect the road from foreign enemies. These two parts of the town are separated by a rivulet.

The anchorage is at the back of a pretty high and steep hill. Shut up as it were by this hill, which intercepts the easterly winds, the most constant and most unfavorable in these parts: exposed without any refreshing breezes to the seething beams of the sun, reflected from the hill, from the sea, and the black sand on the beach; this place is extremely hot, and always unhealthy. Besides, there is no harbour; and the ships which cannot winter safely upon this coast are obliged to take shelter at Fort-Royal. But these disadvantages are compensated by the convenience of the road of St Peter's, for loading and unloading of goods; and by its situation, which is such that ships can freely go in and out at all times, and with all winds.
MARTYR, in heraldry, little birds reprented without feet; and used as a difference or mark of distinction for younger brothers, to put them in mind that they are to trust to the wings of virtue and merit, in order to raise themselves, and not to their feet, they having little land to set their foot on. See HERALDRY. Plate CXXVII. fig. 1. A.

MARTYRIA, in botany: A genus of the angiospermia order, belonging to the dilliwia clafs of plants, and in the natural method ranking under the 20th order, Peronotae. The calyx is quinquefid, the corolla ringent, the capulc aisiote, covered with a bark, with a hooked beak, trilocular, and bifid. There are two species, both of them tender, herbaceous, flowery plants of South America; one of them annual, the other a perennial, rising with erect stalks, from a foot to two feet high, garnished with oblong simple leaves, and terminated by short spikes of large monopetalous, bell-shaped flowers, of bluc and purple colours. They flower in July and August, and are very ornamental, but require always to be kept in the hotchell part of the hove.

MARTYR, is one who lays down his life, or sufferers death, for the sake of his religion. The word is Greek, μαρτυς, properly signifies "a witness." It is applied, by way of eminence, to those who suffer in writhe of the truth of the gospel.

The Christian church has abounded in martyrs, and history is filled with surprising accounts of their singular constancy and fortitude under the cruellest torment human nature was capable of suffering. The primitive Christians were assayed by their enemies, or paying a sort of divine worship to the martyrs. Of this we have an instance in the answer of the church of Smyrna to the suggestion of the Jews who, at the martyrdom of Polycarp, desired the heathen judge not to suffer the Christians to carry off his body, left they should leave their crucified master, and worship him in his stead. To which they answered, "We can neither forake Christ, nor worship any other; for we worship him as the Son of God; but love the martyrs as the disciples and followers of the Lord, for the great affection they have shown to their King and Master." A like answer was given at the martyrdom of Fructuus in Spain. For when the judge asked Eulogius, his deacon, Whether he would not worship Fructuus? as thinking, that thou refused to worship he then idols, he might yet be inclined to worship a Christian martyr; Eulogius replied, "I do not worship Fructuus, but him whom Fructuus worships." The primitive Christians believed, that the martyrs enjoyed very singular privileges, that upon their death they were immediately admitted to the beatific vision, while other fools wete dooms by the complete of their happiness till the day of judgment: and that God would grant chiefly their prayers the hastening of his kingdom, and shortening the times of perfecution.

The churches built over the graves of the martyrs, and called by their names, in order to preserve the memory of their sufferings, were distinguished by the title martyrum confessi, or memoria.

The festivals of the martyrs are of very ancient date in the Christian church, and may be carried back at least till the time of Polycarp, who suffered martyrdom about the year of Christ 169. On these days the Christians met at the graves of the martyrs, and offered prayers and thanksgiving to God for the examples they had afforded them; they celebrated the eucharist, and gave alms to the poor; which, together with a panegyric oration or sermon, and reading the acts of the martyrs, were the spiritual exercises of these anniversaries.

Of the fayings, sufferings, and deaths of the martyrs, though preferred with great care for the above purpose, and to serve as models to future ages, we have but very little left, the greatest part of them having been destroyed during that dreadful persecution which Diocletian carried on for ten years with fresh fury against the Christians; for a most diligent search was then made after all their books and papers; and all of them that were found were committed to the flames. Eusebius, indeed, composed a martyrology, but it never reached down to us; and those since compiled are extremely suspected. From the eighth century downwards, several Greek and Latin writers endeavoured to make up the loss, by compiling, with vast labour, accounts of the lives and actions of the ancient martyrs, but which coilt of little else than a series of fables: Nor are those records that pass under the name of Martyrology worthy of superior credit, since they bear the most evident marks both of ignorance and falsehood.

MARTYR (Peter), a famous divine, born at Florence in 1503. He studied philosophy and the tongues at Padua and Bologna, was a regular Augustine in the monastery of Ficoili, and was counted one of the best preachers in Italy. Zuanglius and Bocer's writings gave him a good opinion of the Protestants, and his conversation with Valdes confirmed it. He preached that doctrine at Rome in private; and, being impeached, fled to Naples, and thence to Lucca, where he brought over to the protestant interest Emanuel Tremelius, Celsus, Martinengas, Paul Lathius, and Jeremiah Zanchy. He was sent for to England by king Edward VI. and made preacher of divinity at Oxford in 1549. In Queen Mary's reign he returned to Strasburg, and was present at the conference of Poitou. His sentiments were not the same with Calvin's about Christ's preference in the eucharist. He wrote a great number of works, and died in 1562.

MARTYROLOGY, a catalogue or list of martyrs, including the history of their lives and sufferings for the sake of religion. The term comes from μαρτυς "witness," and μαρτυρία, or μαρτυρία. The martyrologies draw their materials from the kalendae of particular churches, in which the several festivals dedicated to them are marked, and which seem to be derived from the practice of the ancient Romans, who inferred the names of heroes and great men in their fasti or public registers.

The martyrlogies are very numerous, and contain many ridiculous and even contradictory narratives; which is easily accounted for, we consider how many forged and spurious accounts of the lives of saints and martyrs appeared in the first ages of the church, which the legendary writers afterwards adopted without examining into the truth of them. However, some good critics, of late years, have gone a great way towards clearing;
Charles II. took great delight in his conversation, and tried all means to win him over to his side, but in vain, nothing being ever able to shake his resolution. There were many instances of his firmness in resisting the offers of the court; but he was proof against all temptations. The king having one night entertained him, sent the lord-treasurer Danby the next morning to find out his lodgings, which were then up two pair of stairs in one of the little courts in the Strand. He was busy writing, when the treasurer opened the door abruptly upon him. Surprised at the sight of a unexpected a visitor, Mr Marvell told his Lordship, "That he believed he had mistaken his way." Lord Danby replied, "Not, now I have found Mr Marvell; telling him he came from his Majesty, to know what he could do to serve him. Coming to a serious explanation, he told the lord-treasurer, that he knew the nature of courts full well; that whoever is distinguished by a prince's favour, is certainly expected to vote in his interest. The Lord Danby told him, that his Majesty had only a just sense of his merits, in regard to which he only desired to know, if there was any place at court he could be pleased with. These offers, though urged with the greatest earnestness, had no effect upon him. He told the Lord-treasurer, that he could not accept of them with honour; for he must be either ungrateful to the king in voting against him, or false to his country in giving into the measures of the court. The only favour therefore he had to request, of his Majesty was, that he would esteem him as dutiful a subject as any he had, and more in his proper interest by refusing his offers than if he had embraced them. The Lord Danby finding no arguments could prevail, told him, that the king had ordered a thousand pounds for him which he hoped he would receive till he could think what farther to ask of his Majesty. The last offer was rejected with the same decided spirit of mind as the first; though, as soon as the Lord-treasurer was gone, he was forced to send to a friend to borrow a guinea. He died not without strong suspicions of his being poisoned, in 1678, in the 58th year of his age. In 1688, the town of Kingston upon Hull contributed a sum of money to erect a monument over him in the church of St Giles in the Fields, where he was interred, and an epitaph composed by an able hand; but the ministrality of that church forbid both the interposition and monument to be erected there. He wrote many ingenious pieces, as, The Rehearsal transported; A short historical Essay concerning General Councils, Creeds, and impostitions in matters of religion, &c.; also Poems and Letters. Marvell, of Peru, in botany. See Mikaelis.

MARY, the mother of our Saviour Jesus Christ, and a virgin at the time that she conceived him; daughter of Joachim and of Anna, of the tribe of Judah, and married to Joseph of the same tribe. The Scripture tells us nothing of her parents, not so much as their names, unless Hel. mentioned by St Luke iii. 23, be the same with Joachim. All that is said concerning the birth of Mary and of her parents is only to be found in some apocryphal writings; which, however, are very ancient. Mary was of the royal race of David, as was also her husband: 'A virgin, espoused to a man whose name was Joseph, of the house of David,' says our translation.
by which they came. But the time of Mary’s purification being come, that is 40 days after the birth of Jesus, Mary went to Jerusalem (Luke ii. 21.), there to present her son in the temple, and there to offer the sacrifice appointed by the law for the purification of women after childbirth. There was then at Jerusalem an old man named Simeon, who was full of the Holy Ghost, and who had received a secret assurance that he should not die before he had seen Christ the Lord. He came then into the temple by the influence of the spirit of God, and taking the little Jesus within his arms, he blessed the Lord: and afterwards addressing himself to Mary, he told her, ‘That this child should be for the rising and falling of many in Israel, and for a sign which should be spoken against; even so far as that her own soul should be pierced with a sword, that the secret thoughts in the hearts of many might be discovered.’ Afterwards when Joseph and Mary were preparing to return to their own country of Nazareth (Matt. ii. 13, 14), Joseph was warned in a dream to retire into Egypt with Mary and the child, because Herod had a design to destroy Jesus. Joseph obeys the admonition, and they continued in Egypt till after the death of Herod; upon which he and Mary returned to Nazareth, not daring to go to Bethlehem because it was in the jurisdiction of Archelaus the son and successor of Herod the great. Here the holy family took up their residence, and remained till Jesus began his public ministry. We read of Mary being present at the marriage of Cana in Galilee, with her son Jesus and his disciples (John ii. 1, 2, &c.) On which occasion Jesus having turned water into wine, being the first public miracle that he performed, he went from thence to Capernaum with his mother and his brethren, or his parents and disciples: and this seems to be the place where the holy virgin afterwards chiefly resided. However, St. Ephremius thinks that she followed him everywhere during the whole time of his preaching; though we do not find the evangelists make any mention of her among the holy women that followed him and ministered to his necessities. The virgin Mary was at Jerusalem at the last passover that our Saviour celebrated there; she saw all that was transacted against him, followed him to Calvary, and stood at the foot of his cross with a constancy worthy of the mother of God. There Jesus, seeing his mother, said to the disciple near her, ‘Behold thy mother.’ And from that hour the disciple took her home to his own house. It is not to be doubted, but that our Saviour appeared to his mother immediately after his resurrection; and that she was the first, or at least one of the first, to whom he vouchsafed this great consolation. She was with the apostles at his ascension, and continued with them at Jerusalem, expecting the coming of the Holy Ghost (Acts i. 14.). After this, she dwelt in the house of St. John the Evangelist, who took care of her as of his own mother. It is thought that she took her along with him to Ephesus, where she died in an old age. A few days after, the magi or wise men came from the east, and brought to Jesus the mystic presents of gold, frankincense, and myrrh; after which being warned by an angel that appeared to them in a dream, they returned into their own country by a way different from that
Mary (Magdalen), who has been generally confounded with Mary the sister of Martha and Lazarus, but very improperly, was probably that sinner mentioned by St Luke, chap. vii. 36, 37, &c., whose name he does not tell us. There are some circumstances sufficient to convince us, that the is the name whom he calls Mary Magdalen in chap. viii. 2. and from whom he says Jesus drove out seven devils. Jesus having healed the widow’s son of Nain, entered into the city, and there was invited to eat by a Pharisee named Simon. While he was at table, a woman of a scandalous life came into the house, having an alabaster box full of perfumed oil; and standing upright behind Jesus, and at his feet, for he was lying at table on a couch after the manner of the ancients, she poured her perfume on his feet, kissed them, watered them with her tears, and wiped them with her hair. The Pharisee observing this, said within himself, If this man were a prophet, he would know who this woman is that touches him, that is one of a wicked life. Then Jesus, who knew the bottom of his heart, illustrated her cafe by a parable; and concluded with answering the woman, that her sins were forgiven her. In the following chapter, St Luke tells us, that Jesus, in company with his apostles, preached the gospel from city to city; and that there were several women whom he had delivered from evil spirits, and had cured of their infirmities, among whom was Mary called Magdalen, out of whom went seven devils. This, it must be owned, is no positive proof that the sinner mentioned before was Mary Magdalen; however, it is all we have in support of this opinion: An opinion which has been ably controverted by others. Mary Magdalen had her surname, it is thought, from the town of Magdala in Galilee. Lightfoot believes that this Mary is the same with Mary the sifter of Lazarus. Magdalen is mentioned by the evangelists among the women that followed our Saviour, to minister to him according to the custom of the Jews. St Luke viii. 2. and St Mark xvi. 9. observe, that this woman had been delivered by Jesus Christ from seven devils. This some understand is the literal devil; but others take it figuratively, for the crimes and wicked deeds of her past life (supposing her to be the sinner aforementioned), from which Christ had refused her. Others maintain, that she had always lived in virginity; and consequently they make her a different person from the sinner mentioned by St Luke; and by the seven devils of which she was possessed, they understand no other than a real possession, which is not inconsistent with a holy life. This indeed is the most probable opinion, and that which has been best supported. In particular, the author of a “Letter to Jonas Hanway” on the subject of Magdalen House, published in 1738, has shewn by a variety of learned remarks, and quotations both from the Scriptures and from the best commentators, that Mary Magdalen was not the sinner spoken of by Luke, but on the contrary that she was a woman of distinction, and very easy in her worldly circumstances. For a while, she had laboured under some bodily indisposition, which our Lord miraculously healed, and for which benefit she was ever after very thankful. So far as we know, her conduct was always regular and free from censure; and we may reasonably believe, that after her acquaintance with our Saviour it was edifying and exemplary. I conceive of her (continues our author) as a woman of a fine understanding, and known virtue and discretion, with a dignity of behaviour becoming her age, her wisdom, and her high station; by all which she was a credit to him whom she followed as her master and benefactor. She showed our Lord great respect in his life, at his death, and after it; and she was one of those to whom he first showed himself after his resurrection.”

Mary Magdalen followed Christ in the last journey that he made from Galilee to Jerusalem, and was at the foot of the cross with the holy virgin (John xix. 25. Mark xv. 57). After which she returned to Jerusalem to buy and prepare the perfumes, that she might embalm him after the sabbath was over which was then about to begin. All the sabbath day she remained in the city; and the next day early in the morning she went to the sepulchre along with Mary the mother of James and Salome (Mark xvi. 1, 2. Luke xxiv. 1, 2.). On the way, they inquired of one another, who should take away the stone from the mouth of the sepulchre, and were sensible of a great earthquake. This was the token of our Saviour’s resurrection. Being come to his tomb, they saw two angels, who informed them that Jesus was risen. Upon this Mary Magdalen ran immediately to Jerusalem, and acquaints the apostles with this good news, returning herself to the sepulchre. Peter and John came also, and were witnesses that the body was no longer there. They returned: but Mary stayed, and stooping forward to examine the inside of the tomb, she saw two angels sitting, one at the head and the other at the foot of the tomb; and immediately afterwards, upon turning about, she beheld the Lord himself. She would have called him at his feet to kiss them. But Jesus said to her “Touch me not, for I am not yet ascended to my Father.” As he had said, “You shall have leisure to see me hereafter; go now to my brethren, my apostles, and tell them that I am going to my Father and to my God, to my Father and to their Father.” Peter and John had Mary the happiness of first seeing our Saviour after his resurrection. (See Math. xxviii. 5, &c. Mark xvi. 6, &c. John xx. 11, 17.)

She returned then to Jerusalem, and told the apostles that she had seen the Lord, that she had spoken to him, and told them what he had said to her. But at first they did not believe her, till her report was confirmed by many other testimonies.—This is what the gospel informs us concerning Mary Magdalen, different from Mary the sifter of Martha, though she has been often called by this name. For as to the pretended History of Mary Magdalen, which is said to have been written in Hebrew by Peter the servant of Martha; this can only relate to Mary sifter of Martha, and besides is a mere piece of imposture.

Mary, queen and tyrant of England, was eldest daughter of Henry VIII. by his first wife Catharine of Spain, and born at Greenwich in February 1537. Her mother was very careful of her education, and provided her with tutors to teach her what was fitting. Her first preceptor was the famous Linacre, who drew up for her use The Rudiments of Grammar, and afterwards De amenda structura Latina fere-
Mary, moni libro sex. Linacre dying when she was but six years old, Ludovicus Vives, a very learned man of Valenza in Spain, was her next tutor; and he composed for her De ratione studii puellae. Under the direction of these excellent men, she became so great a mistress of Latin, that Erasmus commends her for her epistles in that language.

Towards the end of her father’s reign, at the earnest solicitation of Queen Catharine Parr, she undertook to translate Erasmus’s Paraphrase on the gospel of St John; but being cast into bonds, as Udall relates, partly by overmuch study in this work, after she had made some progress therein, she left the rest to be done by Dr Mallet her chaplain. This translation is printed in the first volume of Erasmus’s Paraphrase upon the New Testament, London, 1548, folio; and before it is a Preface, written by Udall, the famous master of Eton school, and addressed to the queen dowager (a).

had she been educated in Spain, however, and an inquisitor had been her preceptor, she could not have imbued more strongly the bloody principles of Roman persecution; and to the eternal disgrace of the English presbytery, though the reformation had taken root in both universities, she found English bishops ready to carry her cruel designs to effect, into effectual execution. King Edward her brother dying the 6th of July 1553, she was proclaimed queen the same month, and crowned in October by Stephen Gardiner bishop of Winchester. Upon her accession to the throne, she declared, in her speech to the council, that she would not persecute her Protestant subjects; but in the following month, the prohibited preaching without a special licence; and before the expiration of three months, the Protestant bishops were excluded the house of lords, and all the statutes of Edward VI. respecting the Protestant religion were repealed. In July 1554, she was married to Philip prince of Spain, eldest son of the emperor Charles V.; and now began that persecution against the Protestants for which her reign is so justly infamous. Some have suppos'd, that the queen was herself of a compassionate and humane disposition; and that most of the barbarities were translated by her bishops without her knowledge or privity. Without her knowledge and privity they could not be: it would be a better defence of her to say, that a strict adherence to a false religion, and a conscientious observance of its pernicious and cruel dictates, over ruled and got the better of that goodness of temper which was natural to her. But neither can this plea be reasonably admitted by any one, who considers her unkind and inhuman treatment of her sister the Lady Elizabeth; her admitting a council for the taking up and burning of her father’s body; her most ungrateful and pernicious breach of promise with the Suffolk men; her ungenerous and barbarous treatment of Judge Hales, who had strenuously defended her right of succession to the crown; and of Archbishop Cranmer, who in reality had saved her life. Shall we execute all this by saying, Tantum religios potuit esse aecar malorum? Her obligations to Cranmer deserve to be more particularly fet forth. Burnet says, “that her firm adherence to her mother’s cause and interest, and her backwardness in submitting to the king her father, were thought crimes of such a nature by his majesty, that he came to a resolution to put her openly to death; and that when all others were unwilling to run any risk in saving her, Cranmer alone ventured upon it. In his gentle way he told the king, “that she was young and innocent, and therefore it was no wonder if she obstinately adhered to her sect.”

(a) As this preface contains many reflections which may very much edify the females of this age, we shall for their sakes here transcribe a part to it. Mr Udall takes occasion in it to obverse to her majesty, “The great number of noble women at that time in England, not only given to the study of human sciences and foreign tongues, but also so thoroughly expert in the Holy Scriptures, that they were able to compare with the best writers, as well in enditing and penning of godly and fruitful treatises, to the instruction and edifying of realms in the knowledge of God, as also in translating good books out of Latin or Greek into English, for the use and commodity of such as are rude and ignorant of the said tongues. It was now (he says) no news in England to see young damfels in noble houses, and in the courts of princes, instead of cards and other instruments of idle trifling, to have continually in their hands either psalms, homilies, and other devout meditations, or else Paul’s epistles, or some book of holy scripture matters, and as familiarly both to read or reason thereof in Greek, Latin, French, or Italian, as in English. It was now a common thing to see young virgins so trained in the study of good letters, that they willingly fet all other vain pastimes at nought for learning’s sake. It was now no news at all to see queens and ladies of most high estate and progeny, instead of courty dalliance, to embrace virtuous exercises of reading and writing, and with most earnest study, both early and late, to apply themselves to the acquiring of knowledge, as well in all other liberal arts and disciplines, as also most especially of God and his holy word. And in this behalf (says he), like as to your highness, as well for compassing and setting forth many godly psalms, and divers other contemplative meditations, as also for causing these paraphrases to be translated into our vulgar tongue, England can never be able to render thanks sufficient; so may it never be able, as her deferts require, enough to praise and magnify the most noble, the most virtuous, the most witty, and the most ingenious lady Mary’s grace, for taking such pains and travails in translating this Paraphrase of Erasmus upon the gospel of St John.—What could be a more plain declaration of her most constant purpose to promote God’s word, and the free grace of his gospel! &c. Mr Udall was mistaken; she never meant any such thing: for soon after her accession to the throne, a proclamation was issued for calling in and suppressing this very book, and all others that had the least tendency towards furthering the reformation. And Mr Walpole is of opinion, that the fickness which came upon her while she was translating St John, was all affected; “for (says he) she would not so easily have been cast into fickness, had she been employed on the Legends of St Terefa or St Catharine of Sienna.”
to that which her mother and all about her had been infusing into her for many years; but that it would appear strange, if he should for this cause so far forget the father, as to proceed to extremities with his own child; that if the were separated from her mother and her people, in a little time there might be ground gained on her; but that to take away her life, would raise horror throughout all Europe against him;" by which means he preferred her.

—Along with Archbishops Cranmer, who had thus saved her life, the bishops Ridley and Latimer were also condemned for herefy at Oxford, and afterwards burnt. In 1556, the persecution became victims the queen and Philip, the same peridious violation of promises and treaties 8000 land, procured an offensive and defensive alliance France on account of Spain; yet in who had brought immense sums of money into the assistance fion the queen long, however, been, a this war; and some aifert, that upon this single accidents, such as want of children, and the absence occaiioned her death; but it is better authenticated, this, the queen's and eldest abject's: the loge epijio/arum "ty;" there are several more of her letters, the third, "A prayer to be read at the hour of death." In Fox's "Acts and monuments" are printed eight of her letters to king Edward and the lords of the council, on her nonconformity, and on the imprisonment of her chaplain Dr Mallet. In the Syloge epistolatarum are several more of her letters, extremely curious: one of her delicacy in never having written but to three men; one of affection for her sister; one after the death of Ann Boleyn; and one very remarkable of Cromwell to her. In "Haynes's State Papers," are two in Spanish, to the emperor Char. V.—There is also a French letter, printed by Strype from the Cotton library, in answer to a haughty mandate from Philip, when he had a mind to marry the lady Elizabeth to the duke of Savoy, against the queen's and prince's inclination: it is written in a most objeet manner, and a wretched style.

Mary of Medicis, wife of Henry IV, king of France, was declared sole regent of the kingdom in 1616, during the conformation which the aifiliation of that beloved king had occasioned. By her ambitious in-

trigues, the nation lost all its influence abroad, and was torn to pieces at home by contending factions. After several vicissitudes of fortune, she was abandoned by her son Louis XIII, whose reign had been constantly disturbed by the civil commotions she had occasioned; and died in insidious at Brussels, in 1642, aged 68. She built the superb palace of Luxembourg at Paris, and embellished that city with aqueducts and other ornaments.

Mary queen of Scotland, daughter of James V. was born in the royal palace of Linlithgow on the 8th of December 1542. Her mother was Mary, the eldest daughter of Claude duke of Guife, and widow of Louis duke of Longueville. Her father dying a few days after her birth, the fearfully exiled before she was hailed queen.

The government of a queen was unknown in Scotland; and the government of an infant queen could not command much respect from martial and turbulent nobles, who exerted a kind of sovereignty over their own vassals; who looked upon the most warlike of their monarchs in hardly any other light than as the chief of the aristocracy; and who, upon the slightest disgusts, were ever ready to fly into rebellion, and to carry theirarms to the foot of the throne.—James had not even provided against the disorders of a minority, by committing to proper persons the care of his daughter's education, and the administration of affairs in her name. The former of these objects, however, was not neglected, though the regency of the kingdom was entrusted to very feeble hands. At six years of age Mary was conveyed to France, where she received her education in the court of Henry II. The opening powers of her mind, and her natural dispositions, afforded early hopes of capacity and merit. After being taught to work with her needle and in tapestry, she was instructed in the Latin tongue; and she is said to have understood it with an accuracy, which is in this age very uncommon in persons of her rank, and sex. She was not only instructed in the dress and deportment of a princess, but was taught to work with her needle and in tapestry, and to write with propriety. She walked, danced, and rode with enchanting gracefulness; and she was qualified by nature, as well as by art, to attain to distinction in painting, poetry, and music. To accomplish the woman was not, however, the sole object of her education. Either she was taught, or she very early discovered, the necessity of acquiring such branches of knowledge which might enable her to discharge with dignity and prudence the duties of a sovereign; and much of her time was devoted to the study of history, in which she delighted at the end of her life.

While Mary resided in the court of Henry II, her personal charms made a deep impression on the mind of the Dauphin. It was in vain that the可用 Montmorency opposed their marriage with all his influence. The importance of her kingdom to France, and the power of her uncles the princes of Lorraine, were more than sufficient to counteract his intrigues; and the Dauphin obtained the most beautiful princes of Chirtenford.

Though this alliance placed the queen of Scotland in
in the most conspicuous point of view, in the politest court of Europe, and drew to her those attentions which are in the highest degree pleasing to a female mind in the gaiety of youth; it may yet be considered as having accidentally laid the foundation of the greatest part of her future misfortunes. Elizabeth, who now fwayed the sceptre of England, had been declared illegitimate by an act of parliament: and though the English protestants paid no regard to a declaration which was compelled by the tyrannic violence of Henry VIII. and which he himself had indeed rendered null by calling his daughter to the throne after her brother and elder sister; yet the papists both at home and abroad had objections to the legitimacy of Elizabeth's birth; founded on principles which with them had greater weight than the acts of any human legislature. Elizabeth was unquestionably the next heir in regular succession to the English throne; if Elizabeth should die without legitimate issue; and upon her marriage to the Dauphin, she was induced by the perfusion of her uncles, by the authority of the French king, and no doubt partly by her own ambition, to assume the title and arms of queen of England and Ireland. These, indeed, the forbore as soon as she became her own mistress, but the having at all assimiled them was an offence which Elizabeth could never forgive, and which rankling in her bosom made her many years afterwards pursue the unhappy queen of Scots to the block.

Henry II. dying soon after the marriage of the Dauphin and Mary, they mounted the throne of France. In that elevated station, the queen did not fail to distinguish herself. The weakness of her husband served to exhibit her accomplishments to the greatest advantage; and in a court where gallantry to the sex, and the most profound respect for the person of the sovereign were inseparable from the manners of a gentleman, she learned the first leasons of royalty. But this scene of successful grandeur and unmixed felicity was of short duration. Her husband Francis died unexpectedly, after a short reign of sixteen months. Regret for his death, her own humiliation, the power of her uncle the duke of Alençon, which instantly followed, and the coldness of Catharine of Medicis the queen mother, who governed her son Charles IX. plunged Mary into inexpressible sorrow. She was invited to return to her own kingdom, and she tried to reconcile herself to her fate.

She was now to pass from a situation of elegance and splendour to the very reign of incivility and turbulence, where most of her accomplishments would be utterly lost. Among the Scots of that period, elegance of taste was little known. The generality of them were sunk in ignorance and barbarism; and what they termed religion, dictated to all a petulant rudeness of speech and conduct, to which the queen of France was wholly unaccustomed. During her minority and absence, the Protestant religion had gained a kind of establishment in Scotland; obtained, indeed, by violence, and therefore liable to be overthrown by an act of the sovereign and the three estates in parliament. The queen, too, was unhappily of a different opinion from the great body of her subjects, upon that one topic, which among them actuated almost every heart, and directed almost every tongue. She had been educated in the church of Rome, and was strongly attached to that profession: yet she had either moderation enough in her spirit, or discretion enough in her understanding, not to attempt any innovation in the prevailing faith of protestantism. She allowed her subjects the full and free exercise of their new religion, and only challenged the same indulgence for her own. She contrived to attach to her, whether from his heart or only in appearance, her natural brother, the prior of St Andrew's; a man of strong and vigorous parts, who, though he had taken the usual oath of obedience to the pope, had thrown off his spiritual allegiance, and placed himself at the head of the reformers. By his means she crushed an early and formidable rebellion; and in reward for his services conferred upon him a large estate, and created him Earl of Murray. For two or three years her reign was prosperous, and her administration applauded by all her subjects, except the Protestant preachers; and had the either remained unmarried, or bestowed her affections upon a more worthy object, it is probable that her name would have descended to posterity among those of the most fortunate and most deserving of Scottish monarchs.

But a queen, young, beautiful, and accomplished, an ancient and hereditary kingdom, and the expectation of a mightier inheritance, were objects to excite the love and ambition of the most illustrious personages. Mary, however, who kept her eye steadily fixed on the English succession, rejected every offer of a foreign alliance; and, swayed at first by prudential motives, and afterwards by love the most excessive, gave her hand to Henry Stuart, lord Darnley, the son of the earl of Lenox. This nobleman was, after herself, the nearest heir to the crown of England; he was likewise the first in succession after the earl of Arran to the crown of Scotland; and it is known that James V. had intended to introduce into his kingdom the Salique law, and to settle the crown upon Lenox in preference to his own daughter. These considerations made Mary licentious for an interview with Darnley; and at that interview love stole into her heart, and effaced every favourable thought of all her other suitors. Nature had indeed been lavish to him of her kindness. He was tall of stature; his countenance and shapes were beautiful and regular; and, amidst the masks and dancing with which his arrival was celebrated, he shone with uncommon lustre. But the bounty of nature extended not to his mind. His understanding was narrow; his ambition excessive; his obstinacy inflexible; and under the guidance of no fixed principle, he was unaffected and capricious. He knew neither how to enjoy his prosperity nor how to endure it.

On the 29th of July 1565, this ill-fated pair were married; and though the queen gave her husband every possible evidence of the most extravagant love; though she infringed the principles of the constitution to confer upon him the title of king; and though she was willing to share with him all the offices, honours, and dignities of royalty—he was not satisfied with his lot, but soon began to clamour for more power. He had not been married even months, when he entered into a conspiracy to deprive Mary of the government, and to set himself on her throne. With this view he
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Mary

headed a band of ruffians, who entered her chamber at night; and though she was then advanced in her pregnancy, murdered her secretary in her presence, whilst one of the ruffians held a cocked pistol to her breast. Such an outrage, together with his infidelity and frequent amours, could not fail to alienate the affections of a high spirited woman, and to open her eyes to those defects in his character which the ardor of love had hitherto prevented her from seeing. She fighed and wept over the precipitation of her marriage; but though it was no longer possible to love him, she still treated him with attention and respect, and laboured to fashion him to the honour of her people.

This was labour in vain. His prepossessing vanity and aspiring pride routed the resentment and the scorn of the nobles: his follies and want of dignity made him little with the people. He deserted the queen for a woman, from his talents and his followers, regarded: and aspiring pride roused the resentment and the loaf of the people. He deserted the queen for a woman, from his talents and his followers, regarded: and aspiring pride roused the resentment and the loaf of the people. He deserted the queen for a woman, from his talents and his followers, regarded: and aspiring pride roused the resentment and the loaf of the people. He deserted the queen for a woman, from his talents and his followers, regarded: and aspiring pride roused the resentment and the loaf of the people. He deserted the queen for a woman, from his talents and his followers, regarded: and aspiring pride roused the resentment and the loaf of the people. 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as much honour, service, and obedience, as ever in any former period was paid by the nobility to the princes her predecessors, the unhappy queen delivered herself into the hands of her rebels, and perjured her husband to fly from the danger which her apprehension threatened his life. These promises were instantly violated. The faithful nobles, after insulting their sovereign in the cruelest manner, hurried her as a prisoner to a castle within a lake, where she was committed to the care of that very woman who was the mother of her bastard brother; who, with the natural infallibility of a whore's meanness, says Mr Whitaker, affected the legitimacy of her own child and the illegitimacy of Mary; and who actually carried the natural vulgarity of a whore's impudence so far, as to strip her of all her royal ornaments, and to dres her like a mere child of fortune in a coarse brown calico.

In this distress the queen's fortitude and presence of mind did not forsake her; she contrived to make her escape from her prison, and soon found herself at the head of 6000 combatants. This army, however, was defeated; and, in opposition to the advice and interests of all her friends, she hastily formed the resolution of taking refuge in England. The archbishop of St Andrew's in particular accompanied her to the border; and when she was about to quit her own kingdom, he laid hold on her horse's bridle, and on his knees conjured her to return; but Mary proceeded, with the utmost reliance on the friendship of Elizabeth, which had been offered to her when she was a prisoner, and of the sincerity of which the harboured not a doubt.

That princess, however, who had not yet forgotten her assumption of the title and arms of queen of England, was now taught to dread her talents and to be envious of her charms. She therefore, under various pretences, and in violation not only of public faith, but even of the common rights of hospitality, kept her a close prisoner for 19 years; encouraged her rebellious subjects to accuse her publicly of the murder of her husband; allowed her no opportunity of vindicating her honour: and even employed venal scribblers to blast her fame. Under this unparalleled load of complicated diftrusts, Mary preferred the magnanimity of a queen, and practiced with sincerity the duties of a Christian. Her sufferings, her dignified affability, and her gentleness of disposition, gained her great popularity in England, especially among the Roman catholics; and as she made many attempts to procure her liberty, and carried on a constant correspondence with foreign powers, Elizabeth became at last so much afraid of her intrigues, that she determined to cut her off, at whatever hazard. With this view she prevailed upon her sordid parliament to pass an act which might make Mary answerable for the crimes of all who should call themselves her partisans; and upon that flagitious statute she was tried as a traitor concerned in the conspiracy of Babington (see Scotland). Though the trial was conducted in a manner which would have been illegal even if she had been a subject of England, and though no certain proof appeared of her connection with the conspirators, she was, to the amazement of Europe, condemned to suffer death.

The fair heroine received her sentence with great composure; saying to those by whom it was announced, "The news you bring cannot but be most welcome, since they announce the termination of my sufferings. Nor do I account that soul be deserving of the felicities of immortality which can shrink under the sufferings of the body, or temper the stroke that fets it free." On the evening before her execution, for which, on the succeeding morn, she prepared herself with religious solemnity and perfect resignation, she ordered all her servants to appear before her. She even condescended to beg their pardon for her omissions or neglects; and recommended them to them to the care of that very woman who was the mother of her bastard brother. She was conducted to the scaffold, under the superintency of the earl of Peterborough. Twenty years afterwards her bones were by order of her son and only child, King James I., removed to Westminster, and deposited in their proper place among the kings of England.

The general character of Mary, which in the regular order of biography should now be laid before the reader, has furnished matter of controversy for 200 years. She is universally allowed to have had considerable talents, and a mind highly cultivated. By one party she is painted with more virtues and with fewer defects than almost any other woman of the age in which she lived. By another she is represented as guilty of the grossest crimes which a woman can commit—adultery and the murder of her husband. By all it is confessed, that previous to her connection with the earl of Bothwell, her life as a Christian was exemplary, and her administration as a queen equitable and mild; and it has never been denied that the base and tedious sufferings with such resignation and fortitude as are seldom found united with conscious guilt. These are strong presumptions of her innocence. The moral characters of men change by degrees; and it seems hardly consistent with the known principles of human nature, that any person should at once plunge deliberately from the summit of virtue to the depths of vice; or, when firked low, should by one effort recover his original state of elevation. But in this controversy presumptions must go for nothing. The positive evidences which were brought against the queen of Scots are so conclusive, that if they be genuine she must have been guilty; and if they be spurious, there can be no doubt of her innocence. They consisted of a box with letters, contracts, and sonnets, said to be written by herself and sent to the earl of Bothwell. In addition to these, the suppoled confessions of the criminals who had suffered for the king's murder were originally urged as proofs of her guilt; but these confessions are now admitted by all parties to be either wholly forged, or so grossly interpolated that no fires whatever can be laid upon them; and during Mary's life it was affirmed.
Mary, firmly by her friends, and not sufficiently contradicted by her enemies, that the persons who had accused Bothwell, and were doubles of his accomplices, instead of criminating the queen, had openly protested her innocence in their dying moments.

The box then, with its contents, was the evidence upon which her accusers had the chief and indeed the only reliance: and it is upon this evidence, whatever it be, that the guilt or innocence of the Scottish princes must finally be determined. It is uniformly affirmed upon the part of the earl of Murray and his faction, that the casket with the letters and theonnets had been left by Bothwell in the castle of Edinburgh; that this nobleman, before he fled from Scotland, sent a messenger to recover them; and that they were found in the possession of this person. The 20th day of June 1567 is fixed as the date of this remarkable discovery. The governor of the castle at that time was Sir James Balfour. George Dalglish, a servant of Bothwell's is named as his messenger upon this errand. He was seized, it is said, by the domestics of the earl of Morton: and it was the earl of Morton himself who made the actual production of the casket and its contents.

This story is unsupported by vouchers, contains improbabilities, and cannot be reconciled with history and events. There remains not any authentic or unanswerable evidence that the queen had disdained the bed of Lord Darnley: and there is the most satisfactory evidence, that, though Bothwell was entrapped with the defence of the borders on account of his tried courage and loyalty, he was privately dislik'd by Mary for his uncommon zeal in the cause of Protestantism. At the very time when the queen is said to have had the most violent love for that nobleman, and with him to have been carrying on the most criminal intercourse against her husband, we know both from Randolph and from Knox, that Bothwell refused to gratify her by the smallest compliance with the ceremonies of her religion, though many of the other Protestant peers scrupled not to accompany her to the celebration of the mass. That the villain who could deliberately commit murder, should be so ferapulous conficientious with respect to modes of faith and worship, as to stand forward with a peculiar strain of bravery to oppose, in a favourite measure, the queen who was then admitting him to her bed, and actually forming plans for raising him to her throne, is surely, to say the least of it, extremely improbable.

But let us suppose this non-compliance on the part of Bothwell to have been a mere fearearted concert between the queen and him to conceal more effectually from the eyes of the public the criminal intercourse in which they were engaged; is it not very suprising, that of such politicians, one should have written those letters, and the other have left them in the power of their enemies? The earl of Bothwell was exposed, to more than suspicions of a concern in the murder of the king. These papers contained manifest proofs of his guilt. It evidently was not his interest to preserve them: or admitting, that till his marriage was solemnized with the queen he might look upon them as his best security for the realising of his ambitious hopes, yet, after the event, when all his former friends had deserted him, he must have felt the strongest inducements to destroy such a criminal correspondence, and Mary must have been ardently animated with the same wish. The castle of Edinburgh, where the box is said to have been lodged, was at this time entirely at their command; and Sir James Balfour their deputy, was the creature of Bothwell. If his enemies, who were now in arms against him, should profess themselves of this box and its contents, his destruction was inevitable. From his marriage till the 5th day of June, it was in his power to have destroyed the fatal papers; and if they had existed, it is not to be imagined that he would have neglected a step so expedient, not only for his own security and reputation, but also for those of the queen. During all this time, however, he made no effort to recover his box and letters: he had lodged them in the castle of Edinburgh; and there he chose to leave them in the custody of a man in whom he could not have one particle of affiance. This was excessively foolish; but his subsequent conduct was still more so. Upon the 6th day of June, it is evident that he had reason to suspect the fidelity of Sir James Balfour, since he avoided to take refuge in the castle of Edinburgh and fled to Dunbar. He returned, however, with an army in order to fight the rebels. The balance of power might then seem to have suspended between himself and his enemies; and in that state of things, a man of such commodious principles as Balfour appears to have been, might be inclined to do his old friend and patron a secret service, both to efface his former perfidy and to create himself a new interest with him in case he should be victorious over the rebels. Yet in these critical moments Bothwell neglected to make any application to him for the casket and the letters! On the 15th of June, all his towering imaginations were at once dashed to the ground. He had come to Carberry-hill, followed by an army and accompanied by a queen; but he fled from it attended only by a single servant, and was glad to shelter himself in the castle of Dunbar from the vengeance due to his crimes. Yet in this extremity of distress he is represented as trying a bold experiment, which he had not courage to try when he was fortified with the authority of his sovereign, and when he was facing the rebels in the field. In the very hour when almost every friend had deserted him, he expected a return of friendship from a man who had deserted him at first only because he suspected him to be in danger. At this period he sent his servant George Dalglish to wait upon Balfour, the acting governor of the castle of Edinburgh, with a requisition for the box of letters, and to bring back the important charge, through ten thousand dangers, to Dunbar. Though this man was one of his agents in the murder of the king, and might therefore have been safely entrusted with any secret, he did not order him, as common sense requires he should have done, to destroy the letters as soon as he should get them into his possession. No! he sent him to fetch them from the castle, as if there was no danger in going thither, no doubt of receiving them there, and no difficulty in carrying them back. To a traveller in an easy chair, all roads are smooth, and all days are fine. Accordingly this same Dalglish, though he knew that Bothwell had so long a good his entrance at the gates of the city, though these were guarded by 450 harquebusiers all hostile to his...
Mary, his master, finds his way to the castle, and delivers his message. But what is more astonishing than all, he actually receives the box of letters from Sir James Balfour. This indeed, says Mr. Whitaker, is a day going it against the advice of Herod. But what was the double flaw of self-love and love? He had with infinite perniciousness turned against his friend, his patron, and his queen, only because he saw them opposed by a party which he thought would prove too strong for them; but now when they were both plunged into the lowest state of distress, and branded with the appellation of regicides, his selfishness was suddenly changed into generosity; his meanest gave place to exalted sentiments, and, at the peril of his own life, he performed an heroic act of kindness! In such circumstances (asks a contemporary writer), is it to be thought, either that the earl would send to the said Sir James, or that the said Sir James would send anything to the earl? Is it likely? Is it credible?

No matter: Bothwell is made to send for his papers at a time when his difficulties and his despair render it improbable that he could think of them, and when it was absolutely impossible that he could recover them. His messenger accordingly is intercepted with the casket; and the adversaries of the queen, upon the 20th day of June, became possessors of vouchers with which they might operate her destruction. These inconstancies are glaring, and of a force not easily to be controverted; and the story is open to other objections, which are, if possible, greater; and altogether infirmountable.

By comparing different proclamations of the rebels with the several dispatches of Throgmorton, who was then Elizabeth's resident in Scotland, Mr. Whitaker has made it appear in the highest degree probable, that Dalgleish was not seized till the 17th of July; that he was then, in consequence of an order issued by the court of secession, apprehended, together with Powrie, another of Bothwell's servants, in that nobleman's lodgings in the palace of Holyroodhouse; and that therefore he could not be the bearer of the letters intercepted by the earl of Morton on the 20th of June. What adds greatly to this probability is the account which the rebels themselves give of his examination. A few days after he was taken, he was examined, say they, judicially, in a council where the earls of Morton and Athol are marked as present. It was natural upon this occasion to make inquiries about the casket and the papers. No questions, however, were put to him on that subject. He was not confronted with Sir James Balfour, from whom he had received the casket; nor with the domestics of the earl of Morton, by whom it was said that he had been apprehended. He was kept in prison many months after this examination; and during that period when the rebels were infinitely pressed to apologize for their violence against the queen, there were opportunities without number of bringing him to a confession. These opportunities, however, were avoided; and there exists not the slightest evidence that the casket and the papers had ever been in his possession. Is it then to be supposed, that if the casket and the papers had really been discovered with him, the establishment of a fact so important would have been neglected by the adversaries of the queen? No! they would have established it by the most complete evidence; which they were far from attempting to do, that the earliest account which they give of their pretended seizure of the letters is dated fifteen days after the event itself, and nearly six months after the death of the queen.
tremeties towards her, and (as Throgmorton continues) to threaten the great plague of God against the whole country and nation if she should be spared from her con dignum punishment; but they ventured not to excite the fury of these ghostly fathers by exhibiting to them the box and the letters. They compelled the queen to subscribe a resignation of her crown; and then had the strongest reason to be solicitous to justify this daring transgression. The box and the letters would have served as a complete vindication of them: yet they neglected to take any notice of these important vouchers; and were contented with resting on the wild and frivolous pretence that the queen, from sickness and fatigue, was disgusted with the care of her kingdom.

To the irrefragable proof of the forgery of the letters arising from their having been so long concealed, it has been replied, that the rebels could not produce them sooner with any regard to their own safety. † A considerable number of their fellow-subjects, headed by some of the most powerful noblemen in the kingdom, was combined against them. This combination they could not hope to break or to vanquish without aid either from France or England. In the former, by the powerful duke of Guise and the cardinal of Lorraine, were at that period all-powerful, and the king himself was devotedly attached to her. The loading the queen, therefore, with the imputation of being accessory to the murder of her husband, would be deemed such an inexplicable crime by the court or France, as must cut off every hope of countenance or aid from that quarter. From England, with which the principal confederates had been long and intimately connected, they had many reasons to expect more effectual support; but to their astonishment, Elizabeth condemned their proceedings with severity. Her high notions of royal authority, and of the sublimity due to subjects, induced her on this occasion to act herself in behalf of Mary, not only with sincerity but with zeal: she solicited, she solicited, she threatened. From all these circumstances the confederates had every reason to apprehend that Mary would soon obtain her liberty, and by some accommodation be restored to the whole, or at least to a considerable portion, of her authority as sovereign; and therefore they were afraid of the consequences of acceding her publicly to crimes so atrocious as adultery and murder.

This apology for the rebels consists of assertions for which there is no evidence, and of arguments which are wholly unanswerable. There is no evidence that Elizabeth exerted herself in behalf of Mary with sincerity and with zeal. If she had, she would have done more than threaten. An English army of 5000 men, aided by the Scottifh combination which continued faithful to the queen, would have overthrown the rebel government in the space of a month. It is inconceivable that the rebels were prevented by any apprehension of the queen's restitution from acceding to her of the crimes of murder and adultery; for we learn from a dispatch of Throgmorton's dated the 15th of July 1567, that "men of good regard did then boldly and overtly by their speach, utter great things and extremity against their sovereign; for they say, it shall not be in the power of any without the reality, neither without, to keep her from con dignum punishment for her notorious crimes." From another dispatch of the same ambassador's, dated five days after the former, we learn, that through him they did accuse her to Elizabeth of "inconstancy, as well with the earl of Bothwell as with others, and likewise of the murder of her husband, of which, they laid, they had as apparent proof against her as might be; as well by the testimony of her own hand-writing, which they had recovered; as also by sufficient witnesses." This testimony, however, was not produced till more than four months afterwards; a certain proof, that though it was now in the hands of the manufacturers, it was not yet ready for inspection.

But let us take the facts of this ablest antagonist of Mary as he had stated them, and consider the argument which they are made to support. It is apparent from the last quoted dispatch of Throgmorton †, that it could not be unknown, either to the court of France or the court of England, that the rebels were at all events determined to crown the prince, and either to put the queen to death or to keep her a close prisoner for life. These desperate enterprises, however, could not, it seems, be carried into effect without the countenance and aid of Elizabeth or Charles: but Elizabeth's notions of royal authority, and of the sublimity due by subjects, were high; and the French king was devotedly attached to the deposed queen. If this was so, common sense says, that the business of the confederates, since they expected aid from these princes, was to charge Mary at once with the murder and adultery, and support the charge with the most convincing evidence which they had to produce. No! says this apologists of theirs, Charles IX. would have considered such conduct as a crime inexpiable, though he might reasonably be expected to give them its countenance in putting to death, or keeping in perpetual prison, for a comparatively venial offence, the queen to whom he was devotedly attached! This is strange reasoning; but it seems not to have occurred to the rebels themselves. The letters made their first appearance in a secret council assembled by the earl of Murray on the 4th of December 1567; and the reason there assigned by the confederates for their unwillingness to produce them was, "That lest they be made to her person, what sometime was there sovereign, and for the reverence of his majesty, wrais the like is, as also the many gifts and excellent and valuable goods with God sometimes indowith her." And they proceed to say, that they would not have produced them at all, "if others were in the sence of their intentions and proceedings from the beginning been known to the natives and the inhabitants of this land (of whom many yet remains in suspece in judgment) to be the reformer of the rightness of their quarrel, and the security of them and their posterity be any other mean might be provided and established." So far were they from dreaming that the production of the letters would injure the cause in the court of France, that we see they frankly acknowledged that the sincerice and reduct of their proceedings could not otherwise be manifested to foreign nations. In this instance they think and talk like reasonable men; but they do not long preserve the same faculty in this act of council the rebels discover the greatest anxiety for their pardon and security: And, the
matter being large and with good deliberation
written. This is astonishing; and shows the extreme
difficulty of carrying to any length a consistent series
of falsehoods. Even Murray, Morton, and Lething-
town, could not do it. They knocked down none nine-
pin in endeavouring to let up another; and they fin-
ally threw down all, making them mutually and suc-
cessively to strike one another.

We have not yet done with this act of council. It
was with a view to the approaching convention of
the estates that it had been formed and managed. It
was a preparation for the parliament in which the conspira-
ators had secured the fullest sway, and where they pro-
posed to effectuate their pardon and security, and to
establish the letters as decisive vouchers against the
queen. Accordingly, upon the 15th day of December
1567, the three estates were assembled. The conspira-
ators invited no candid or regular investigation. The
friends of the nation and of the queen were overawed.
Every thing proceeded in conformity to the act of
council. The conspirators, by a parliamentary decree,
received a full approbation of all the severities which
they had exercised against the queen. A pardon by
anticipation was even accorded to them for any future
crime they might be induced to inflict upon her.

The letters were mentioned as the cause of this singu-
lar law; and this new appeal to them may be termed
the second mark of their distinction. But, amidst the
plenteous of their power, the conspirators called not
the estates to a free and honest examination of them.
This, indeed, had the letters been genuine, would
have annihilated for ever all the consequence of the
queen. Upon this measure, however, they ventured
not. The letters were merely produced in parliament,
and an act founded on them; but the queen was not
brought from her confinement to defend herself, nor
was any advocate permitted to speak for her. We learn
from a paper of unquestionable authenticity, that See Whi-
"Gardie nobility that was her Grace's favouris then the
present, but with all (the rebel proceedings in this
parliament), maid principle for forfeiture of his Grace's
lyfe, quillik, or thair coming to parliament, was con-
cluid and subverifyt be ane great part of thir takers,
to be taken fra hir in meil crewel manner, as is no-
tourlie known." By the power of this magic, the
friends of Mary were bound fast. They durft not
venture to question publicly the authenticity of the
letters from their dread of exposing the queen to the
dagger of the affair. The parliament, therefore,
furnished these forgeries as vouchers of her guilt,
without scrutiny or debate of any kind. The conspira-
ators, who were themselves the criminals, were her
acquaint and her judges, and passed a law exactly in
the terms in which the act of secret council had be-
fore drawn it up.

It was necessary to describe both the letters in the
act of council and in the ordinance of parliament;
and these deeds having fortunately defended to po-
teity, it is apparent from a comparison of them, that
between the 4th and 15th days of December, the
letters must have undergone very essential alterations
under the management of the conspirators. In the
act of council the letters are described expressly as
written and deliveirt with the queen's assent, but
in the act of parliament they are said to be only
"written belittle with her awin hand," and there is no
intimation
intimation that they were *subscribed* by her. Whence arises this difference? From a blunder in the clerk penning the act of council, says one: From a habit contracted by the same clerk, which made him mechanically *add subscribed to written*, says another: From the carelessness of the writer who transcribed the copy of the act of council which has descended to us, says a third. These subterfuges have been exposed in all their weaknesses by Meffrs Tyler and Whitaker: but in this abstrait it is sufficient to observe, that they are mere suppositions supported by no evidence; and that the copy of the act of council which we have been given to the ministers of Elizabeth by the leaders of the faction, who were neither blundering clerks, nor under the habit of mechanically adding *subscribed* to *written*. Under one form, therefore, the letters were certainly exhibited before the council, and under another form they were produced in parliament: but had they been genuine, they would have appeared uniformly with the same face. The clerk of the council was Alexander Hay, a notary public accustomed to draw up writings and to attest them; and what puts his accuracy with respect to the letters beyond all possibility of doubt, his description of them is authenticated in the fullest manner by the signatures of Murray, Morton, and a long train of others who formed the secret council. The letters, therefore, were actually prefixed to the secret council with the customary appendage of subscription to them. But when these artifices of fraud came to reflect more closely on the approach of the public, and to prepare their letters for the inspection of the friends of Mary, they began to shrink at the thoughts of what they had done. To subornate the charge by letters under her own hand, they had naturally annexed her own subscription, a letter *unsubscribed* being a solemn in evidence. But most unfortunately for the cause of complete forgery, Mary was still in possession of her own *feal*, and he who fabricated the letters was not an engraver. For this reason, *the allegit writings in form of millive letters or ciphers,* says the bishop of Rofs, in an address to Elizabeth, *are not feals nor fignetis.* They were neither attested by her subscription at the bottom, nor secured by her seal on the outside. In the secret council, where all were equally embarked in rebellion, these omissions were of no importance. But that letters containing intimations of adultery and of murder, should be sent by the queen to the earl of Bothwell, with her subscription to them, and yet without any guard of a seal upon them, so far exceeds all the bounds of credibility, that they could not expect it to gain the belief of parliament. They were strick with the absurdity of their plan, and dreaded a detection. They were under the necessity of altering it; but they could not supply the defect of the seal. They, therefore, wrote over the letters anew, and withheld the subscription.

These letters were now as complete as the conspirators wished them; yet in this state, while they were *unsubscribed* and unsealed, they wanted other formsilities which are usual in dispatches. They were without directions, and they had no dates. They must, therefore, have been sent by the queen to Bothwell as *open and loose papers*; yet they contained evidence against herself, and against him, of the most horrid wickedness; and Nicholas Hubert, the person who is said to have carried most of them, was of the lowest condition, and, as Dr Robertson characterizes him, *a foolish talkative fellow.* He would, therefore, surely read these papers, which are polluted from end to end with open and uncovered adultery, and as surely report their contents to others. These are the most incredible circumstances, on the supposition that the letters are authentic, unless the queen was, what none of her enemies ever represented her, an absolute idiot.

The letters in their composition bore no resemblance to the other writings of the queen. They have a vulgarity, an indelicacy, and a coarseness of expression and manner, that by no means apply to her. They breathe nothing of the passion of love besides the impuluses of the sensual appetite; and they represent a queen highly accomplished in love with one of her subjects, as acting with all the sneaking humility of a contemplator to a peer. A few instances will show this. *Whitaker* "The devil finder us," she is made to exclaim, "and God knit us togidder for ever for the maif faithful coupli that ever he uniti: this is my fchal: I will die in it." "I am," the says in another place, "varry glad to wryte unto zow quhen the refi are fleipand; I cannot fleip as they do, and at I wold desyre, that is, in your arms, my dear lufe." *Seeing to obey zow, my dear lufe, I fpare nother hour, confience, hafard, nor greautnes quafianwer; tak it, I pray you, in gade part, as from the maif faithful luifer that ever ze bad, or ever fall have." "Se not hir (his wife), quhais fezente teires fold not be fa mickle prudet nor efemtit as the trew and faithful trevells quhilk I fultine for to merite her plaice." "God give zou, my only lufe, the hap and prosperite quhilk your humble and faithfull lufe desyre unto zou, who hopis to be fierbly another thing to you for the reward of my irk some travelles." "When I will put you out of dount, and cler myselfe, refuse it not, my dear lufe; and suffer me to make zon some prue be my obedience, my faithfulness, confiance, and voluntary subjection, quhilk I tak for the piefand gade that I might refleff, gif ze will accept it." "Sae hir (says Mr Whitaker) was the caire birtles, and the homely neckatie, in which thef wretched repreffers of Mary dreed themfelves up, for the exhibition of a queen dignified, refined, and elegant; a queen whom, according to their own account, 'God had indowit with mony gude and excellent gifts and virtues'!"

The evidence which points to the forgery of the letters is profuse and instructive. In its separate parts, it is powerful and satisfactory. When taken together, and in the union of its parts, it is invincible. But, amid all its cogency and strength, there is a circumstance most peculiarly in its favour, and of which it required no aid or allusion. By this peculiarity, it is casted completely in steel, and armed at every point. The letters have come down to us in the French, the Scottifh, and the Latin languages. Now the conspirators affirmed, that they were written by the queen in the French language. But by a critical examination of them in these different languages, Mr Goodall demonstrated, that the pretended French originals are a translation from the Latin of Buchanan, which
which is itself a version from the Scotch. This is indeed acknowledged by Dr Robertson, the ablest and most perverting of all Mary's enemies, who pretends, that, so far as he knows, it never was denied. Determined, however, to support the authenticity of the letters at all events, the same elegant and ingenious writer supposes, that the French originals are now lost, but that two or three sentences of each of those originals were retained, and prefixed to the Scotch translation; and that the French editor observing this, foolishly concluded that the letters had been written partly in French and partly in Scotch. In support of this singular hypothesis, he proceeds to affirm, that "if we carefully consider these few French sentences of each letter which still remain, and apply to them that species of criticism by which Mr Goodall examined the whole, a clear proof will arise, that there was a French copy, not translated from the Latin, but which was itself the original from which both the Latin and Scotch had been translated." He accordingly applies this species of criticism, points out a few variations of meaning between what he calls the remaining sentences of the original French and the present Latin; and thinks, that in the former he has discovered spirit and elegance which neither the Latin, nor the Scotch have retained. His critical observations have been examined by Mr Whitaker; who makes it apparent that he was misled by the notion of our transcribing the observations of the two editors, as he has thought "if we consider carefully few French sentences of each letter which still remain, and apply to them that species of criticism by which Mr Goodall examined the whole, a clear proof will arise, that there was a French copy, not translated from the Latin, but which was itself the original from which both the Latin and Scotch had been translated." He accordingly applies this species of criticism, points out a few variations of meaning between what he calls the remaining sentences of the original French and the present Latin; and thinks, that in the former he has discovered spirit and elegance which neither the Latin, nor the Scotch have retained. His critical observations have been examined by Mr Whitaker; who makes it apparent that he was misled by the notion of our transcribing the observations of the two editors, as he has thought "if we consider carefully few French sentences of each letter which still remain, and apply to them that species of criticism by which Mr Goodall examined the whole, a clear proof will arise, that there was a French copy, not translated from the Latin, but which was itself the original from which both the Latin and Scotch had been translated."

Indeed, a daring zealot of rebellion; but, with all his audacity, he hath been called the talk in which he was engaged a very ungracious one. When he set down to debase, in the eyes of all Europe, a queen to whom he owed not only allegiance but also personal gratitude, it is not conceivable that he could have translated from a Scotch translation, had he known any thing of a French original; and if the rebel commissioners, who were paid to produce him, knew nothing of such originals, certainly nobody else ever did: if they existed not with Buchanan, they existed no where.

Dr Robertson, however, has another argument against Mr Goodall, which he thinks conclusive. Of the eight letters "the five remaining (he says) never appeared in Latin; nor is there any proof of their ever being translated into that language. Four of them, however, are published in French. This entirely overturns our author's hypothesis concerning the necessity of a translation into Latin."

"An authentic fact will indeed overturn any hypothesis; but, most un luckily for this argument, the Doctor advances the hypothesis, and the fact refts with Mr Goodall. It is indeed true that Buchanan published only the three first letters in Latin at the end of his detection; but it does not therefore follow, that the other five were never translated into that language. Indeed Mr Whitaker has made it as apparent as any thing can be, that the whole eight were turned into Latin for the use of the French translator, who, by his own account, understood not the Scotch. He has made it in the highest degree probable, that this translator was one Canus, a French refugee; and he has demonstrated, that the translation was made in London under the eye of Buchanan himself. We do not quote his arguments, because they confit of a great number of observations which cannot be abridged; and because the translator himself confesses every thing which is of importance to the cause maintained by Mr Goodall, "Au refle (he tells us) eplutas miles far la fin," which were all but the eighth, "avaient ete ecrites par la Royne, partie en Francois, partie en Ecossois; et depuis traduques entierement en Latin: mais n'ayant cognissance, de la langue Ecossoise, j'ay mieux aimle exprimer tout ce, que j'ay trouvé en Latin, que," &c. "This confession (says Mr Whitaker) takes a comprehensive sweep. It makes all the seven letters at least, and the whole of each, to have been translated into Latin, and from thence to have been rendered into French. It flirts no piddling objections about sentences or half-sentences, at the head or at the tail of any. It embraces all within its widespread arms. And it proves the fancied existence of a French copy at the time to be all a fairy vision; the creation of minds that have subjected their judgments to their imaginations; the invited dreams of self-delusion."

The letters, so weak on every side, and so incapable of sustaining any scrutiny, give: the marks of suspicion and guilt in all the stages of their progress. Even with the parliamentary function afforded to them by the three estates, which the earl of Murray assembled upon the 15th day of December 1567, he felt the delicacy..."
MAR [ 614.]

Mary. to delicacy and the danger of employing them openly to the purposes for which they were invented. For while he was scheming with Elizabeth his accusation of the queen of Scots, he took the precaution to shun it privately to the letters to that princess by the agency of his secretary Mr Wood. The object of this secret transaction, which took place early in the month of June 1568, was the most flagitious, and preferable only against the integrity of Murray, but also against that of the English queen. Before he would advance with his charge, he solicited from her an assurance that the judges to be appointed in the trial of Mary would hold the letters to be true and probative.

By the encouragement of Elizabeth, the earl of Murray was prevailed upon to prefer his accusation. He was soon to depart for England upon this business. A privy-council was held by him at Edinburgh. He took up in it with formality the letters of the queen from the earl of Morton, and gave a receipt for them to that nobleman. That receipt is remarkable and interesting. It is dated upon the 16th day of September 1568, and contains the first mention that appears in history of the discovery of the letters as in the actual possession of Dalgleish upon the 20th of June 1567. This, as we have already noticed, is a very suspicious circumstance; but it is not the only suspicious circumstance which is recorded in the receipt. In the act of receipt, which, as the earl of Morton was on the ordination of parliament, in December 1567, when the earl of Murray and his associates were infinitely anxious to establish the criminality of the queen, the only vouchers of her guilt to which they appealed were the letters; and at that time, doublets, they had prepared no other papers to which they could allude. But in Murray's receipt in September 1568, there is mention of other vouchers beside the letters. He acknowledges, that he also received from the earl of Morton contracts or obligations, and sonnets or love-verses. These remarkable papers, though said to have been found upon the 20th of June 1567, appeared not till September 1568; and this difficulty is yet to be solved by those who conceive them to be genuine. The general arguments which affect the authenticity of the letters apply to them in full force; only it must be observed, that as the original letters were undoubtedly in Scotch, the original sonnets were as certainly written in French. This has been completely proved by Dr Robertson, and is fully admitted by Mr Whitaker, who has made it in the highest degree probable that Lethington forged the letters and Buchanan the sonnets. Be this as it may, the sonnets have every external and internal evidence of forgery in common with the letters, and they have some marks of this kind peculiar to themselves. In particular, they make the love of Mary still more grovelling than the letters made it; and with a degree of mean ness, of which the soul of Lethington was probably incapable, the author of the sonnets has made the queen consider it as 'na lythill honor to be maistair of her subject's guid!' In this the dignified prince is totally lost in 'the maid Marien!' of her pretended imitators; and Buchanan, who in his commerce with the sex was a mere sensualist, forgot on this occasion that he was perforating a lady and a queen.

There is, however, in these sonnets, one passage of singular importance, which we must not pass wholly unnoticed. The queen is made to say,

'I love you as I love myself; more,
Premier que de ce corps l'assumer,
Quelquefois il n'avait pas de cœur.
Tint ne donna un autre dernier amour,
Que quand je vis j'ai fang m'antise dragea.'

For him also I povray out many tears,
First when he made himself posseffour of this body,
Of the quibth then he had not the heart.
After he did give me such other hard charge,
Queen he bled of his blade greit quantity, &c.

If these sonnets could be supposed to be genuine, this passage would overthrow at once all the letters and both the contracts which were produced; and would prove, with the force of demonstration, that the seizure of Mary by Bothwell was not with her own consent; that she actually committed a rape upon her; that she had for him no love; and that she married him merely as a refuge to her injured honour. The sonnets, however, are undoubtedly spurious; but, considered in this light, the verses before us prove with equal force the full conviction in the minds of the rebels of what in an unguarded moment they actually confessed to Throgmorton, and was manifest to all the world viz. that 'the queen their sovereign was led captive, and by fear, force, and (as many conjectures may be well suspected) other extraordinary and more unlawful means compelled to become bed-fellow to another wife's husband.' They prove likewise, that after the rape, finding Mary highly ignignant at the brutality done her, Bothwell actuallystabbed himself; not, we may believe, with any intention to take away his own life, but merely that by shedding many a 'drachm' of blood he might mollify the heart of the queen.

But we mean not to pursue the history of the sonnets any farther. Though they were undoubtedly invented in aid of the letters to prove that fundamental principle of the conspirators,—that the love of Mary to Bothwell was inordinate; yet they were so incompatible with history, and with one another, that they demonstrate the spuriousness of themselves, and of the evidence which they were intended to corroborate. By thus endeavouring to give an air of nature and probability to their monstrous fictions, the rebels at once betrayed the fabrication of the whole. They have themselves supplied us with a long and particular journal, to show the true date of facts; and by that journal have their letters and their sonnets been demonstrated to be infamous. The makers of these papers (says Mr Whitaker) have broken thro' all the barriers of their own history. They have started aside from the orbit of their own chronology. They have taken a flight beyond the bounds of their own creation, and have there placed themselves conspicuous in the paradise of fools.'
When Tytler's Inquiry into the Evidence produced by the Earl of Murray and Morton against Mary Queen of Scots was first published, it was reviewed in the Gentleman's Magazine by the late Dr. Johnstone. The report, which consists of a brief analysis of the work, with reflections interposed on the force of the evidence, concludes thus:—"That the letters were forged is now made so probable, that perhaps they will never more be cited as testimonies." Subsequent experience has shown that the great critic's knowledge of human nature had not deserted him when he guarded his prediction with the word perhaps. Few authors possess the magnanimity of Fendale; and it is not to be expected that he who once maintained the letters to be genuine, should by reaoning or criticism be compelled to relinquish them: but we are persuaded, that, after the present generation of writers shall be extinct, these letters and sonnets will never be cited as evidence, except of the profligacy of those by whom they were fabricated. Having said this, we leave the general character of Mary to the reflection of the reader (A).

She wrote, 1. Poems on various occasions, in the Latin, French, and Scotch languages. One of her poems is printed among those of A. Blackwood; another in Bratome's Dames illustres, written on the death of her first husband Francis II. 2. Confession of her long imprisonment and royal advice to her son. 3. A copy of verse, in French, sent with a diamond ring to queen Elizabeth. There is a translation of these verses among the Latin poems of Sir Thomas Chaloner. 4. Genuine Letters of Mary queen of Scots, to James Earl of Bothwell; translated from the French, by E. Simonds; 1726. There are, besides, many other of her epistles to queen Elizabeth, secretary Cecil, Mildmaye, &c., which are preserved in the Cottonian, Amnolean, and other libraries.

Mary II. queen of England, eldest daughter of James II. by his first wife, was born at St James's in 1662. She was bred up a Protestant, and married to William Henry of Nassau, then prince of Orange, afterward king of England, in the 16th year of her age. She died in Holland with her husband till February 12, 1699, when she came over, and was solemnly proclaimed queen of England, &c. She was an equal sharer with her husband in all the rights belonging to the crown; but the administration and execution thereof was lodged solely in the king. She was a princess endowed with the highest...

(A) This article stands in need of an apology; but whether for its length or shortness, our readers may perhaps differ in opinion. If it be considered as a piece of common biography, and compared with the limits which we have prescribed to our other articles of the same kind, it has swelled to an extent beyond all proportion. But as a piece of common biography it ought not to be considered; it is intimately connected with the history of Scotland and Europe; it is a parallel, and it has been justly observed, by one of the ablest writers of the age, that "the fact under dispute in the life of Mary, is a fundamental and essential one; and that, according to the opinion which the historian adopts with regard to it, he must vary and displace the whole of his subsequent narration." Viewed in this light, our abstract of the evidence which has been urged on both sides of this controversy will by many be deemed too short. To such as wish for complete satisfaction we can only recommend the unbiased study of the writings of Buchanan, Leslie bishop of Rofs, Coedal, Robertson, Hume, Tytler, Sir David Dalrymple, Stuart, and Whitaker.
right perfections both of body and mind: she loved his-
tory, as being proper to give her useful instructions;
and was also a good judge as well as a lover of poe-
try. She studied more than could be imagined, and
would have read more than she did if the frequent re-
turns of ill-humours in her eyes had not forced her to
spare them. She gave her minutes of leisure to ar-
chitecture and gardening; and since it employed many
hands, she said she hoped it would be forgiven her.
She was the most gracious of sovereigns to her sub-
jects, and the most obliging of wives to her husband,
as well as the most excellent of mistresses to her ser-
vants: she ordered good books to be laid in the places
of attendance, that persons might not be idle while
they were in their turn of service. She was exceeding
zealous for a reformation of manners; charitable
in the highest degree, without the least ostentation.
This excellent queen died on the 28th of December
1695; at Kennington, of the small-pox, in the 33d
year of her age. In her the arts lost a protectress,
the unfortunate a mother, and the world a pattern of
every virtue. As to her person she was tall, of a ma-
jectory graceful mien, her countenance serene, her
complexion ruddy, and her features beautiful.

Mary Magdalen's Day, a festival of the Roman
church, observed on the 22d of July.

Mary-Greene's House, a name given to Dunmore-
head in the parish of Dunquen, county of Kerry, and
province of Munster, in Ireland. It is the most we-
ter point of all Europe, and called by the Irish 
Kerry Geovone. It is a point as much celebrated by
them as John of Groat's-house by the Scots, which
is the utmost extremity of North Britain.

Maryborough, a borough, market, and port
town, and the affizzes town to the queen's county,
in the province of Leinster, in Ireland, so called in ho-
our of Mary queen of England, who reduced this
part of the country to shire-ground by 25% of parlia-
ment 6th and 7th Philip and Mary. It is governed
by a burgomaster and bailiffs, and has a barrack for
a troop of horse. It returns two members to parliament,
and his five fairs, is distant from Dublin 40 miles.

Marygold. See Fort-William.

Marygold. See Calth.

Corn Maryland. See Chrysanthemum.

French Maryland. See Tagetes.

Maryland, one of the United States of Ame-
rica. It received that name in honour of Henrietta
Maria, the comfort of King Charles I., who made a
grant of this country, with very extraordinary pow-
ers, to Lord Baltimore. It lies between 38 and 40
degrees north latitude, and in longitude from 74 to
76 degrees west from London. It is bounded on
the north by Pennsylvania; on the east by the Delaware
states; on the south-east and south by the Atlantic
Ocean, and a line drawn from the ocean over the penin-
sula (dividing it from Accomack county in Virginia)
to the mouth of Patowmack river, thence up the Pa-
towmack to its first fountain, thence by a due north
line till it intersects the southern boundary of Pennsyl-
vania, in lat. 39° 45' 18", so that it has Virginia on
the south, fourth-west, and west. It contains about
14000 square miles, of which about one-sixth is wa-
ter. It is divided into 20 counties, 12 of which are
in the western and 8 on the eastern shore of Chefs-
peak bay, viz. Harford, Baltimore, ditto town and pre-
cincts, Ann Arundel, Frederick, Allegany Washing-
ton, Montgomery, Prince George, Calvert, Charles,
St Marys, Cecil, Kent, Queen Ann, Caroline, Talbot,
Somerset, Dorchester, Worcester. Each of these
counties sends four representatives to the house of de-
legates, besides which the city of Annapolis, and town
of Baltimore, send each two.

The climate is generally mild and agreeable, suited
to agricultural productions and a great variety of fruit-
trees. In the interior hilly country the inhabitants
are healthy; but in the flat country, in the neighbour-
hood of the marshes and stagnant waters, they are,
as in the other southern states, subject to intermit-
tents. Cheapeak bay divides this state into the eastern
and western divisions. It affords several good fisheries;
and, in a commercial view, is of immense advantage
to the state. It receives a number of the largest rivers
in the United States. From the eastern shore in Mar-
land, among other smaller ones, it receives Pocomo-
ake, Choptank, Chester, and Elk rivers; from the
north the rapid Susquehanna; and from the west Patapco, Severn, Patuxent and Potomack, half of
which is in Maryland and half in Virginia. Except
the Susquehanna and Potomack, these are small ri-
ers. East of the blue ridge of mountains, which
stretches across the western part of this state, the
land, like that in all the southern states, is generally
level and free of stones. Wheat and tobacco are the
 staple commodities of Maryland. In the interior
country, on the uplands, considerable quantities of
hemp and flax are raised.

Wheat and tobacco are the staple commodities.
Tobacco is generally cultivated in fields by negroes,
in the following manner: The seed is sown in beds of
fine mould, and transplanted the beginning of May.
The plants are set at the distance of 3 or 4 feet from
each other, and are hilled and kept continually free of
weeds. When as many leaves have shot out as the
soil will nourish to advantage, the top of the plant
is broken off, which prevents its growing higher. It
is carefully kept clear of worms, and the suckers, which
put out between the leaves, are taken off at proper
times till the plant attains perfection, which is in
August. When the leaves turn of a brownish colour,
and begin to be spotted, the plant is cut down and
hung up to dry, after having sweated in heaps one night.
When it can be handled without crumbling, which
is always in moist weather, the leaves are stripped
from the stalk, and tied in bundles, and packed for ex-
portation in hogheads containing 800 or 900 pounds.
No suckers nor ground leaves are allowed to be merchant-
able. An industrious person may manage 6000
plants of tobacco, (which yield a 1000 lb.) and four acres of
Indian corn.

Two articles are said to be peculiar to Maryland,
viz. the genuine white wheat, which grows in Kent,
Queen Ann's, and Talbot counties, on the eastern
shore, and which degenerates in other places—and the
bright kie's foot tobacco, which is produced at
Elkridge, on the Potomack, on the Western Shore.
Among other kinds of timber is the oak, of several
kinds, which is of a firr grain and easily rives into
slaves,
The black walnut is in demand for cabinets, tables, and other furniture. The apples of this state are large, but mealy; their peaches plenty and good. From these the inhabitants distil cider, brandy, and peach brandy.

The number of inhabitants in this state, including the negroes 319,728, which is nearly 23 for every square mile. The inhabitants, except in the populous towns, live on their plantations, often several miles distant from each other. Mr. Morier observes, that to an inhabitant of the middle, and especially of the eastern states, which are thinly populated, they appear to live very retired and unobtrusive lives. The effects of this comparative solitude are visible in the countenances, as well as in the manners and dress of many of the country people. You observe comparatively little of that cheerful sprightliness of look and action which is the invariable and genuine offspring of social intercourse. Nor do you find that attention paid to dress, which is common, and which decency and propriety have rendered necessary, among people who are liable to receive company almost every day. Unaccustomed, in a great measure, to frequent and friendly visits, they often suffer too much negligence in their dress. As the negroes perform all the manual labour, their manners are left to saunter away life in sloth, and too often in ignorance. These observations, however, must in justice be limited to the people in the country, and to those particularly, whose poverty or parsimony prevents their spending a part of their time in populous towns, or otherwise mingling with the world. And with these limitations, they will equally apply to all the southern states. The inhabitants of the populous towns, and those from the country who have intercourse with them, are in their manners and customs genteel and agreeable.

That pride which grows on slavery, and is habitual to those, who, from their infancy, are taught to believe and to feel their superiority, is a visible characteristic of the inhabitants of Maryland. But with this characteristic we must not fail to connect that of hospitality to strangers, which is equally universal and obvious. Many of the women possess all the amiable, and many of the elegant accomplishments of their sex.

The chief towns in this state are Annapolis and Baltimore. Annapolis, the capital, and the wealthiest town of its size in America, is situated just at the mouth of Severn river, 30 miles south of Baltimore. The houses are generally large and elegant; and the state-house is a noble building. Baltimore has had the most rapid growth of any town on the continent, and is the fourth in size and fifth in trade in the United States. It lies in lat. 39° 21' on the north side of Patapco river, around what is called the Bason. The situation of the town is low. The number of houses is about 2,500. The number of stores is near 300; and of churches 9, which belong to German Calvinists and Lutherans, Episcopalians, Presbyterians, Roman Catholics, Baptists, Methodists, Quakers, Nicholites, or New Quakers. The number of inhabitants appears by the census to be 13,500. There are many very respectable families in Baltimore, who live genteelly, are hospitable to strangers, and maintain a friendly and improving intercourse with each Maryland other; but the bulk of the inhabitants, recently collected from almost all quarters of the world, bent on the pursuit of wealth, varying in their habits, their manners, and their religions, are less improved. The trade of Maryland is principally carried on from Baltimore, with the other states, with the West Indies, and with Europe. To these places they send annually large quantities of tobacco, wheat, flour, pig iron, lumber, and corn—beans, pork, and flaxseed, in smaller quantities; and receive in return, dry goods, wines, spirts, sugars, and other West Indian commodities. The balance is generally in their favor.

Georgetown stands on the bank of the river Potomak, about 160 miles from its entrance into Chesapeek Bay. The ground on which it stands is very broken, being a cluster of little hills, which, though at present elevated considerably above the surface of the river, were probably, at some former period overflowed, as at the depth of 8 or 10 feet below the surface, marine shells have been found. Dr. Mason, concludes an account of the climate and diseases, of this town, in the following words: "Upon the whole, Georgetown and its vicinity may be considered as a healthy part of America; and in any disputes about the propriety of the seat of the general government being fixed here, no objection can be urged against it on account of its diseases."

Fredericktown is a fine flourishing inland town of upwards of 300 houses, built principally of brick and stone, and mostly on one broad street. It is situated in a fertile country, about 4 miles south of Catoktan mountain and is a place of considerable trade. It has four places for public worship, one for Presbyterians, two for Dutch Lutherans and Calvinists, and one for Baptists; besides a public gaol, and a brick market house.

Elkton is situated near the head of Cheapeake bay, on a small river which bears the name of the town. It enjoys great advantages from the carrying trade between Baltimore and Philadelphia. The tides ebb and flow to this town.

The city of Washington, in the territory of Columbia, was ceded by the states of Virginia and Maryland, to the United States, and by them established as the seat of their government, after the year 1800. This city, which is now building, stands at the juncture of the rivers Patomak and the Eastern branch, latitude 38° 53' North, extending nearly four miles up each, and including a tract of territory, exceeded, in point of convenience, salubrity, and beauty, by none, in America. For although the land in general, appears level, yet by gentle and gradual swellings, a variety of elegant prospects are produced, and a sufficient descent formed for carrying off the water occasioned by rain. Within the limits of the city are a great number of excellent springs; and by digging wells, water of the best quality may readily be had. Besides, the never failing streams, that now run through that territory, may also be collected for the use of the city. The waters of Redly branch, and of..."
Maryland. Tiber creek, may be conveyed to the President's house. The source of Tiber creek is elevated about 236 feet above the level of the tide in said creek. The perpendicular height of the ground on which the capitol is to stand, is 78 feet above the level of the tide in Tiber creek. The water of Tiber creek, may, therefore, be conveyed to the capitol, and, after watering that part of the city, may be diverted to other useful purposes.

The Eastern branch is one of the safest and most commodious harbours in America, being sufficiently deep for the largest ships, for about four miles above its mouth, while the channel lies close along the bank adjoining the city, and affords a large and convenient harbour.—The Patomak, although only navigable for small craft, for a considerable distance from its banks next to the city (excepting about half a mile above the junction of the rivers) will nevertheless afford a capacious summer harbour; as an immense number of ships may ride in the great channel, opposite to, and below the city.

The Roman Catholics, who were the first settlers in Maryland, are still numerous. Besides these, there are Protestant Episcopalians, English, Scots, and Irish Presbyterians, German Calvinists, German Lutherans, Friends, Baptists, Methodists, and Episcopalian, or New Quakers.—Seminaries of Learning, &c. Washington academy, in Somerset county, was instituted by law in 1770. It was founded and is supported by voluntary subscriptions and private donations, and is authorized to receive gifts and legacies, and to hold 2000 acres of land. A supplement to the law, passed in 1794, increased the number of trustees from eleven to fifteen.

In 1782, a college was instituted at Chestertown, in Kent county, and was honoured with the name of Washington College, after President Washington. It is under the management of 24 visitors or governors, with power to supply vacancies, and hold estates, whose yearly value shall not exceed 6.000l. current money. By a law enacted in 1787, a permanent fund was granted to this institution of 230l. a year, currency, out of the monies arising from marriage licences, fines and forfeitures on the Eastern Shore.

St. John's college was instituted in 1784, to have also 24 trustees, with power to keep up the face of the college by supplying vacancies, and to receive an annual income of 900l. A permanent fund is affiliated this college, of 1750l. a year, out of the monies arising from marriage licences, ordinary licences, fines and forfeitures on the Western Shore. This college is to be at Annapolis, where a building is now prepared for it. Very liberal subscriptions were obtained towards founding and carrying on these seminaries. The two colleges constitute one university, by the name of 'the University of Maryland,' whereof the governor of the State, for the time being, is chancellor, and the principal of one of them, vice chancellor, either by seniority or by election, as may hereafter be provided for by rule or by law. The chancellor is empowered to call a meeting of the trustees, or a representation of seven of each, and two of the members of the faculty of each, (the principal being one) which meeting is called 'The Convocation of the university of Maryland,' who are to frame the laws, preferve uniformity of manners and literature in the Maryland colleges, confer the higher degrees, determine appeals, &c.

The Roman Catholics have also erected a college at Georgetown, on Potomac river, for the promotion of general literature.

In 1783, the Methodists instituted a college at Arlington, in Harvard county, by the name of Cokesbury college, after Thomas Coke, and Francis Ablury, bishops of the Methodist Episcopal Church. The college edifice is of brick, handsomely built, on a healthy spot, enjoying a fine air, and a very extensive prospect.

The students, who are to consist of the sons of travelling preachers, the sons of annual subscribers, the sons of the members of the Methodist society and orphans, are instructed in the English, Latin, Greek, Logic, Rhetoric, History, Geography, Natural Philosophy and Astronomy; and when the finances of the college will admit, they are to be taught the Hebrew, French and German languages.

The college was erected and is supported wholly by subscription and voluntary donations.

The students have regular hours for rising, for prayers, for their meals, for study, and for recreation. They are all to be in bed precisely at nine o'clock. Their recreations, (for they are to be indulged in nothing which the world calls play') are gardening, walking, riding, and bathing without doors; and within doors, the carpenters, joiners, cabinet-makers, or turners' business. Suitable provision is made for these several occupations, which are to be considered, not as matters of drudgery and constraint, but as pleasing and healthful recreations, both for the body and mind. Another of their rules, which though new and singular, is favourable to the health and vigour of the body and mind, is, that the students shall not sleep on feather beds, but on mattresses, and each one by himself. Particular attention is paid to the morals and religion of the students.

There are a few other literary institutions, of interior note, in different parts of the State, and provision is made for free-schools in most of the counties; the sons are entirely neglected, and very few carried on with any success so that a great proportion of the lower classes of people are ignorant; and there are not a few who cannot write their names. But the revolution, among other happy effects, has routed the spirit of education, which is fast spreading its salutary influences over this and the other southern states.

Constitution. The legislature is composed of two distinct branches, a senate and house of delegates, and filled the General Assembly of Maryland. The senators are elected in the following manner: On the first of September, every fifth year, the freemen choose two men in each county to be electors of the senate, and one elector for the city of Annapolis, and one for the town of Baltimore. These electors must have the qualifications necessary for country delegates. These electors meet at Annapolis, or such other place, as shall be appointed for convening the legislature, on the third Monday in September, every fifth year, and elect by ballot 15 senators out of their own body or from the people at large. Nine of these must be residents on the western shore, and six on the eastern: they must be more than
Maryland. than twenty five years of age—must have resided in the state more than three years next preceding the election, and have real and personal property above the value of a thousand pounds, the senate may originate any bills, except money bills, to which they can only give their assent or dissent. The senate elect their president by ballot. The house of delegates is comprised of four members for each county, chosen annually the first Monday in October. The city of Annapolis and town of Baltimore send each two delegates. The qualifications of a delegate are, full age, one year’s residence in the county where he is chosen, and real and personal property above the value of five hundred pounds. Both houses choose their own officers and judge of the election of their members. A majority of each is a quorum. The election of senators and delegates is vis a vis, and sheriff’s returning officers, except in Baltimore town, where the commissioners superintend the elections and make returns. The stated session of the legislature is on the first Monday in November. The qualifications of a free man are full age, a freehold estate of fifty acres of land, and actual residence in the county where he offers to vote—property to the value of thirty pounds in any part of the state, and a year’s residence in the county where he offers to vote.

On the second Monday in November annually, a governor is appointed by the joint ballot of both houses, taken in each house respectively, and deposited in a conferencing room; where the boxes are examined by a joint committee of both houses, and the number of voices severally reported. The governor cannot continue in office longer than three years consecutively, nor be re-elected until the expiration of four years after he has been out of office. The qualifications for the chief magistracy are, twenty-five years of age, five years residence in the state, next preceding the election, and real and personal estate above the value of five thousand pounds, one thousand of which must be freehold estate. On the second Tuesday of November, annually, the senators and delegates elect by joint ballot, five able and discreet men, above twenty-five years of age, residents in the state three years next preceding the election, and possessing a freehold of lands and tenements above the value of a thousand pounds, to be a council for advising the governor in the duties of his office. Senators, delegates and members of council, whilst such, can hold no other office of profit, nor receive the profits of any office exercised by another. The governor with the advice of his council, appoints the chancellor, all judges and justices, the attorney general, naval and militia officers, registrars of the land office, surveyors, and all other civil officers, except constables, superintendents and overseers of the road. A court of appeals is established for the final determination of all causes, which may be brought from the general court of admiralty, or of chancery.

Maryland was granted, as has been already noticed, by King Charles 1. to Cecilus Calvert, Baron of Baltimore in Ireland, June 20, 1632. The government of the province was by charter with the proprietor; but it appears that he neither ever exercised these powers alone, nor for a short time. The honourable Leonard Calvert, Esq. Lord Baltimore’s brother, was the first governor or lieutenant-general. In 1658, a law was passed, constituting the first regular house of assembly, which was to consist of such representatives, called burgesses, as should be elected pursuant to a writ issued by the governor. These burgesses possessed all the powers of the persons electing them; but any other freemen, who did not attend to the election, might take their seats in person. Twelve burgesses or freemen, with the lieutenant-general and secretary, constituted the assembly or legislature. This assembly sat at St. Mary’s, one of the southern counties, which was the first settled part of Maryland. In 1689 the government was taken out of the hands of Lord Baltimore by the grand convention of England. Mr. Copley was appointed governor by commission from William and Mary in 1692, when the Protestant religion was established by law. In 1716, the government of this province was restored to the proprietary, and continued in his hands till the late revolution; when, being an absentee, his property in the lands was confiscated, and the government assumed by the freemen of the province, who formed the constitution now existing. At the close of the war, Henry Harford, Esq; the natural son and heir of Lord Baltimore, petitioned the legislature of Maryland for his estate: but his petition was not granted. Mr. Harford estimated his lost of quit-rents, valued at 20 years purchase, and including arrears, at £359,488, 5s.—dollars at 75. 6d. and the value of his sermons and referred lands at 327,441 of the same money.

MARYPORT, a sea-port town of Cumberland, situated at the mouth of the Elne. It has a good harbour; and has 70 or 80 full of shipping from 20 to 250 tons burden, principally employed in the coal-trade; some of them sail up the Baltic for timber, flax, iron, &c. They have a furnace for cast-iron and a glass-house. A chapel was erected here in 1760.

MA S (Levis du), natural son to Jean Louis de Montcalm Stigneur de Candie, and a woman of rank of Rouergue, was born at Nimes in 1767. His first attention was bestowed on jurisprudence; but afterwards he was altogether occupied with mathematics, philosophy, and the study of the languages. Father Maltebranche cultivated his acquaintance and esteemed his virtues. His first appearance was severe, his general temper tranquil; yet he had a lively and fertile imagination. His mind was active, full of resources, and methodical. He was inducted to his industry for the Typographical Bureau. This invention is the more ingenious, as it prefers the tedious parts of education, namely, reading, writing, and the elements of languages, to the youthful mind as a delightful entertainment, and many people in France both in the capital and in the provinces have adopted it with success. After he had conceived the idea of this invention, he made the first trial of it on the young Candie, who was remarkable for his understanding in his earliest years. Du Mas conducted his pupil to Paris and the principal cities of France, where he was universally admired. This prodigy was carried off in the year 1726 before he was seven years of age, and his loss had nearly deprived Du Mas of his reason. A dangerous illness was the consequence of his vexation; and he would have died of want, if a gentleman had
had not taken him from his garret and entertained him in his own house. Du Mas afterwards retired with Madame de Vanjour within two leagues of Paris, and died in the year 1774, aged 68. He was a philosopher both in genius and character. His works are, t. L'Art de transférer toutes sortes de Musiques sans être obligé de connaître, ni le temps ni le mode, published at Paris in 1711. This work is extremely curious, but of no advantage to the study of music. 2. A volume in quarto, printed at Paris 1733, in four parts, intituled Bibliothéque des enfants. In this treatise he has placed, in a clear point of view, the system and economy of his Typographical Bureau. This invention, like everything new, was cenured by some and admired by others. The author himself defended it with much success in the journals and several occasional pamphlets. This collection, however, is become exceedingly scarce. The Typographical Bureau was brought to perfection by M. Reybert a citizen of Avignon, who enriched it with many articles containing useful and agreeable information in geography, history, fable, &c. &c. 3. Mémoires de l'Ecole sous le règne de Marie Stuart, by Crawford, and translated from the English. This translation was found in manuscript in the library of the late marquis d'Aubais, with whom Du Mas had lived in the most intimate habits of friendship. 4. Mas Planta, a plant which upon the same root produces male flowers only. See Masculus Flex.

Masafuero, an island of the South-Sea, lying in S. Lat. 33° 45'. W. Long. 80° 46'. It is very high and mountains, and at a distance seems to consist of one hill or rock. It is of a triangular form, and seven or eight leagues in circumference. There is much plenty of fish, that a boat with a few hooks and lines may very soon catch as many as will serve one hundred people. There are coal-fish, cavillers, cod, halibut, and cray fish. Captain Carteret's crew caught a king-fish that weighed 87 pounds, and was five feet and an half long. The sharks were here so ravenous, that in taking baundings, one of them swallowed the lead, by which they haunted him above water; but he regained his liberty by disgorging his prey. Seals are so numerous here, that Captain Carteret says, if many thousands were killed in a night, they would not be missed next morning. These animals yield excellent train-oil; and their hearts and plucks are very good food, having a taste something like those of a hog; their skins are covered with a very fine fur. There are many birds here, and some very large hawks. Of the pintado bird one ship caught 700 in one night. Commodore Byron landed here with difficulty in 1765, in order to take in wood and water, of both which he Mascaron.

found plenty. He found two great number of goats whose flesh tasted as well as venison in England.

Mascotte, or Mesbothean, the name of a feat, or rather of two feats; for Ezechiel, or rather Hecgelippus whom he cites, makes mention of two different feats of Masbotheans. The first was one of the seven feats that arose out of Judaism, and proved very troublesome to the church; the other was one of the seven Jewish feats before the coming of Jesus Christ. The word is derived from the Hebrew מַשָּׁבָּח, "to reft or repose," and signifies idle easy indolent people. Ezechiel speaks of them as if they had been so called from one Masbotheus their chief; but it is much more probable their name is Hebrew, or at least Chaldaic, signifying the same thing with a Sabbatarian in our language; that is, one who makes a profession of keeping Sabbath.

Valeius will not allow the two feats to be confounded together: the last being a feat of Jews before, or at least contemporary with Christ; and the former a feat of heretics descended from them. Rufinus distinguished them in their names: the Jewish feat he calls Masbotheus; and the heretics Masbotheani. The Masbotheans were a branch of the Simonians.

Mascardi (Aquilin), a distinguished person in the republic of Letters, was born at Sarazine, a city of the state of Genoa, in 1791. He spent the early part of his life among the Jesuits, and afterwards became chamberlain to Pope Urban VIII. He was naturally of eloquent, that this fame pope, merely to excite his talent, founded a professorship of rhetoric for him in the college de la Sapienza 1628, and settled upon him for life a pension of 500 crowns. Mascardi filled the chair with great reputation; but his love of letters made him neglect what is of more confluence than even letters, the management of his affairs: for he was always poor, and always in debt. He wrote a great many things in verse and prose; and among the rest, a treatise entitled Dell' arte historica. In his "History of the Conspiracy of the Comte de Fife," he has very frequently attacked the religion of Hubert Poletta; and in his other books he used some writers in the same way, which occasioned him to be attacked in his turn. The objections which were made to him, together with his answers, were added to the second edition of the history just mentioned. He died at Sarazane, 1640, in his 49th year.

Mascaron (Julius), bishop of Agen, and a most eminent French preacher, was born at Marseille in
M A S

MASCLEF, Macculd'e. in 1634. He inherited of his father, who was the most celebrated advocate of the parliament of Aix, that uncommon talent of eloquence which distinguished him. He was admitted a member of the congregation of the oratory very young: and from his 22d year taught rhetoric at Mans. Soon after this he commenced preacher, and preached with great success in St Peter's church at Sanur. The bishop of Mans, willing to engage a able preacher in his church, made him prebendary of it. He was much admired at Paris, when he preached the advent at the oratory. He preached after this five or six years at court, and was promoted to the bishopric of Tulle in 1671. He was afterwards translated to the bishopric of Agen. He was called in 1694 to preach the Lent sermon at court. The year following, he opened the assembly of the clergy, and returned to his diocese; where he died of a dropy in his chest, Dec. 16. 1703. There is nothing printed of this great man excepting A Collection of Funeral Orations made upon the queen-mother, the dauphiness, the duke of Beaufort, the chancellor Seguier, mareschal Turenne; and at the head of this collection there is a short life of him.

MASCLEF (Francis), was at first a curate in the diocese of Amiens, the place of his birth, and afterwards theologian and confidant to the generous De Brou bishop of that diocese. He was appointed to the charge of a seminary of learning under that prelate. He deferred this employment both from his piety and profound learning. The oriental languages were as familiar to him as his native tongue. He pursued his researches into the idioms of the east with the spirit and the ingenuity of a philosopher. He was made canon of Amiens a little before the death of De Brou, which happened in 1706. His opinions on the Jansenist controversy were so offensive to Sabatier, the successor of that worthy prelate, that he was removed from the care of the seminary and from almost every other public office which he held. The regard of the dead comforted Masclef under the oppression of the living. He devoted himself to the study of the Holy Scripture, that he contracted a disease of which he died the 14th Nov. 1728, aged 66 years. His principal works are, 1 A Hebrew Grammar in Latin, after his new method, printed at Paris 1716, in 12mo. This grammar was again printed in two volumes in 12mo. in the year 1720, under the direction of M. de la Bletterie at that time priest of the oratory and the friend of Masclel. All the objections which Father Guarin made in his Hebrew grammar to Maclel's method of reading Hebrew without the use of points are attended to in this edition. There is nothing more necessary, according to this plan, than to take the vowel which is next the consonant in the order of the alphabet. This method was approved of by some learned men, but rejected by a great many more. 2 Les Confrérences Ecclesiastiques du diocese d'Amiens, in 12mo. 3 Le Catechisme d'Amiens, in 4to. 4 Une Philosophie et une Theologie, in MS. These would have been published had they not discovered a partiality to the principles of Jansenism. The author was an able man, equally respectable for his manners and his knowledge.

MASCULINE, something belonging to the male, or the stronger of the two sexes. See Male.

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MASCUINE, is more ordinarily used in grammar Masculine to signify the first and worthieth of the genders of nouns. See Gender.

The masculine gender is that which belongs to the male kind, or something analogous to it.

Most substantives are ranged under the heads of masculine or feminine.—This, in some cases, is done with a flaw of reason; but in others is merely arbitrary, and for that reason is found to vary according to the languages and even according to the words introduced from one language into another.—Thus the names of trees are generally feminine in Latin and masculine in the French.

Further, the genders of the same word are sometimes varied in the same language. Thus albus, according to Priscian, was anciently masculine, but is now become feminine. And navire, "a ship," in French, was anciently feminine, but is now masculine.

MASCULINE Rhyme, in the French poetry, is that made with a word which has a strong, open, and accented pronunciation; as all words have, excepting those which have an e feminine in their last syllable.

For instance, amour and fort, mort and fort, are masculine rhymes; and pers and more, gloire and mereur, are feminine. Hence also verses ending with a masculine rhyme, are called masculine verses, and those ending with a feminine rhyme, feminine verses. It is now a rule established among the French poets never to use the above two masculine or two feminine verses successively, except in the looser kind of poetry.

Mars was the first who introduced this mixture of masculine and feminine verses, and Ronfard was the first who practised it with success. The masculine verses should always have a syllable less than the feminine ones.

MASCULINE Signs. Astrologers divide the signs into masculine and feminine; by reason of their qualities, which are either active, and hot or cold, accounted masculine; or passive, dry and moist, which are feminine. On this principle they call the Sun, Jupiter, Saturn, and Mars, masculine signs; the Moon and Venus feminine. Mercury, they suppose, partakes of the two. Among the signs, Ariés, Libra, Gemini, Leo, Sagittarius, Aquarius, are masculine: Cancer, Capricornus, Taurus, Virgo, Scorpio, and Pisces, are feminine.

MASCULUS PLVS, in botany. See Flos.

MASH, a drink given to a horse, made of a peck of ground malt put into a pail, into which as much cold water is poured as will wet it very well: when that is done, stir it about, till, by raffling, you find it as sweet as honey; and when it has stood till it be lukewarm, it is to be given to the horse. This liquor is only used after a purge, to make it work the better; or after hard labour, or instead of drink in the time of any sickness.

MASK. See Masque.

MASNINGA, a king of a small part of Africa, who at first assisted the Carthaginians in their wars against Rome; but afterwards joined the Romans, and became the firmest ally they ever had. See Numidia.

MASON, a person employed under the direction of an architect, in the raising of a stone-building.


MAS

The chief business of a mason is to make the mortar; raise the walls from the foundation to the top, with the necessary retreats and perpendiculars; to form the vaults, and employ the stones as delivered to him. When the stones are large, the masons of building or cutting them belong to the stone-cutters, though these are frequently confounded with masons: the ornaments of sculpture are performed by carvers in stones or sculptors. The tools or implements principally used by them are the square, level, plumb-line, compass, hammer, chisel, mallet, and so forth, and the square, level, plumb-line, &c. See SQUARE, &c.

Besides the common instruments used in the hand, they have likewise machines for raising of great burdens, and the conducting of large stones; the principal of which are the lever, pulley, wheel, crane, &c. See LEVER, &c.

Free and Accepted Masons, a very ancient society or body of men: so called, either from some extraordinary knowledge of masonry or building, which they are supposed to be masters of, or because the first founders of the society were persons of that profession. These are now very considerable, both for number and character, being found in every country in Europe, and consisting principally of persons of merit and consideration. As to antiquity, they lay claim to a standing of some thousand years. What the end of their institution is, seems still in some measure a secret: and they are said to be admitted into the fraternity by being put in possession of a great number of secrets, called the masons’ word, which have been religiously kept from age to age, being never divulged. See FREE-MASONRY.

MASONRY, in general, a branch of architecture, consisting in the art of hewing or squaring stones, and cutting them level or perpendicular, for the uses of building: but, in a more limited sense, masonry is the art of assembling and joining stones together with mortar.

Hence arise as many different kinds of masonry as there are different forms and manners for laying or joining stones. Vitruvius mentions several kinds of masonry used among the ancients; three of hewed stone, viz. that in form of a net, that in binding, and that called the Greek masonry; and three of unhewed stones, viz. that of equal courses, that of unequal courses, and that filled up in the middle; and the seventh was a composition of all the rest.

Net-masonry, called by Vitruvius reticulatum, from its resemblance to the meshes of a net, consists of stones squared in their courses, and disposed as that their joints go obliquely; and their diagonals are the one perpendicular and the other level. This is the most agreeable masonry to the eye, but it is very apt to crack. See n° 1.

Bound-masonry, that in which the stones were placed one over another, like tiles; the joints of their beds being level, and the muntants perpendicular, so that the joint that mount and separates two stones always falls directly over the middle of the stone below. This is left beautiful in the net-work; but it is more solid and durable. See n° 2.

Greek masonry, according to Vitruvius, is that where after we have laid two stones, each of which makes a course, another is laid at the end, which makes two courses, and the same order is observed throughout the building; this may be called double binding, in regard the binding is not only of stones of the same course with one another, but likewise of one course with another course. See n° 3.

Masonry by equal courses, called by the ancients fodoftomum, differs in nothing from the bound masonry, but only in this, that its stones are not hewn. See n° 4.

Masonry by unequal courses, called fendoofdomum, is also made of unhewed stones, and laid in bound work; but then they are not of the same thickness, nor is there any equality observed excepting in the several courses, the courses themselves being unequal to each other. See n° 5.

Masonry filled up in the middle, is likewise made of unhewed stones, and by courses; but the stones are only set in order as to the courses: (see n° 6). A, the courses; B, the parts filled up; C, a coat of plaster.

Compound masonry is of Vitruvius’s proposing, so called as being formed of all the rest. In this the courses are of hewed stone; and the middle being left void, is filled up with mortar and pebbles thrown in together; after this the stones of one course are bound to those of another course with iron-cramps fastened with melted lead: (See n° 7). E, the stones cramp’d; F, the cramps; G, the middle part filled up. —

N° 8, represents another sort of compound masonry, the middle of which is stone, and the edges boards. All the kinds of masonry now in use may be reduced to these five, viz. bound masonry; that of brick-work, where the bodies and projections of the stones incline square spaces or panels, &c. set with bricks; that of molion, or small work, where the courses are equal, well squared, and their edges or beds rufficated; that of small stones and mortar. See n° 2.

Free-MASONRY, denotes the system of mysteries and secrets peculiar to the society of free and accepted masons.

The origin of this society is very ancient; but we have no authentic account of the time when it was first instituted, or even what was the reason of such an application of people under the title of Mason, more than of any other mechanical profession. In Doctor Paracelus’s history we find the origin of the Free Mason Society in Britain attributed to the difficulty found in former times, of procuring a sufficient number of workmen to build the multitude of churches, monasteries, and other religious edifices which the superstition of those ages prompted the people to raise. Hence the masons were greatly favoured by the popes, and many indulgences were granted in order to augment their numbers. In times like those we speak of, it may well be supposed that such encouragement from the supreme pastors of the church must have been productive of the most beneficial effects to the fraternity; and hence the increase of the society may naturally be deduced. The Doctor quotes, in confirmation of this, the words of an author who was well acquainted with their history and constitution.

"The Italians (says he), with some Greek refugees, and with them French, Germans, and Flemings, join-
MAS [ 621 ]

Masonry. ed into a fraternity of architects, procuring papal bulls for their encouragement and their particular privileges; they styled themselves Free-masons, and ranged from one nation to another, as they found churches to be built: their government was regular: and where they fixed near the building in hand, they made a camp of hutts. A freemason governed in chief; every ten to twenty of them called a ward, and overlooked each nine. The gentlemen in the neighbourhood, either out of charity or commutation of pencey, gave them the materials and carriages. Those who have seen the accounts in records of the charge of the building in hand, together with the materials and carriages, may have seen how they erected such lofty structures.

By other accounts, however, the antiquity of masonry is carried up much higher, even as early as the building of Solomon's temple. In Britain the introduction of masonry has been fixed at the year 674, when glass-making was first introduced; and it appears indeed, that from this time many buildings in the same style were erected; every master or fellow, who are said to have called themselves free, because they were at liberty to work in any part of the kingdom.

Others have derived the institution of free masons from a combination among the people of that profession not to work without an advance of wages, when they were summoned from several counties, by writs of Edward III. directed to the sheriffs, to affit in rebuilding and enlarging the castle, together with the church of St George at Windsor. At this time, it is said, the masons agreed on certain tokens by which they might know and assist each other against being imprisoned, and not to work unless free and on their own terms.

In a treatise on Masonry published in 1792 by William Preston, master of the Lodge of Antiquity, the origin of masonry is traced from the creation. "Ever since symmetry began, and harmony displayed her charms (says he), our order has had a being." Its introduction into England he likewise supposes to have been prior to the Roman invasion. There are, according to him, the remains yet existing of some stupendous works executed by the Britons much earlier than the time of the Romans; and even these display no small share of ingenuity of invention: so that we can have no doubt of the existence of masonry in Britain even during these early periods. The Druids are likewise said to have had among them many customs similar to those of the masons, and to have derived their government from Pythagoras; but the resemblance between their usages and those of the free-mason societies now existing cannot be accurately traced even by the masons themselves.

Masonry is said to have been encouraged by Caesar, and many of the Roman generals who were appointed governors of Britain: but though we know, that at this period the freemasons were employed in erecting many magnificent fabrics, nothing is recorded concerning their lodges and conventions; and we have but a very imperfect account of the customs which prevailed in their assemblies.

For a long time the progress of masonry in Britain was obstructed by the frequent wars which took place; and it did not revive till the time of Carausius, by whom it was patronized. This general, who hoped to be the founder of a British empire, encouraged learning and learned men; collecting also the best artificers from many different countries, particularly masons, whom he held in great veneration, and appointing Albanus his steward the principal superintendent of their assemblies. Lodges, or conventions of the masons, began now to be introduced, and the business of masonry to be regularly carried on. The masons, through the influence of Albanus, obtained a charter from Carausius to hold a general council, at which Albanus himself sat president, and affixed at the reception of many new members. This Albanus was the celebrated Alban, the first who suffered martyrdom in Britain for the Christian faith. Mr Preston quotes an old MS. destroyed with many others, said to have been in the possession of Nicholas Stone, a curious sculptor under Inigo Jones; from which we learn that St Alban was a great friend to masons, and gave them two hillings per week besides threepence for their cheer: while, before that time, they had only one pence and halfpenny for their meat. He likewise obtained "a charter from the king and his council for them to hold a general council, which was named an assembly." The same circumstances are mentioned in a MS. written in the time of James II. only this increases the weekly salary of the masons to 3s. 6d. and 3d. per day for the bearers of burthens.

The progress of masonry was greatly obstructed by the departure of the Romans from Britain; and in a short time fell into absolute neglect. This was occasioned first by the furious irruptions of the Scots and Picts, which left no time for the cultivation of the arts; and afterwards by the ignorance of the Saxons, whom the ill-advised Britons called in as allies, but who soon became their masters. After the introduction of Christianity, however, the barbarity of these conquerors began to wear off, the arts received some encouragement, and masonry particularly began to flourish. Lodges were now formed; but these being under the direction of foreigners, were seldom convened, and never attained to any degree of consideration or importance. In this situation it continued till the year 557, when St Aulnian, with 40 monks, among whom the sciences had been preferred, came into England. By the principles of Christianity were propagated with such zeal, that all the kings of the heptarchy were converted; and which masonry was taken under the patronage of St Aulnian and the Gothic style of building was introduced into England by the numerous foreigners who resorted at this time to the kingdom. Aulnian himself appeared at the head of the fraternity in founding the old cathedral of Canterbury in 600; that of Rochester in 602; St Paul's in London in 604; St Peter's in Westminster in 605, as well as many others. The number of masons in England was thus greatly increased, as well as by his other buildings of castles, &c. throughout the kingdom.

In 640 a few expert brethren arrived from France, and formed themselves into a lodge under the direction of Bennet abbot of Wirral; whom King Edmund, King of Mercia soon after appointed inspecror of the lodges, and general superintendent of the masons. During the
MASONRY, the whole time of the heptarchy, however, masonry was in a low state, but began to revive in 856 under the patronage of St. Wulftho, whom Ethelfrith employed to repair some religious houses; and from that time the art gradually improved till the year 872, when it found a zealous protector in Alfred the Great. This prince was a most eminent patron of all kinds of arts and manufactures: and, with regard to masonry in particular, he appropriated a seventh part of his revenue for maintaining a number of workmen, whom he constantly employed in rebuilding the cities, castles, &c., ruined by the Danes. During the reign of his successor Edwin, the masons continued to hold their lodges under the patronage of Ethelred, husband to the king's sister, and Ethelward his brother, to whom the care of the fraternity was intrusted. The latter was a great architect, and founded the university of Cambridge.

The true re-establishment of masonry in England, however, is dated from the reign of King Athelstan; and there is still extant, a grand lodge of masons at York, who trace their existence from this period. This lodge, the most ancient in England, was founded in 626, under the patronage of Edwin the king's brother, who obtained for them a charter from Athelstan, and became grand master himself. By virtue of this charter it is said, that all the masons in the kingdom were convened at a general assembly in that city, where they established a general or grand lodge for their future government. Under the patronage and jurisdiction of this lodge it is also alleged that the fraternity increased very considerably, and that kings, and princes, and other eminent persons who had been initiated into the mysteries, paid due allegiance to the assembly. But as the times were yet turbulent and barbarous, the art of masonry was sometimes more or less patronized; and of course the assembly more or less respected according to the respect with which the art itself met with. The appellation of ancient-York masons is well known both in Ireland and Scotland, and the general tradition is, that they originated at Anlaby near York; and as Anlaby was a feast of Edwin, this tradition gives considerable confidence. There is indeed great reason to believe that York was the original seat of masonic government, no other place having claimed it, and the whole fraternity having at various times owned allegiance to the authority there established; though we know not whether that allegiance be now given or not. Certain it is, that if such a lodge was once established there, of which there is no reason to doubt, we have no account of its being regularly moved from that place to any other part of the kingdom, with content of its members. Many respectable meetings have indeed been held at different times in other parts of the kingdom, but there is no account of any other general meeting being held in another place than York till very lately.

While prince Edwin lived, the masons were employed as formerly in building churches, monasteries, &c., and repairing those that had suffered by the ravages of the Danes; and after his death the order was patronized by king Athelstan himself; but on his death the masons were dispersed, and remained in an unsettled state till the reign of Edgar in 690. They were now collected by St. Dunstan, who employed them in works of the same kind: but as no permanent encouragement was given them, their lodges soon declined, and masonry remained in a low state for upwards of 50 years. It revived, however, in 1041, under Edward the Confessor, who superintended the execution of several great works. By the assistance of Leofric earl of Coventry, he rebuilt Westminster Abbey, the earl being appointed superintendent of the masons; and by this architect many other magnificent structures were likewise erected. After the conquest, in 1066, Gundulph bishop of Rochester and Roger de Montgomery earl of Shrewsbury, both of them eminent architects, became joint patrons of the masons; and under their auspices the Tower of London was begun, though finished only in the reign of William Rufus, who likewise rebuilt London Bridge with wood, and in 1087 first constructed the palace and hall of Westminster.

The masons now continued to be patronized by the sovereigns of England in succession. The lodges assembled during the reign of Henry I. and during that of Stephen, the society were employed in building a chapel at Westminster, now the House of Commons, and several other works; the president of the lodges being under Gilbert de Clare, the marquis of Pembroke. During the reign of Henry II. the lodges were superintended by the grand-master of the Knights Templars, who employed them in building their temple in Fleet-street in the year 1155. Masonry continued under the patronage of this order till the year 1290, when John succeeded Richard I. in the throne of England, and Peter de Colechurch was then appointed grand-master. He began to rebuild London Bridge with stone, which was afterwards finished by William Almain in 1209. Peter de Rupibus succeeded Peter de Colechurch in the office of grand-master, and Geoffrey Fitz-Peter, chief surveyor of the king's works, acted as deputy under him; masonry continued also to flourish under the auspices of these two artists during this and the following reign. On the accession of Edward I. in 1272, the superintendence of the masons was transferred to Walter Giffard archbishop of York. Gilbert de Clare eal of Gloucester and heir of Robert, earl of Gloucester and lord of Mount Hermon, the progenitor of the family of the Montagues; and by these architects the abbey of Westminster was finished, after having been begun in 1220, during the minority of Henry II. During the reign of Edward II. the fraternity were employed in building Exeter and Oriel Colleges in Oxford, Clare-hall in Cambridge, &c., under the auspices of Walter Stapleton bishop of Exeter, who had been appointed grand-master of the masons in 1307.

Edward III. was a great encourager of learning in general, and not only patronized the masons, but applied very affably to the confusions of the order, revised and reconstituted the masonic charges, and added several useful regulations to the original constitution by which the fraternity had been governed. He patronized the lodges, and appointed five deputies under him to inspect their proceedings; and at this period it appears from some old records, that the lodges were numerous, and that the fraternity held communications under the protection of the civil magistrates. William a Wykeham was continued grand-master on the accession of Richard.
The bishop was soon after this diverted from his persecution of the nations by an affair of a more important kind. He had formed a design of surprising the city of London on the evening of St Simon and St Jude's day, that on which the Lord Mayor was invested with his office. But the plot having been discovered by the duke of Gloucester, the Mayor was sent for while at dinner, and ordered to keep a strict watch for that night. The bishop's party accordingly made an attempt to enter by the bridge about nine the next morning, but were repulsed by the vigilance of the citizens. At this the prelate was so much enraged, that he collected a numerous body of archers and men at arms, commanding them to assault the gate with shot. By the prudence of the magistrates, however, all violent measures were stopped; but no reconciliation could be procured between the two parties, though it was attempted by the archbishop of Canterbury, and Peter duke of Coimbra, eldest son to the king of Portugal, with several other persons of distinction. At last the bishop wrote a letter to the duke of Bedford, urging his return to England, and informing him of the danger there was of a civil war, and reflecting upon the duke of Gloucester, who had continually encouraged the people, and stirring up a rebellion in the nation, contrary to the king's peace." To this the bishop answered, "That he never had any intention to disturb the peace of the nation or raise a rebellion; but that he sent to the duke of Bedford to solicit his return to England, to settle all those differences which were so prejudicial to the peace of the kingdom: That though he had indeed written in the letter, ‘That if he tarried, we should put the land in adventure by a field, such a brother you have here,’ he did not mean it of any design of his own, but concerning the seditious assemblies of masons, carpenters, tylers, and plasterers, who being disturbed by the late act of parliament against the excessive wages of these trades, had given out many seditious speeches and menaces against certain great men, which tended much to rebellion.’ &c.

Notwithstanding this heavy charge, the duke of Gloucester, who knew the innocence of the parties accused, took the masons under his protection, and transferred the charge of sedition and rebellion from them to the bishop and his followers. By the interest of the latter, however, the king granted him pardon for all offences; and though the duke drew up fresh articles of impeachment against him in 1442, and presented them in person to the king, the council, being camped
This event might have been attended with Mafoary, composed mostly of ecclesiastics, proceeded so slowly in the business, that the duke, wearied out with the tediousness of the matter, dropped the prosecution entirely.

This contest terminated in the impeachment, imprisonment, and murder of the duke of Gloucester himself. This event might have been attended with bad consequence, had not their inveterate enemy, the prelate of York, been taken off by death in about two months after the duke. The masons then continued not only to meet in safety, but were joined by the king himself. He was, that very year (1442) initiated into masonry, and from that time spared no pains to become completely master of the art. He perused the ancient charges, revised the constitutions, and, with the consent of his council, honoured them with his sanction. The example of the sovereign was followed by many of the nobility, who assiduously studied the art. The king presided over the lodges in person, nominating William Wanefleet bishop of Winchester grand-master. This bishop at his own expense built Magdalen college, Oxford, and several religious houses. Eton-college near Windsor, and King's-college at Cambridge, were also founded during this reign. Henry himself founded Christ's-college, Cambridge, as his queen Margaret of Anjou did Queen's-college in the same university.

About this time also, the masons were protected and encouraged by James I. of Scotland, who, after his return from captivity, became a zealous patron of arts and learning of all kinds. He honoured the lodges with his royal presence, and setled an annual revenue of four pounds Scots (an English noble) to be paid by every master-mason in Scotland, to a grand-master chosen by the grand lodge, and approved by the crown, one nobly born, or an eminent clergyman who had his deputies in cities and counties; something was likewise paid him by every other brother at his entry. His office intitled him to regulate every thing in the fraternity which could not come under the jurisdiction of law-courts; and, to prevent law-suits, both mason and lord, or builder and founder, appealed to him. In his absence, they appealed to his deputy or grand-warden, who reigned next the previous master.

The flourishing state of masonry was interrupted by the civil wars between the houses of York and Lancaster, which brought it almost totally into neglect. About 1471, however, it revived under the auspices of Robert Beauchamp bishop of Sarum, who had been appointed grand-master by Edward IV. and honoured with the title of Chancellor of the Garter, for repairing the castle and chapel of Windor. It again declined during the reigns of Edward V. and Richard III.; but came once more into repute on the accession of Henry VIII. in 1585. It was now patronized by the master and fellows of the order of St John at Rhodes (now Malta), who attended their grand-lodge in 1500, and chose Henry for their protector. On the 24th of June 1502, a lodge of masons was formed in the palace, at which the king presided as grand-master; and having appointed John Filip abbot of Westminster, and Sir Reginald Bray knight of the garter, his wardens for the occasion, proceeded in great state to the east end of Westminster abbey, where he laid the first stone of that excellent piece of Gothic architecture called Henry the Seventh's Chapel. The cape-floane of this building was celebrated in 1507. The palace of Richmond, as well as many other noble structures, were raised under the direction of Sir Reginald Bray, and the colleges of Brazen-Nose in Oxford, and Jesus and St John's in Cambridge, were all finished in this reign.

On the accession of Henry VIII. Cardinal Wolsey was appointed grand-master; who built Hampton-court, Whitehall, Christ-church college, Oxford, with several other noble edifices; all of which, upon the dis-grace of that prelate, were forfeited to the crown in 1530. Wolsey was succeeded as grand-master in 1534 by Thomas Cromwell earl of Essex; who employed the fraternity in building St James's palace, Christ's hospital, and Greenwich castle. Cromwell being beheaded in 1540, John Touchet lord Andley succeeded to the office of grand-master, and built Magdalen college in Cambridge, and many other structures. In 1547, the duke of Somerset, guardian to the king, and regent of the kingdom, became superintendant of the masons, and built Somerset-house in the Strand; which, on his being beheaded, was forfeited to the crown in 1552.

After the death of the duke of Somerset, John Poynter bishop of Winchester presided over the lodges till the death of the king in 1553. From this time they continued without any patron till the reign of Elizabeth, when Sir Thomas Sackville accepted of the office of grand-master. Lodges, however, had been held during this period in different parts of England; but the general or grand lodge assembled in the city of York, where it laid the fraternity were numerous and respectable.—Of the queen we have the following curious anecdote with regard to the masons: Hearing that they were in possession of many secrets which they refused to divulge, and being naturally jealous of all secret assemblies, the sent an armed force to York to break up their annual grand-lodge. The design was prevented by the interposition of Sir Thomas Sackville, who took care to initiate some of the chief officers whom the had sent on this duty in the secrets of masonry. These joined in communication with their new brethren, and made favourable reports to the queen on their return that the countermanded her orders, and never afterwards attempted to disturb the meetings of the fraternity. In 1567, Sir Thomas Sackville resigned the office of grand-master in favour of Francis Russell earl of Bedford, and Sir Thomas Gresham an eminent merchant. The former had the care of the brethren in the northern part of the kingdom assigned to him, while the latter was appointed to superintend the meetings in the south, where the society had considerably increased, in consequence of the Honourable report which had been made to the queen. The general assembly, however, continued to meet at York as formerly; and here all records were kept, and appeals made on every important occasion to the assembly.

Sir Thomas Gresham abovementioned proposed to erect a building in the city of London for the benefit of commerce, provided the citizens would purchase a plot proper for the purpose. Accordingly some houses
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booses between Cornhill and Threadneedle-street being pulled down, the foundation-stone of the building was laid on the 7th of June 1566, and with such expedition was the work carried on, that the whole was finished in November 1567. This building, which was constructed on the plan of the exchange of Antwerp, was called at first simply the Bourse; but in January 1570, the queen having dined with Sir Thomas, returned through Cornhill, entered the Bourse on the fourth side, and having viewed every part of the building, particularly the gallery which extended round the whole structure, and which was furnished with shops filled with all sorts of the finest merchandise in the city, she caused the edifice to be proclaimed, in her presence, by herald and trumpet, the Royal Exchange; and on this occasion, it is said Sir Thomas appeared publicly in the character of grand-master.

The queen being now thoroughly convinced that the fraternity of masons did not interfere in state affairs, became quite reconciled to their assemblies, and from this time masonry made a considerable progress; lodges were held in different parts of the kingdom, particularly in London and its neighbourhood, where the number of the brethren increased considerabyl. Several great works were carried on there under the auspices of Sir Thomas Gresham, from whom the fraternity received every encouragement.

Sir Thomas was succeeded in the office of grand-master by Charles Howard earl of Suffolk, who continued to preside over the lodges in the fourth till the year 1588, when George Hattingham earl of Huntington was chosen grand-master, and remained in the office till the decease of the queen in 1603.

On the accession of James I. to the crown of England, masonry flourished in both kingdoms, and lodges were held in both kingdoms. A number of gentlemen returned from their travels, with curious drawings of the old Greek and Roman architecture, as well as strong inclination to revive a knowledge of it. Among these was the celebrated Inigo Jones, who was appointed general surveyor to the king. He was named grand-master of England, and was depoted by the king to prescribe over the lodges. Several learned men were now initiated into the mysteries of masonry, and the society increased considerably in reputation and consequence. Ingenious artists returned to England in great numbers; lodges were constituted as seminaries of instruction in the sciences and polite arts after the model of the Italian schools; the communications of the fraternity were established, and the annual festivals regularly observed. Under the direction of this accomplished architect, many magnificent structures were raised; and among the rest he was employed, by command of the sovereign, to plan a new palace at Whitehall, worthy of the residence of the kings of England. This was executed; but for want of a parliamentary fund, no more of the plan was ever finished than the banqueting-house. Inigo Jones continued in the office of grand-master till the year 1621, when he was succeeded by the earl of Pembroke; under whose auspices many eminent and wealthy men were initiated, and the mysteries of the order held in high estimation.

After Charles I. ascended the throne, Earl Pembroke was continued in his office till the year 1630, when he resigned in favour of Henry Danvers earl of Danby. This nobleman was succeeded in 1633 by Thomas Howard earl of Arundel, the ancestor of the Norfolk family. In 1635, Francis Rulcel earl of Bedford accepted the government of the society; but Inigo Jones having continued to patronize the lodges during his lordship's administration, he was re-elected the following year, and continued in office till the year of his death, 1646. The progress of masonry, however, was for some time obstructed by the breaking out of the civil wars; but it began to revive under the patronage of Charles II. who had been received into the order during his exile. Some lodges during this reign were constituted by leave of the several noble grand-masters, and many gentlemen and learned scholars requested at that time to be admitted into the fraternity. On the 27th of December 1663, a general assembly was held, where Henry Jenyns earl of St Albans was elected grand-master; who appointed Sir John Denham his deputy, and Mr Christopher Wren, afterwards the celebrated Sir Christopher Wren, and John Webb, his wardens. At this assembly several useful regulations were made, for the better government of the lodges, and the greatest harmony prevailed among the whole fraternity. The Earl of St Albans was succeeded in his office of grand-master by Sir Christopher Wren in the year 1666, when Sir Christopher Wren was appointed deputy, and distinguished himself beyond any of his predecessors in promoting the prosperity of the lodges which remained at that time, particularly that of St Paul's, now the lodge of Antiquity, which he patronized upwards of 18 years. At this time he attended the meetings regularly; and during his presidency made a present to the lodge of three mahogany candlesticks, which at that time were very valuable. They are still preserved, and highly valued as a testimony of the esteem of the donor.

The fire which in 1666 destroyed such a great part of London, afforded ample opportunity for the masons to exert their abilities. After a calamity so sudden and extenuative, however, it became necessary to adopt some regulations to prevent such a catastrophe in time to come. It was now determined, that in all the new buildings to be erected, stone should be used instead of timber. Wren was ordered by the king and grand-master to draw up the plan of a city with broad and regular streets. Sir Christopher Wren was appointed surveyor-general and principal architect for rebuilding the city, the cathedral of St Paul, and all the parochial churches erected by parliament, in lieu of those that were destroyed, with other public structures. This gentleman, however, conceiving the charge to be too important for a single person, selected for his assistant Mr Robert Hook professor of geometry in Gresham college. The latter was immediately employed in measuring, adjusting, and setting out the

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(a) Mr Pretyton observes, that the grand-master of the north bears the title of grand-master of all England, which (says he) may probably have been occasioned by the title of grand-master.
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ground of the private streets to the several proprietors.

The model and plan were laid before the king and house of commons, and the practicability of the whole scheme, without any infringement of private property; but unfortunately it happened, that the greater part of the citizens were totally averse to leaving their old habitations, and building houses in other places: and so obstinate were they in their determinations, that they chose rather to have their old city again under all its disadvantages, than a new one upon the improved plan. Thus an opportunity was lost of making the new city the most magnificent as well as the most convenient for health and commerce of any in Europe.

Hence the architect, being cramped in the execution of his plan, was obliged to alter and abridge it, and to model the city after the manner in which it has since appeared. In 1673 the foundation stone of the cathedral of St. Paul’s was laid with great solemnity by the king in person, and the mallet which was used on this occasion is still preserved in the lodge of Antiquity as a great curiosity.

During the time that the city was rebuilding, lodges were held by the fraternity in different places, and many new ones constituted, to which the best architects resorted. In 1674, Earl Rivers resigned the office of grand-master in favour of George Villiers, Duke of Buckingham, who left the care of the fraternity to his wardens, and Sir Christopher Wren who still continued to act as deputy. In 1679, the Duke resigned in favour of Henry Bennet, Earl of Arlington: but this nobleman was too deeply engaged in state affairs to attend to his duty as a mason, though the lodges continued to meet under his function, and many respectable gentlemen joined the fraternity. During the short reign of James II. the masons were much neglected. In 1685, Sir Christopher Wren was elected to the office of grand-master, who appointed Gabriel Cibber and Sir Edward Strong his wardens: yet notwithstanding the great reputation and abilities of this celebrated architect, masonry continued in a declining way for many years, and only a few lodges were held occasionally in different parts of the kingdom.

At the Revolution, the society was in such a low state in the south of England, that only seven regular lodges were held in London and its suburbs; and of these, only three, that of St. Paul’s and one at St. Thomas’s hospital, Southwark, were of any consequence. But in 1695 King William having been initiated into the mysteries, honoured the lodges with his presence, particularly one at Hampton-court, at which he is said to have frequently prised during the time that the new part of his palace was building. Many of the nobility were present at a general assembly and feast held in 1698, particularly Charles Duke of Richmond and Lenox, who was elected grand-master for that year; but in 1698 resigned his office to Sir Christopher Wren, who continued at the head of the fraternity till King William’s death in 1702.

During the reign of Queen Anne, masonry made no considerable progress. Sir Christopher’s age and infirmities drew off his attention from the duties of his office, the annual festivals were entirely neglected, and the number of masons considerably diminished. It was therefore determined that the privileges of masonry should not be confined to operative masons, but that people of all professions should be admitted to participate in them, provided they were regularly approved and initiated into the order.

Thus the society once more rose into esteem; and on the accession of George I., the masons, now deprived of Sir Christopher Wren, resolved to unite again under a grand-master, and revive the annual festivals. With this view, the members of the only four lodges at that time existing in London, met at the Apple-tree tavern in Charles-street Covent Garden; and having voted the oldest master-mason then present into the chair, constituted themselves a grand-lodge pro tempore. It was now resolved to renew the quarterly communications among the brethren; and at an annual meeting held on the 24th of June the same year, Mr. Anthony Sayer was elected grand-mason, invested by the oldest master-mason there present, installed by the master of the oldest lodge, and had due emolument paid him by the fraternity. Before this time a sufficient number of masons, met together within a certain district, had ample power to make masons without a warrant of constitution: but it was now determined, that the privilege of assembling as masons should be vested in certain lodges or assemblies of masons convened in certain places, and that every lodge to be afterwards convened, excepting the four old lodges then existing, should be authorized to act by a warrant from the grand-master for the time, granted by petition from certain individuals, with the consent and approbation of the grand-lodge in communication; and that without such warrant no lodge should hereafter be deemed regular or constitutional. The former privileges, however, were still allowed to remain to the four old lodges then existing. In consequence of this, the old masons in the metropolis vested all their inherent privileges as individuals in the four old lodges, in trust that they never would suffer the ancient charges and land-marks to be infringed. The four old lodges, on their part, agreed to extend their patronage to every new lodge which should hereafter be constituted according to the new regulations of the society; and while they acted in conformity to the ancient constitutions of the order, to admit their masters and wardens to share with them all the privileges of the grand-lodge, that of precedence only excepted.

Matters being thus settled, the brethren of the four old lodges considered their attendance on the future communications of the society as unnecessary; and therefore trusted implicitly to their masters and wardens, satisfied that no measure of importance would be adopted without their approbation. It was, however, soon discovered, that the new lodges being equally represented with the old ones at the communications, would at length far outnumber them, that by a majority they might subvert the privileges of the original masons of England which had been centered in the four old lodges; on which account a code of laws was, with the consent of the brethren at large, drawn up for the future government of the society. To this the following was annexed, binding the grand master for the time being, his successors, and the master of every lodge to be hereafter constituted, to preserve it inviolably; "Every annual grand-lodge has an..."
History. an inherent power and authority to make new regulations, or to alter those for the real benefit of this ancient fraternity, provided always that the old landmarks be carefully preserved; and that such alterations and new regulations be proposed and agreed to at the third quarterly communication preceding the annual grand feast; and that they be offered also to the perusal of all the brethren before dinner, in writing, even of the youngest apprentice; the approbation and consent of the majority of all the brethren present being absolutely necessary to make the same binding and obligatory. To commemorate this circumstance, it has been customary, ever since that time, for the master of the oldest lodge to attend every grand installation; and, taking precedence of all present, the grand-master only excepted, to deliver the book of the original constitutions to the new installed grand-master, on his promising obedience to the ancient charges and general regulations.

By this precaution the original constitutions were established as the basis of all succeeding masonic jurisdiction in the south of England; and the ancient landmarks, as they are called, or the boundaries set up as checks against innovation, were carefully secured from the attacks of any future invaders. No great progress, however, was made during the administration of Mr Sayer, only two lodges being constituted, though several brethren joined the old ones. In 1718 Mr Sayer was succeeded by Mr George Payne, who collected many valuable manuscripts on the subject of masonry, and earnestly requested, that the fraternity would bring to the grand lodge any old writings or records concerning the fraternity, to show the usages of ancient times; and in consequence of this invitation, several old copies of the Gothic constitutions were produced, arranged, and digested. Another assembly and feast were held on the 24th of June 1719, when Dr Defaguliers was unanimously elected grand-master. At this feast the old, regular, and peculiar toasts were introduced; and from this time we may date the rise of free-masonry on its present plan in the south of England. Many new lodges were established, the old ones visited by many masons who had long neglected the craft, and several noblemen initiated into the mysteries. In 1720, however, the fraternity sustained an irreparable loss by the burning of several valuable manuscripts, concerning the lodges, regulations, charges, secrets, &c. (particularly one written by Mr Nicholas Stone, the warden under Inigo Jones). This was done by some ferapous brethren, who were alarmed at the publication of the masonic constitutions. At a quarterly communication it was this year agreed, that, for the future, the new grand-master shall be named and proposed to the grand-lodge some time before the feast; and if appointed, he shall be installed as grand-master elect; and that every grand-master, when he is installed, shall have the full power of appointing his deputy and wardens according to ancient custom.

In the mean time masonry continued to spread in the north as well as the south of England. The general assembly, or grand lodge at York, continued to meet as usual. Several lodges met in 1705, under the direction of Sir John Tempest baronet, then grand master; and many persons of worth and character were initiated into the mysteries of the fraternity. The greatest harmony subsisted between the two grand lodges, and private lodges were formed in both parts of the kingdom under their separate jurisdiction. The only distinction which the grand lodge in the north appears to have retained is in the title of the Grand Lodge of all England; while the other was only called the Grand Lodge of England. The latter, however, being encouraged by some of the principal nobility, soon acquired influence and reputation, while the other seemed gradually to decline; but, till within these few years, the authority of the grand lodge at York was never challenged; on the other hand, every mason in the kingdom held that assembly in the highest veneration, and considered himself bound by the charges which originated from that assembly. It was the glory and boast of the brethren in almost every country where masonry was established to be accredited descendants of the original York masons; and from the universality of the idea that masonry was first established at York, by charter, the masons of England have received tribute from the first fates Eu- rope. At present, however, this social intercourse is abolished, and the lodges in the north and south are almost entirely unknown to one another; and neither the lodges of Scotland nor Ireland could correspond with the grand lodge at London. This is said to have been owing to the introduction of some innovations among the lodges in the south; but for the coolness which subsists between the two grand lodges another reason is assigned. A few brethren at York having, on some trivial occasion, received from their ancient lodge, they applied to London for a warrant of constitution. Their application was honoured without any inquiry into the merits of the case; and thus, instead of being recommended to the mother lodge to be restored to favour, these brethren were encouraged to revolt, and permitted, under the sanction of the grand lodge in London, to open a new lodge in the city of York itself. This illegal extension of power greatly offended the grand lodge at York; and occasioned a rupture which has never yet been made up.

The duke of Bucclugh, who in 1723 succeeded the duke of Wharton as grand-master, first proposed a scheme of raising a general fund for destitute masons. The duke's motion was supported by Lord Paldey, Colonel Hounston, and a few other brethren; and the grand lodge appointed a committee to consider of the most effectual means of carrying the scheme into execution. The disposal of the charity was first vested in seven brethren; but this number being found too small, nine more were added. It was afterwards resolved that 12 matters of contributing lodges, in rotation with the grand officers, should form the committee; and by another resolution it was determined that at all past and present grand officers, with the masters of all regular lodges which shall have contributed within 12 months to the charity, shall be members of the committee. This committee meets four times in the year by virtue of a summons from the grand master or his deputy. The petitions of the destitute brethren are considered at these meetings; and if the petitioner be considered as a delinquent object, he is immediately relieved with five pounds. If the circumstances of the case are of
MASONRY, a peculiar nature, his petition is referred to the next communication, where he is relieved with any fund the committee may have specified, not exceeding 20 guineas at one time. Thus the diffidnt have always found ready relief from this general charity, which is supported by the voluntary contributions of different lodges out of their private funds, without being burdensome to any member in the society. Thus has the committee of charity for free masons been established; and free masons have the contributions been; that though the sums annually expended for the relief of the distressed brethren have for several years past amounted to many thousand pounds, there still remains a considerable sum.

The most remarkable events which of late have taken place in the affairs of masonry, are the initiation of Omnitul Omrah Bahauder, eldest son of the nabob of the Carnatic, who was received by the lodge of Trinchnopolly in the year 1779. The news being officially transmitted to England, the grand lodge determined to send a congratulatory letter to his highness on the occasion, accompanied with an apron elegantly decorated, and a copy of the book of Constitutions superbly bound. The execution of this commission was entrusted to Sir John Duy, advocate-general of Bengal, and in the beginning of 1780, an answer was received from his highness acknowledging the receipt of the present, and expressing the warmest attachment and benevolence to his brethren in England. The letter was written in the Persian language, and inclosed in an elegant cover of cloth of gold, and addressed to the grand master and grand lodge of England. A proper reply was made; and a translation of his highness's letter was ordered to be copied on vellum; and, with the original, elegantly framed and glazed, and hung up in the hall at every public meeting of the society.

After such a long history of the rise and progress of masonry, it must be natural to inquire into the use of the institution, and for what purpose it has been patronized by so many great and illustrious personages. The profound secrecy, however, in which every thing relating to masonry is involved, prevents us from being very particular on this head. The masons themselves, in general, that it is a system of morality, friendship, and charity; that in proportion as masonry has been cultivated, the countries have been civilized, &c. How far this can be depended upon, the fraternity themselves best know. Another advantage, however, seems leis equivocal, viz. that its signs serve as a kind of universal language, so that by means of them, people of the most different nations may become acquainted, and enter into friendship with one another. This certainly must be accounted a very important circumstance; and considering the great number which have been, and daily are, admitted to the society, and their inviolable attachment to the art, we must certainly conclude, that if it contains nothing of great importance to mankind at large, it must at least be extremely agreeable, and even fascinating to those who are once initiated.

Egyptian Masonry; a new system of masonry taught by the celebrated impostor the Count Cagliostro.—It is not known whether this system was an invention of his own, or whether any such thing really has an existence among the superstitious Egyptians. The scheme was first put in execution in London; and by means of his pretended knowledge in the mysteries of this art, the Count procured great sums of money, and attached to himself a vast number of followers. The following particulars concerning it were confided by him before the inquisition at Rome.

The Egyptian masons are divided into several sects, but there are two more esteemed than the rest. The first is that of the adepts, the members of which (say the inquisitors) profess the most irreligious sentiments, and employ magic in their operations; but their principal object is the destruction of the Catholic religion and monarchy. The members of the other sect end to be occupied about the secrets of the hermetic art, and more especially the philosopher's stone. Cagliostro owned that he was associated in London with the second of these sects; that his wife was likewise a member, and received a diploma, which contained five guineas. The lady was presented with a ribbon, on which were embroidered the words Union, Silence, and Virtue; and she was desired to keep the following night with the ribbon attached to her thigh. When a male candidate is to be admitted, his courage must be tried in a number of ways. Cagliostro himself submitted to these trials; among which the following are mentioned in the account of his life. He was first hoisted up to the ceiling by means of a pulley, and after suffering considerable pain, had his hand forced by means of a candle. His eyes were then covered with a bandage, and he received an empty pistol, with orders to charge it. This being done, he was ordered to discharge it against his head; and upon his refusing to do so, the pistol was taken from him with contempt, but returned after a number of ceremonies. This had such an effect upon him, that without any regard to self-preservation, he drew the trigger, and got a smart stroke on the skull, which, however, produced no bad consequence. At the initiation of other candidates, he discovered that the pistol was changed, an unloaded one being put into the hands of the person when blindfolded, and that one of the aforesaid struck him a smart blow on his head, to make him think himself wounded. The ceremony was concluded with his taking an oath of secrecy and obedience to the grand-master.

MASORA, a term in the Jewish theology, signifying a work on the Bible, performed by several learned rabbins, to secure it from any alterations which might otherwise happen.

Their work regards merely the letter of the Hebrew text, in which they have, first, fixed the true reading by vowels and accents; they have feconedly, numbered not only the chapters and sections, but the verses, words, and letters of the text; and they find in the Pentateuch 5245 verses, and in the whole Bible 23206. The mason is called, by the Jews, the hedge or fence of the law, because this enumeration of the verses, &c. serves as a means of preferring it from fear of omission and alteration. They have, thirdly, marked whatever irregularities occur in any of the letters of the Hebrew text; such as the different size of the letters, their various positions and inversions, &c. and they have been fruitful in finding out reasons for these irregularities and mysteries in them. They are, fourthly, supposed to be
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be the authors of the Keri and Chetibb, or the marginal corrections of the text in our Hebrew Bibles.

The text of the sacred books, it is to be observed, was originally written without any breaks or divisions into chapters or verses, or even into words; so that a whole book, in the ancient manner, was but one continued word: of this kind we have still several ancient manuscripts, both Greek and Latin. In regard therefore, the sacred writings had undergone an infinite number of alterations, whence various readings had arisen, and the original was become much mangled and disfigured, the Jews had recourse to a canon, which they judged infallible, to fix and ascertain the reading of the Hebrew text; and this rule they call maforah, “tradition,” from tradit, as if this critique were nothing but a tradition which they had received from their forefathers. Accordingly they say, that when God gave the law to Moses at Mount Sinai, he taught him, first, the true reading of it; and, secondly, its true interpretation, and that both these were handed down by oral tradition, from generation to generation, till at length they were committed to writing. The former of these, viz. the true reading is the subject of the maforah; the latter, or true interpretation, that of the mithna and gemara.

According to Elias Levita, they were the Jews of a famous school at Tiberias, about 500 years after Christ, who composed, or at least began the maforah; whence they are called maforites and maforetic doctors. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which serve for vowels.

The age of the maforites has been much disputed. Archbishop Usher places them before Jerom; Capel, at the end of the fifth century; father Morin, in the tenth century. Balfnage says, that they were not a society, but a succession of men; and that the maforah is the work of many grammarians, who, without associating and communicating their notions, composed this collection of criticisms on the Hebrew text. It is urged that there were maforites from the time of Ezra and from the first century of the Christian era; and that Ben Abner and Ben Naphthali, who were the best of the profession, and who, according to Balfnage, were the inventors of the maforah, flourished at this time. Each of these published a copy of the whole Hebrew text, as correct, says Dr Prideaux, as they could make it. The eastern Jews have followed that of Ben Naphthali, and the western that of Ben Abner; and all that has been done since is to copy after them, without making any more corrections, or maforetical critidifs.

The Arabs have done the same thing by their Koran that the maforites have done by the Bible; nor do the Jews deny their having borrowed this expedient from the Arabs, who first put it in practice in the seventh century.

There is a great and little maforah printed at Venice and at Basil, with the Hebrew text in a different character. Buxtorf has written a maforetic commentary, which he calls Tiberias.

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MASQUE, or MASK, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition either to preserve their complexion from the weather, or of moda}sty to prevent their being known. Poppaea, wife of Nero, is said to be the first inventor of the masque, which she did to guard her complexion from the sun and weather, as being the most delicate woman with regard to her person, that has been known.

Theatrical masques were in common use both among the Greeks and Romans; Suidas and Athenaeus ascribe the invention of them to the poet Choerilus, a contemporary of Theophras; Horace attributes them to Alcybul; but Aristotel informs us, that the real inventor, and consequently the time of their first introduction and use, were unknown. Brantome observes, that the common use of modern masques was not introduced till towards the end of the sixteenth century. Masques is also used to signify anything used to cover the face, and prevent a person's being known.

The penitents of Lyons and Avignon hide their faces with large white veils, which serve them for masques.

The Iron Masque (Masque de Fer), or Man with the iron masque, a remarkable personage so denominated, who existed as a state prisoner in France during the latter part of the last century. As the circumstances of this person form a historical problem which has occasioned much inquiry, and given rise to many conjectures, as well as of late, in consequence of the destruction of the Bastille, excited in a particular manner the curiosity of the public, it shall be endeavoured to condense in this article the substance of every thing material that has been published on the subject. We shall first relate such particulars concerning this extraordinary prisoner as appear to be well authenticated; and shall afterwards mention the different opinions and conjectures that have been entertained with regard to his real quality, and the causes of his confinement.

1. The authenticated particulars concerning the iron Masque are as follows: a few months after the death of Cardinal Mazarine, there arrived at the Isle of Sainte Marguerite, in the sea of province, a young prisoner whose appearance was peculiarly attractive; his person was above the middle size, and elegantly formed; his mien and deportment were noble, and his manners graceful; and about the year 1658, with his hat thrown off, his face uncovered, he walked before a thousand eyes without embarrassment; and it is certain that every one was insensibly drawn to him, attracted by the unusual elegance of his person and the gravity of his deportment, and never wore his hat before him, nor sat down in his presence unless he was desired. The Marquis de Louvois, who went to see him at Sainte Marguerite, spoke to him standing, and with that kind of attention which denotes high respect.

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During his residence here, he attempted twice, in an indirect manner, to make himself known. One day he wrote something with his knife on a plate, and threw it out of his window towards a boat that was drawn on shore near the foot of the tower. A fisherman picked it up and carried it to the governor. M. de St Mars was alarmed at the sight; and asked the man with great anxiety, whether he could not read, and whether any one else had seen the plate? The man answered, that he could not read, that he had but just found the plate, and that no one else had seen it. He was, however, confined till the governor was well assured of the truth of his assertions. —Another attempt to discover himself proved equally unsuccessful. A young man who lived in the ile, one day perceived something floating under the prisoner’s window; and on picking it up, he discovered it to be a very fine shirt written all over. He carried it immediately to the governor; who, having looked at some parts of the writing, asked the lad, with some appearance of anxiety, if he had not had the curiosity to read it? He protested repeatedly that he had not: but two days afterwards he was found dead in his bed.

The Masque de Fer remained in this ile till the year 1698, when M. St Mars being promoted to the government of the Bafile, conducted his prisoner to that forreces. In his way thither, he slept with him at his estate near Paltuce. The Masque arrived there in a litter, surrounded by a numerous guard on horseback. M. de St Mars eat at the same table with him all the time they resided at Palteau; but the latter was always placed with his back towards the windows; and the peasants, who came to pay their compliments to their master, and whom curiosity kept constantly on the watch, observed that M. de St Mars always sat opposite to him with two pistols by the side of his plate. They were waited on by one servant only, who brought in and carried out the dishes, always carefully shutting the door both in going out and returning. The prisoner was always masked, even when he passed through the court; but the people saw his teeth and lips, and also observed that his hair was grey.

The governor slept in the same room with him, in a second bed that was placed in it on that occasion. In the course of their journey, the iron mask was, one day, heard by an officer his keeper whether the king had any design in his life to be a Prince,” he replied; “provided that you quietly allow yourself to be conducted, your life is perfectly secure.”

The stranger was accommodated as well as it was possible to be in the Bafile. An apartment had been prepared for him by order of the governor before his arrival, fitted up in the most convenient style; and every thing he expressed a desire for was instantly procured him. His table was the best that could be provided; and he was ordered to be supplied with as rich clothes as he desired: but his chief taffe in this last particular was for lace, and for linen remarkably fine. It appears that he was allowed the use of such books as he desired, and that he spent much of his time in reading. He also amused himself by playing upon the guitar. He had the liberty of going to mass; but was then strictly forbidden to speak or uncover his face: orders were even given to the soldiers to fire upon him if he attempted either; and their pieces were always pointed towards him as he passed through the court. When he had occasion to see a surgeon or a physician, he was obliged, under pain of death, constantly to wear his mask. An old physician of the Bafile, who had often attended him when he was indisposed, said, that he never saw his face, though he had frequently examined his tongue, and different parts of his body; that there was something uncommonly interesting in the sound of his voice; and that he never complained of his confinement, nor let fall from him any hint by which it might be guessed who he was. It is said that he often passed the night in walking up and down his room.

This unfortunate prince died on the 19th of November 1703, after a short illness; and was interred next day in the burying-place of the parish of St Paul. The expense of his funeral amounted only to forty livres. The name given him was Marchisias; and even his age, as well as his real name, it seemed of importance to conceal; for in the register made of his funeral, it was mentioned that he was about forty years old; though he had told his apothecary; some time before his death, that he thought he must be sixty. —It is a well known fact, that immediately after the prisoner’s death, his apparel, linen, clothes, mattresses; and in short every thing that had been used by him, were burnt; that the walls of his room were scraped, the floor taken up, evidently from the apprehension that he might have found means of writing any thing that would have discovered who he was. Nay such was the fear of his having left a letter or any mark which might lead to a discovery, that his plate was melted down; the glass was taken out of the window of his room and pounded to dust; the window-frame and doors burnt; and the ceiling of the room, and the plaster of the inside of the chimney, taken down. Several persons have affirmed, that the body was buried without a head; and Monfieur de Saint-Bois informs us, that “a gentleman having bribed the sexton, had the body taken up in the night, and found his Head in a fone instead of the head.”

The result of these extraordinary accounts is, that the iron masque was not only a person of high birth, but must have been of great consequence; and that his being concealed was of the utmost importance to the king and ministry. We come now, therefore, to notice.

II. The opinions and conjectures that have been formed concerning the real name and condition of this remarkable personage. Some have pretended that he was the Duke of Beaufort; others, that he was the Count de Vermandois, natural son to Louis XIV. by the duchess de la Valliere. Some maintain him to have been the Duke of Monmouth, natural son of Charles II. of England by Lucy Walters; and others say, that he was Gerard Magni, minister to the Duke of Modena.

Besides these conjectures, none of which posses sufficient probability to entitle them to consideration, the truth has been advanced namely, That the Iron Masque was a son of Anne of Austria, queen to Louis XIII. and consequently that he was a brother of Louis XIV.; but whether a ballard brother, a bro-
ther-german, or a half brother, is a question that has given rise to three several opinions, which we shall state in the order of time in which the respective transactions to which they allude happened.

1. The first opinion is, that the queen proved with child at a time when it was evident it could not have been by her husband, who, for some months before, had never been with her in private. The supposed father of this child is said by some to have been the duke of Buckingham, who came to France in May 1625, to conduct the Princess Henrietta, wife of Charles I. to England. The private letters and memoirs of those times speak very respectfully of the queen and Buckingham: his behaviour at Amiens, whether the queen and queen-mother accompanied the prince in her way to Boulogne, occasioned much whispering: notwithstanding the pains that have been taken by La Porte in his Memoirs to excuse his mistresses, it appears that the king, on this occasion, was extremely offended at her, and that it required all the influence and address of the queen-mother to effect a reconciliation. It is said, that this child was privately brought up in the country; that Mazarin became a favourite, he was entrusted with the care of him; and that Louis XIV. having discovered the secret on the death of the cardinal, thought it necessary to confine him in the manner that has been related.

But it may be observed, that this secret could scarcely have escaped the vigilance of the cardinal de Richelieu: and it is not improbable, that a minister so little scrupulous, if inclined to save the honour of a queen, would have removed a child, who, if he lived, might have been made use of to disturb the tranquility of the kingdom. After this supposed birth, the queen had frequent quarrels with the king, and what was more dangerous, with the cardinal; who even used every means in his power to inquire into her most private transactions. It was on a memorable occasion of this kind, that her servant La Porte was thrown into the Bafilee; and it can scarcely be imagined she would have had the firmness she then displayed, while conscious of so much guilt, and under the risk of having it discovered. The prisoner with the mask appears, by several accounts, to have been a youth of a handsome figure in the year 1661; and in 1703, when he died, to have been above sixty; but had he been a son of Buckingham, he would have been about thirty-fix in 1661, when he could not be said to have been a youth; and in November 1703, above seventy-eight.

2. The second opinion is, that he was the twin-brother of Louis XIV. born some hours after him. This first appeared in a short anonymous work published without date, and without the name of place or printer. It is therein said, "Louis XIV. was born at St Germain en Laye, on the 5th of September 1643, about noon; and the illusory prisoner, known by the appellation of the Iron Masque, was born the same day, while Louis XIII. was at supper. The king and the cardinal, fearing that the pretensions of a twin-brother might one day be employed to renew those civil wars with which France had been so often afflicted, cautiously concealed his birth, and sent him away to be brought up privately. Having but an imperfect knowledge of the circumstances that followed, I shall say nothing more, for fear of committing errors; but I firmly believe the facts I have mentioned; and time will probably prove to my reader, that I have ground for what I have advanced."

This opinion has been more noticed since the publication of a work called Memoirs du Marechal Duc de Richelieu, written by the Abbé Soulavie; concerning which it may be proper to premise, that the present Duke of Richelieu, son of the marshal, disavows this work; while the Abbé Soulavie, who had been employed by the marshal, insists on the authenticity of his papers (A.). He informs us, that the Duke of Richelieu was the lover of Madame de Valois, daughter of the regent duke of Orleans, and afterwards due to Modena, who in return was passionately fond of him: that the regent had something more than a paternal affection for his daughter; and that, though he held his sentiments in abhorrence, the Duke of Richelieu made use of his influence with her father to discover the secret of the prisoner with the mask: that the regent, who had always observed the most profound silence on this subject, was at last persuaded to entrust her with a manuscript, which she immediately sent to her lover, who took a copy of it. This manuscript is supposed to have been written by a gentleman on his death-bed, who had been the governor of the prisoner. The following is an extract of it, from what the Abbé Soulavie has told us.

"The birth of the prisoner happened in the evening of the 5th of September 1628, in presence of the chancellor, the bishop of Meaux, the author of the manuscript, a midwife named Peronne, and a sieur Honorat. This circumstance greatly disturbed the king's mind; he observed, that the Salique law had made no provision for such a case; and that it was even the opinion of some, that the last born was the first conceived, and therefore had a prior right to the other. By the advice of cardinal de Richelieu, it was therefore resolved to conceal his birth, but to preserve his life, in case by the death of his brother it should be necessary to avow him. A declaration was drawn up, and signed and sworn to by all present, in which every circumstance was mentioned, and several marks on his body described. This document being sealed by the chancellor with the royal seal, was delivered to the king; and all were commanded and took an oath never to speak on the subject, not even in private and among themselves. The child was delivered to the care of Madame Peronne the midwife, to be under the direction of cardinal de Richelieu, at whose death the charge devolved to cardinal de Mazarin. Mazarin appointed the author of the manuscript his governor, and entrusted to him the care of his education. But as the prisoner was extremely attached to Madame Peronne, and the equally so to him, he remained with him till her death. His governor carried him to his house in Barbary, and..."

(A) A letter from the Duke of Richelieu, and an answer from the Abbé Soulavie, appeared in the Journal de Paris.
As the prisoner grew up, he became impatient to discover his birth, and often importuned his governor on that subject. His curiosity had been roused, by observing that messengers from the court frequently arrived at the house; and a box, containing letters from the queen and the cardinal, having one day been inadvertently left out, he opened it, and saw enough to guess at the secret. From that time he became thoughtful and melancholy; which (says the author) I could not then account for. He shortly after asked me to get him a portrait of the late and present king, but I put him off by saying that I could not procure any that were good. He then desired me to get him a portrait of the late and present king, who had captivated his affections. He had conceived the king to be beautiful; and love helped him to accomplish the king. It might have served for either of the traits in his hand, saying, This memoir, real or fiction, concludes with saying, I have suffered with him in our common prison: I am now summoned to appear before the queen and the cardinal, having one of the confessions, and that he at that time was on occasion of the execution of the duke of Beaufort, that was killed by the Turks in the defence of Candia in 1669, and the prisoner with the masque was at Pignerol in 1661. Besides, how could the duke of Beaufort have been arrested in the midst of his army, and brought to France, without any one knowing it? and why confine him? and why that mask?—Others have dreamed that he was the count de Vermandois, natural son of Louis XIV. who died publicly at the army in 1683 of the small-pox, and was buried at the little town of Aire and not Arras; in which Father Griffet was mistaken, but in which to be sure there is no great harm. Others have imagined, that it was the duke of Monmouth, who was beheaded publicly in London in the year 1685, but for this he must have risen again from the dead, and he must have changed the order of time, and placed the year 1662 in the room of the year 1685. King James, who never forgave any one, and who on that account deferred all that happened to him, must have pardoned the duke of Monmouth, and got another to die in his stead, who perfectly resembled him. This Sophia must first have been found, and then he must have had the good fortune to let his head be cut off in public, to fave the king of Monmouth. It was necessary that all England should be mistaken; and that King James should beg of Louis XIV. to be so obliging as to be his gaoler; that Louis XIV. after having shown this trampling of civil rights, James, should not have been wanting in the same attention to his friend King William and to Queen Anne (with both of whom he was engaged in war), and to please them, retained the dignity of gaoler, with which James had honoured him. "All these illusions being dissipated, it then remains to know who this prisoner was, and at what age he died. It is clear, that if he was not permitted to crofs the court of the Bastile, or to speak to his physician, except covered with a masque, it must have been from the apprehension that his features and countenance were nothing but riddles; and that his conjectures were nothing but reveries; but added, that they however had related many circumstances that were true; that in fact the order was given to put the prisoner to death if he discovered himself; and that he fulfilled the conversation by saying, All I can tell you on the subject is, that the prisoner was not of such consequence when he died as to be the beginning of the present century as he had been at the beginning of the reign of Louis the XIV. and that he was shut up for important reasons of state." The Abbé Soulavie tells us, that he wrote down what had been said, and gave it to the Marechal to read, who corrected some expressions. The Abbé having proposed some further questions, he answered, "Read what Voltaire published last on the subject of the prisoner with the masque, especially at the end, and reflect on it."—The passage of Voltaire alluded to is as follows.

"The man with the masque (says he) is an enigma of which every one would give the meaning. Some have said that it was the duke of Beaufort; but the duke of Beaufort was killed by the Turks in the defence of Candia in 1669, and the prisoner with the masque was at Pignerol in 1661. Besides, how could the duke of Beaufort have been arrested in the midst of his army, and brought to France, without any one knowing it? and why confine him? and why that mask?—Others have dreamed that he was the count de Vermandois, natural son of Louis XIV. who died publicly at the army in 1683 of the small-pox, and was buried at the little town of Aire and not Arras; in which Father Griffet was mistaken, but in which to be sure there is no great harm. Others have imagined, that it was the duke of Monmouth, who was beheaded publicly in London in the year 1685, but for this he must have risen again from the dead, and he must have changed the order of time, and placed the year 1662 in the room of the year 1685. King James, who never forgave any one, and who on that account deferred all that happened to him, must have pardoned the duke of Monmouth, and got another to die in his stead, who perfectly resembled him. This Sophia must first have been found, and then he must have had the good fortune to let his head be cut off in public, to fave the duke of Monmouth. It was necessary that all England should be mistaken; and that King James should beg of Louis XIV. to be so obliging as to be his gaoler; that Louis XIV. after having shown this trampling of civil rights, James, should not have been wanting in the same attention to his friend King William and to Queen Anne (with both of whom he was engaged in war), and to please them, retained the dignity of gaoler, with which James had honoured him. "All these illusions being dissipated, it then remains to know who this prisoner was, and at what age he died. It is clear, that if he was not permitted to crofs the court of the Bastile, or to speak to his physician, except covered with a masque, it must have been from the apprehension that his features and countenance were nothing but riddles; and that his conjectures were nothing but reveries; but added, that they however had related many circumstances that were true; that in fact the order was given to put the prisoner to death if he discovered himself; and that he fulfilled the conversation by saying, All I can tell you on the subject is, that the prisoner was not of such consequence when he died as to be the beginning of the present century as he had been at the beginning of the reign of Louis the XIV. and that he was shut up for important reasons of state." The Abbé Soulavie tells us, that he wrote down what had been said, and gave it to the Marechal to read, who corrected some expressions. The Abbé having proposed some further questions, he answered, "Read what Voltaire published last on the subject of the prisoner with the masque, especially at the end, and reflect on it."—The passage of Voltaire alluded to is as follows."

The memoir, real or fictitious, concludes with saying, I have suffered with him in our common prison: I am now summoned to appear before the judge on high; and for the peace of my soul I cannot but make this declaration, which may point out to him the means of freeing himself from his present ignominious situation, in case the king his brother should decide in his favor out of children. Can an exterme oath compel me to observe secrecy on a thing so incredible, but which ought to be left on record to posterity.

3. The third opinion is, that he was a son of the queen by the cardinal de Mazarin, born about a year after the death of her husband Louis XIII.; that he was brought up secretly; and that soon after the death of the cardinal, which happened on the 9th of March 1661, he was sent to Pignerol. To this account Father Griffet objects, that it was needless to masque a face that was unknown; and therefore that this opinion does not merit diffusion. But in an answer it has been observed, That the prisoner might be long enough related to Louis XIV., which would be a sufficient reason to have him masked. This opinion is fapped to have been that entertained by Voltaire, who affirms his thorough knowledge of the secret, though he declined being altogether explicit. The Abbé Soulavie, author of Mémoirs of the Marechal de Richelieu, speaking on this subject, says, That he once observed to the Marechal, that he certainly had the means of being informed who the prisoner was, that even seemed that he had told Voltaire, who durst not venture to publish the secret; and that he at last asked him, whether he was not the elder brother of Louis XIV., born without
nance might have discovered some resemblance. He could show his tongue but not his face. He left himself to the apothecary of the Bailie, a few days before his death, that he believed he was about 60. Mr. Maraban, who was son-in-law to this apothecary, and apothecary to the marquis de Richelieu, and afterwards to the regent duke of Orleans, told me this frequently. Why give him an Italian name?—They always called him Monsieur. He who writes this article perhaps knows more than Father Giffit, but he will say nothing farther."

This opinion has been lately refuted, illustrated, and enforced by M. de Saint-Mihiel, in a work intitled *Le Veritable Homme,* &c. «The real man with the Iron Masque." The author, in support of his idea, attempts to prove that Anne of Austria and Cardinal Mazarin were married. This, says he, the duchesses of Orleans affurles us in three of her letters. In the first, dated Sept. 13, 1713, she expresses herself as follows: "Old Beauvais, who was first lady of the bed-chamber to the queen-dowager, was acquainted with the secret of the ridiculous marriage; this rendered it necessary for the queen to do every thing that her confidential wish; and this circumstance has given rise in this country to an extension of the rights of first lady of the bedchamber." In the second of these letters, dated Nov. 2, 1717, she says, "The queen-mother, widow of Louis XIII. did worse than love Cardinal Mazarin; she married him, for he was not a priest: he was not even in orders; and who could have hindered her? He was most horribly tired of the good queen-mother, and lived on very bad terms with her, which is the reward that people deserve from entering into such marriages." In her third letter, dated July 2, 1719, speaking of the queen, the duchess says, "She was perfectly easy respecting Cardinal Mazarin; he was not a priest, and therefore nothing could prevent their being married. The secret passage thro' which the cardinal went every evening to the queen's apartment, is still to be seen at the Palais-Royal." Among other proofs besides the above, which M. de Saint-Mihiel brings to substantiate this marriage, he observes, that Mazarin held all councils of state in his apartment whilst he was having or dressing; that he never permitted any person to sit down in his presence, not even the chancellor nor marshals de Villeroit; and that while they were deliberating with him on state affairs, he would be often playing with his monkey or linnet. What man (continues the author) would have subjected to such humiliations a chancellor, who holds the first office in the kingdom since that of confidant has been suppressed, and a marshal who was a governor to the king, had he not been in reality a sovereign himself, in virtue of his being husband to the queen-regent? He therefore concludes, that the man with the iron masque was none other than Anne of Austria and Cardinal Mazarin; and endeavours to justify this assertion by a variety of conjectural proofs. Some of these we shall give a short sketch:

1. No prince, or person of any consideration, after the year 1644, at which time the man with the iron masque was born, until the time when his existence was known, disappeared in France. This personage, therefore, was not a prince or great lord of France known at that time.

2. The man with the iron masque was not a foreigner; for foreigners, even of the highest distinction, did not at that period study the French language in such a manner as to attain the great perfection in it as to pass for Frenchmen. If this prisoner had spoken with the least foreign accent, the officer, physicians, surgeons, apothecaries, confessors, and others employed in the prisons where he was, and especially the physicians with whom he conversed at St. Mars, would not have failed to discover it. From all this M. de St. Mihiel infers that he must have been a Frenchman.

3. The existence of the man with the iron masque has been known for upwards of 90 years. Had any person of high rank disappeared at an anterior period, his friends, relations, or acquaintances, would not have failed to claim him, or at least to suppose that he was the man concealed by this masque. But no one disappeared, nor was any one claimed: the man with the iron masque was therefore a person unknown.

4. This man was not torn away from society on account of any criminal action; for when he was arrested, it was for this that he could not endure the confinement, and occasion great expenses. He was therefore not a criminal, else means would have been pursued to get rid of him; and consequently all the importance of his being concealed was attached solely to his person.

5. This stranger must have been a person of very high birth; for the governor of the prison of St. Mars behaved always to him with the greatest respect.

6. Louis XIII. played on the guitar; Louis XIV. did the same in a very masterly manner; and the man with the iron masque played also on that instrument: which gives us reason to believe that his education was directed by the same persons who had prefigured over that of Louis XIV. and who appear to have been the particular choice of Anne of Austria.

7. This stranger died on the 10th of November 1703; and a few days before his death, he told the apothecary of the Baille, that he believed he was about 60 years of age. Supposing that he was then 59 and a half, he must have been born towards the end of May 1644; and if he was 60 wanting three months, he must have been born in the end of August, or the beginning of September, of the same year; a period when the royal authority was in the hands of Anne of Austria, but in reality exercised more by Mazarine than by her. "I have already proved (continues the author), that from the first day of the regency of Anne of Austria, the greatest friendship, and even intimacy, subsisted between this princess and the cardinal; that these sentiments were changed into a mutual love; and that they were afterwards united by the bonds of marriage. They might, therefore, well have a son about the month of September 1664, as Louis XIII. had been then dead more than 15 months, having died on the 15th day of May the year preceding. But nothing of what I have related, or of what has been written, and acknowledged as fact, respecting the man with the iron masque, can be applied, except to a son of Mazarine and Anne of Austria. The man with the iron masque was indebted, therefore, for his existence to cardinal Mazarine, and the regent widow of Louis XIII."—To account for the
the manner in which the queen was able to conceal her pregnancy and delivery, Madame de Montespin is quoted; "whorrellas, under the year 1644, that Anne of Austria quitted the Louvre, because her apartments there displeased her; that she went to reside at the Palais-Royal, which Richlieu, when he died, bequeathed to the deceased king; that when she first occupied this lodging, she was dreadfully afflicted with the jaundice; that the physicians ascribed this disorder to her dejection and application to business, which gave her much embarrassment: but that being cured of her melancholy, as well as her malady, she resolved to think only of enjoying tranquillity; which she did, by communicating to her minister the burden of public affairs. On this quotation, M. de St Mihiel asks, "Is it not very singular, that the queen, during the 29 years of her former wedded state, had always resided in the Louvre, especially from 1626, when Louis XIII. ceased to cohabit with her, until their re-union, which took place in the beginning of December 1647, should have quitted it precipitately in 1644, because she was displeased with her apartments? How happened it that her apartments displeased her this year, and neither sooner nor later? She might undoubtedly have had any kind of furniture there which she desired, and every alteration made according to her wishes, as she was then absolute mistress: but the cause of her determination is plain; the apartments of the Palais-Royal, which front a garden, were much more convenient for her to be delivered in secret."  

8. As it is necessary that some name should be given to every man, in order to distinguish him from another, that of Marchialli was given to the man with the iron mask—a name which evidently shows, that it had been invented by an Italian. [Cardinal Mazarine was a native of Pescia in the Abruzzo.]  

9. Anne of Austria was remarkably delicate respecting every thing that touched her person. It was with great difficulty that cambric could be found fine enough to make shifts and fichets for her. Cardinal Mazarine once rallying her on that subject, said, "If she should be damned, her punishment in hell would be to sleep in Holland sheets." The predominant taste of the man with the iron mask, was to have lace and linen of the most extraordinary fineness. "Who says the author) does not percive, in this similarity of tastes, the maternal tenderness of Anne of Austria, who would have thought her son a great sufferer had he not been indulged with fine linen?"  

"Louis XIII. (continues M. de St Mihiel) was a husband of a gloomy disposition, and an enemy to pleasure: while the queen, on the contrary, was fond of social life; and introduced at the court of France, especially after she became free, that cafe and polite-ness which distinguished it under Louis XIV. from all the other courts of Europe. Louis XIII. had also a disagreeable composure, and a breath so offensive, that it was a punishment for Richlieu to remain near him. It is clear, therefore, that she could not be much pleased with such a husband. When he became regent of the kingdom by the king's death, which happened on the 14th of May 1643, as she had not enjoyed that happiness which arises from a close union of hearts, it will not appear extraordinary that she should indulge the affection she entertained for cardinal Mazarine, and that she should marry him. Every circumstance that could tend to favour such a marriage will be found united in her situation. She was at a distance from her family; absolute mistress of all her actions; and had, besides, a heart formed for love. Mazarine, though a cardinal, had never entered into orders; he gave out that he was descended from a great family; he was handsome and well made; he was of a mild, inimitating disposition, and remarkably engaging in conversation; and his office, as a prime minister, afforded him every opportunity of visiting and conversing with the queen whenever he thought proper. Is it, therefore, so very astonishing, that, with so many advantages, he was able to captivate the queen so far as to induce her to marry him? Such a marriage was not, indeed, according to the usual course of things. Yet it was not without many precedents, particularly among sovereigns of the other sex, who had given their hands to persons of inferior rank. Thus Christian IV. of Denmark espoused Christina Monck; Frederick IV. espoused Mademoiselle René; James II. heir to the throne of England, married the daughter of a counsellor; Peter the Great raised to the throne Catharine I., the daughter of a poor villager, yet perhaps the most accomplished woman at that time between the Vislula and the pole; and Louis XIV. espoused the widow of a poet, but a woman polished of the most extraordinary merit. As the women, however, are not forgiven so readily as the men for entering into such marriages, Anne of Austria kept hers a secret from this motive, and because she would have been in danger of losing the regency of the kingdom had it been known.  

The reasoning of M. de St Mihiel is both ingenious and plausible; though the probability of the account is somewhat diminished by considering what must have been the queen's age at this period, after the had been Louis's wife for 29 years before his death,—The account immediately preceding, without this objection, seems abundantly credible. But whether, upon the whole, either of them can be received as decisive, or whether the mystery of the iron mask remains still to be unravelled, we must leave to the reader to determine.  

Masque, in architecture, is applied to certain pieces of sculpture, representing some hideous forms, grotesque, or fayres, faces, &c. used to fill up and adorn vacant places, as in friezes, the panels of doors, keys of arches, &c., but particularly in grottos.  

Masquerade, or Mascara, an assembly of persons masked or disguised, meeting to dance and divert themselves. This was much in use in Britain, and has been long a very common practice on the continent of Europe, especially in carnival time.  

The word comes from the Italian maschere, and that from the Arabic mofarra, which signifies "railly, buffoonery." Granacci, who died in 1543, is laid to have been the first inventor of masquerades.  

Masarakitha, a pneumatic instrument of music among the ancient Hebrews, composed of pipes of various sizes, fitted into a kind of wooden chest, open at the top, and stopped at the bottom with wood covered with a skin. Wind was conveyed to it from the
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for health, for travellers, &c. which go under the name ofotive masses. There is still a further distinction of masses denominated from the countries in which they were used; thus the Gothic masses, or missa missarum, is that used among the Goths when they were masters of Spain, and which is still kept up at Toledo and Salamanca; the Ambrosian masses is that composed by St Ambrose, and used only at Milan, of which city he was bishop; the Gallic masses, used by the ancient Gauls; and the Roman masses, used by almost all the churches in the Romish communification.

Mass, Missa, in the church of Rome, the office or prayers used at the celebration of the eucharist; or in other words confecrating the bread and wine into the body and blood of Christ, and offering them to the sanctuary of the church, when the deacons said, He massa est, after sermon and reading of the words confecrating the bread and wine into the elements, but after confession they receive the bread and wine which was before consecrated. This mass is performed all Lent, except on Saturdays, Sundays, and the anno­c­ciation. The priest counts upon his fingers the days of the enquiring week on which it is to be celebrated, and cuts off as many pieces of bread at the altar as he is to say masses; and after having consecrated them, deepens them in wine, and then puts them in a box; out of which, upon every occasion, he takes some of it with a spoon, and putting it on a dish lets it upon the altar.

M A S S A, a town of Italy, in the kingdom of Naples, and in the Terra di Lavoro, with a bishop's see; seated on a mountain near the sea, in E. Long. 10. N. Lat. 43° 5.

Massa, an ancient, populous, and handsom town of Italy, and capital of a small territory of the same name, with the title of a principality, and a strong castle. It is famous for its quarries of fine marble, and is situated in E. Long. 14° 23; N. Lat. 40° 40.

MASSACHUSETTS STATE, the principal sub­di­vision of New England, having Hampshire on the north, the Atlantic ocean on the east and south, and Connecticut and New York on the west. It is about 100 miles long, and 40 broad. See New England.

MASSACRE, a term used to signify the sudden and promiscuous butchery of a multitude. The most atrocious example of this, upon which the term is derived, was the Parisian Massacre, or Massacre of St Bartholomew's Day. The Parisian massacre was carried on with such detestable perfidy, and executed with such a bloody cruelty, as would surpass all belief, were it not attested by the most undeniable evidence. In the year 1572, in the reign of Charles IX., many of the principal protestants were invited to Paris, under a solemn oath of safety, upon occasion of the marriage of the king of Navarre with the French king's sister, viz. the king of Navarre's mother, Coligni admiral of France, with other nobles. The queen-dowager of Navarre, a zealous protestant, was poison’d by a pair of gloves before the marriage was solemnized; and on the 24th of August 1572, being Barth­olomew's day, about day-break, upon the toll of the bell of the church of St Germain the butchery began. The admiral was basely murdered in his own house; and then thrown out of the window, to gratify the malice of the duke of Guise: his head was afterwards cut off, and sent to the king and queen-mother; and his body, after a thousand indignities offered to it, hung up by the feet on a gibbet. After this, the
The murderers ravaged the whole city of Paris, and butchered in three days above ten thousand lords, gentlemen, prelates, and people of all ranks. An horrible scene of things, says Thuanus, when the very streets and passages reeked with the noise of those that met together for murder and plunder; the groans of those who were dying, and the shrieks of such as were just going to be butchered, were every where heard; the bodies of the slain thrown out of the windows; the courts and chambers of the houses filled with them; the dead bodies of others dragged through the streets, their blood running down the channels in such plenty, that torrents seemed to empty themselves in the neighbouring river; and, in a word, an innumerable multitude of men, women, with child, maids, and children, were all involved in one common destruction; and the gates and entrances of the king's palace all besmeared with their blood.

From the city of Paris the massacre spread almost throughout the whole kingdom. In the city of Meaux they threw above two hundred into jail; and after they had ravished and killed a great number of women, and plundered the houses of the protestants, there was what the latter is driven to empty themselves in the neighbouring river; and, in a word, an innumerable multitude of men, women, with child, maids, and children, were all involved in one common destruction; and the gates and entrances of the king's palace all besmeared with their blood.

The city of Orleans they murdered above five hundred men, women, and children, and enriched themselves with their spoil. The same cruelties were practised at Angers, Troyes, Bourges, La Chartre, and especially at Lyons, where they inhumanly destroyed above eight hundred protestants; children hanging on their parents' necks; parents embracing their children, cutting the necks of some, dragging them through the streets, and throwing them, mangled, torn, and half-dead, into the river.

It would be endless to mention the butcheries committed at Valence, Romaine, Rouen, &c. We shall, therefore, only add, that, according to Thuanus, above thirty thousand protestants were destroyed in this massacre, or, as others with greater probability affirm, above one hundred thousand.

Thuanus himself calls this a most detestable villainy; and, in abhorrence of St Bartholomew's day, used to repeat these words of P. Statius, Silv. v. iii. ver. 88.

* Exidat illa dies aevi, ne poslera credant
Scuta. Nisi certe tacuatis, et obsta multa.
Nolle tegi propria patiannus crimina gentis.

In the words of Job, chap. iii. ver. 3. &c. "Let that day perish; and let it not be joined unto the days of the year. Let darknes and the shadow of death stain it." &c. And yet, as though this had been the most heroic transgression, and could have procured immortal glory to the authors of it, medals were struck at Paris in honour it.

But how was the news of this butchery received at Rome, that faithful city, that holy mother of churches! How did the vicar of Christ, the successor of Peter, and the father of the Christian world, relish it? Let Thuanus tell the horrid truth. When the news, says he, came to Rome, it was wonderful to see how they exulted for joy. On the 6th of September, when the letters of the pope's legate were read in the assembly of the cardinals, by which he assured the Pope that all was transfixed by the express will and command of the king, it was immediately decreed that the pope should march with his cardinals to the church of St Mark, and in the most solemn manner give thanks to God for the great bleeding confessed on the fee of Rome and the Christian world; and that on the Monday after, solemn masses should be celebrated in the church of Minerva; at which the pope, Greg. XIII. and cardinals were present; and that a jubilee should be published throughout the whole Christian world, and the cause of it declared to be, to return thanks to God for the extirpation of the enemies of the truth and church in France. In the evening the cannon of St Angelo were fired, to testify the public joy; the whole city illuminated with bonfires; and no one sign of rejoicing omitted that was usually made for the greatest victories obtained in favour of the Roman church.

MASSAGETAE, an ancient people about whose seat there is as much doubt as about that of the Amazons: Tibullus and Ammian place them near Albania, beyond the Araxes, which sometimes denotes the Oxus; it is probable they dwelt to the east of Sogdiana, (Dionysius Periegetes, Herodotus, Arrian.)

MASSALIANS, a sort of enthusiasts who sprang up about the year 361, in the reign of the emperor Constantius, who maintained that men have two souls, a celestial and a diabolical, and that the latter is driven out by prayer.

MASSANIELLO, see History of Naples.

MASSETER, in anatomy. See there, (Table of the Muscles.)

MASSICOT, see MASTICOT.

MASSIEU (William), a learned French writer, member of the academy of belles lettres, and of the French academy, was born at Caen in Normandy in 1665, and completed his studies at Paris, when he entered among the Jesuits; but afterwards left them, that he might follow his inclination to polite literature with the greater freedom. In 1710 he was made Greek professor in the royal college; and enjoyed that post till his death, which happened at Paris in 1722. He wrote, 1. Several curious dissertations in the memoirs of the academy of inscriptions. 2. A history of the French poetry, in 12mo, &c.

MASSILIA, (anc. geog.) a town of Gallia Narbonensis, a colony of Phocaeans, from Phocaæa, a city of Ionia, and in confederacy with the Romans; universally celebrated, not only for its ports, commerce, and strength, but especially for its politeenss of manners and for its learning. According to Strabo, it was the school for barbarians, who were excited by its means to a fondness for Greek literature, so that even their public and private transictions were all executed in that language. Strabo adds, "At this day the noblest Romans repair thither for study rather than to Athens." Now MARSEILLES, a city and port-town of Provence.

MASSILLON (Jean Baptiste), son of a notary at Hiers in Provence, was born in 1663, and entered into the congregation of the oratory in 1681. He gained the affections of every person in the towns to which he was sent, by the charms of his genius, the liveliness of his character, and by a fund of the most


Maffillon. de Hâte. Imagine the simple air, the modest carriage, the downcast, and lime, so delicate, and so

logic is movement.

leave him not till he has yielded to my persuasions!’ His manner of composing, therefore, was peculiar to himself, and, in the opinion of men of taste and judgement, was superior to that of Bourdaloue. The affecting and natural simplicity of the father of the oratory, (said a great man), appear fitter to bring home the truths of Christianity to the heart than all the dissections of the Jesuits. We must seek for the logic of the gospel in our breasts; and the most powerful reasonings on the indispensable duty of relieving the disfreted, will make no impression on that man who has beheld without concern the sufferings of his brother, if logic is necessary, it is only in matters of opinion; and these are fitter for the press than for the pulpit, which ought not to be the theatre of declamation. When one of his felow-fellows was congratulating him upon his preaching admirably, according to custom, “Oh! give over, Father (replied he), the devil has told me so already, much more eloquently than you.” The duties of his office did not prevent him from enjoying society; and in the country he forgot that he was a preacher, but always without trespassing against decency. One day when he was at the house of M. de Crozat, the latter said to him, “Father, your doctrine terrifies me, but I am encouraged by your life.” He was chosen, on account of his philosophical and conciliatory disposition of mind, to reconcile one cardinal de Nosailles with the Jesuits. All he gained by his attempts was the displeasure of both parties; and he found that it was easier to convert sinners than to reconcile theologians.

In 1717, the regent, personally acquainted with his merit, appointed him to the bishopric of Clermont. The next year, being destined to preach before Louis XV. who was only nine years of age, he composed in six weeks those discourses which are so well known by the name of l’Eveil Carême. These are the chief d’œuvre of this orator, and indeed of the oratorical art. They ought continually to be read by preachers, as models for the formation of their taste, and by princes as lessons of humanity.

Maffillon was admitted into the French academy a year afterwards, in 1719. The abbey of Savigny becoming vacant, the cardinal du Bois, to whom he had been weak enough to give an attestation for being a priest, procured it for him. The funeral oration of the duchess of Orleans, in 1723, was the last discourse he pronounced in Paris. He never afterwards left his diocese, where his gentleness, politeness, and kindness, had gained him the affection of all who knew him. He reduced the exorbitant rights of the episcopal roll to moderate sums. In two years, he cauited 20,000 écorces to be privately conveyed to the Hotel-Dieu of Clermont. His peaceable dispositions were never more displayed than while he was a bishop. He took great pleasure in collecting the fathers of the oratory and the Jesuits at his country-house, and in making them join in some diversion. He died on the 28th of September 1742, at the age of 70. His name has become that of eloquence itself. Nobody ever knew better how to truth the passions. Preferring sentiment to every thing else, he communicated to the soul that lively and fallatory emotion which exp-

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elites in us the love of virtue. What pathetic eloquence did his discourses display! what knowledge of the human heart! what constant disclosure of a mind deeply affected with his subject! what strain of pathos, philosophy, and humanity! what imagination, at once the most lively, and guided by the soundest judgment! just and delicate thoughts; splendid and lofty ideas; elegant, well chosen, sublime, and harmonious expressions; brilliant and natural images; true and lively conceptions, next, sweet, and equal to the capacity of the multitude, and fitted to please the man of genius, the philosopher, and the courtier, from the character of Maflillon's eloquence, especially in his Petit Cæme. He could at once think, describe, and feel. It has been justly observed concerning him, that he was to Boulard alone what Racine was to Corneille. To give the finishing stroke to his eulogium, of all the French orators, he is the most esteemed by foreigners.

An excellent edition of Maflillon's works was published by his nephew at Paris in 1745 and 1746, in 14 vols. large 12mo, and 12 vols. of a small size.— Among them we find, 1. Complete sets of Sermons for Advent and Lent. It is particularly in his moral discourses, such as are almost all those of his sermons for Advent and Lent, that Maflillon's genius appears. He excels, says M. d'Alembert, in that species of eloquence, which alone may be preferred to all others, which goes directly to the heart, and which agitates without wounding the soul. He searches the inmost recesses of the heart, and lays open the secret workings of the passions, with so delicate and tender a hand, that we are hurried along rather than overcome. His diction, which is always easy, elegant, and pure, every where partakes of that noble simplicity, without which there can be neither good taste nor true eloquence; and this simplicity is, in Maflillon, joined to the most attractive and the sweeter harmony, from which it is no wonder he possesses new graces. In short, to complete the charm produced by this enchanting style, we perceive that these beauties are perfectly natural; that they flow easily from this source, and that they have occasioned no labour to the composer. There even occur sometimes in the expressions, in the turns, or in affecting melody of his style, instances of negligence which may be called happy, because they completely remove every appearance of labour. By thus abandoning himself to the natural current of thought and expression, Maflillon gained as many friends as hearers. He knew, that the more anxious an orator appears to raise admiration, he will find those who hear him the less disposed to bestow it. 2. Several Funeral Orations, Discourses, and Panegyrics, which had never been published. 3. Ten discourses, known by the name of Petit Cæme. 4. The Conferences ecclésiastiques, which he delivered in the seminary of St. Magloire upon his arrival at Paris; those which he delivered to the curates of his diocese; and the discourses which he pronounced at the head of the synods which he assembled every year. 5. Paraphrases on several of the Psalms. The illustrious author of these excellent tracts wished that they had introduced into France a practice which prevails in England, of reading sermons instead of preaching them from memory; a custom which is very convenient, but by which all the warmth and fervour of eloquence are lost. He, as well as two others of his brethren, had flung short in the pulpit exactly on the same day.— They were all to preach at different hours on Good Friday, and they went to hear one another in succession. The memory of the first failed; which so terrified the other two, that they experienced the same fate. When our illustrious orator was asked, what was his best sermon he had delivered, "That which I am most proud of." The same reply is ascribed to Boulard alone. The celebrated P. La Rue was of the opinion of Maflillon, that getting by heart was a slavery which deprived the pulpit of a great many orators, and which was attended with many inconveniences to those who dedicated themselves to it. The Abbé de la Porte has collected into 1 vol. 12mo the most striking ideas, and the most sublime strokes, which occur in the works of the celebrated bishop of Clermont. This collection, which is made with great judgment, appeared at Paris in 1745, 12mo, and forms the 15th volume of the large edition in 12mo, and the 13th of the small in 12mo. It is entitled, Pension par différents sujets de morale et de piété.

MASSINGER (Philip), an English dramatic poet, was born at Salisbury about the year 1581, and was educated at Oxford. He left the university without taking any degree; and went to London to improve his poetical genius by polite conversation. There he wrote many tragedies and comedies, which were received with vail applause; and were greatly admired for the economy of the plots and the purity of the style. He was at the same time a person of the most consummate modesty: which rendered him extremely beloved by the poets of his time, particularly by Fletcher, Middleton, Rowley, Field, and Decker, who thought it an honour to write in conjunction with him. He was as remarkable for his abilities as his modesty. He died suddenly at his house on the Bank-side in Southwark, near the playhouse; and was interred in St. Saviour's church-yard, in the same grave with Mr. Fletcher the poet.

MASSIVE, among builders, an epithet given to whatever is too heavy and solid; thus a massive column is one too short and thick for the order whose capital it bears; and a massive wall is one whose openings or lights are too small in proportion.

MASSON (Papirius), a French writer, was the son of a rich merchant, and born in the territory of Forez, May 1544. After studying the belles lettres and philosophy, and travelling to different places, he came to Paris, where he was made librarian to the chancellor of the duke of Anjou, in which place he continued ten years. In 1576, he was made an advocate of parliament; yet never pleaded but one cause, which however, he gained with universal applause.— When the troubles of France were at an end, he married the sister of a counselor in parliament, with whom he lived thirty-four years, but had no issue by her. — The infirmities of age attacked him some time before his death, which happened Jan. 9, 1611. He wrote four books of French annals in Latin, first printed at Paris 1577, and afterwards in 1598, 4to. The second edition, more enlarged than the first, deduces things
Masson (Anthony), an eminent French engraver, who flourished towards the conclusion of the last century, and reigned chiefly at Paris. It appears that he sometimes amused himself with painting from the life, some of which he also engraved. We have no account of the life of this extraordinary artist; nor are we even informed from what master he learned the principles of engraving. He worked entirely with the graver, and handled that instrument with alarming facility. He seems to have had no kind of rule to direct him with respect to the spacing of the strokes; but twirled and tilted them about, without the least regard to the different forms he intended to express, making them entirely subservient to his own fancy. Yet the effect he has produced in this singular manner (Mr Strutt observes), is not only far superior to what one could have supposed, but is often very picturesque and beautiful. It was not in historical engraving that his greatest strength consisted. He could not draw the naked parts of the human figure so correctly as was necessary; but where the figure itself was to be clothed, he succeeded in a wonderful manner. Among the most esteemed works by this admirable artist may be reckoned the following: The assumption of the Virgin, a large upright plate from Rubens; a holy family, a middling-sized plate, lengthwise, from N. Mignon; Christ with the pilgrims at Emaus, a large plate, lengthwise, from Titian, the original picture of which is in the cabinet of the king of France. This admirable print is commonly known by the name of the table-cloth; for the cloth, with which the table is covered, is executed in very a singular style: also the following portraits, among others: The comte de Harcourt, a large upright plate, reekoned a masterpiece in this class of subjects; Guillaume or Brifacier, secretary to the queen of France, a middling-sized upright plate: finally known in England by the name of the Grey-headed Man, because the hair in this print is finely executed.

Massuah, a small island in the Red Sea, near the coast of Abyssinia, about three quarters of a mile long, and half as broad, one-third of which is occupied by houses, another by cisterns for receiving rain water, and one reserved for a burial place. It has an excellent harbour, with water sufficiently deep for ships of any size to the very edge of the island; and so well secured, that they may ride in safety, let the wind blow from what quarter or with what degree of strength it will. By the ancients it was called Sebastianum Qis, and was formerly a place of great consequence on account of its harbour, from whence a very extensive commerce was carried on, and possessed a share of the Indian trade in common with other ports of the Red Sea near the Indian Ocean.—A very considerable quantity of valuable goods was also brought thither from the track of mountainous country behind it, which in all ages has been accounted very un hospitable, and almost inaccessible to strangers. The principal articles of exportation were gold, ivory, elephants, and buffaloes hides; but above all, flames, who, on account of their personal qualifications, were more esteemed than those from any other quarter. Pearls of a considerable size, and of a fine water, are likewise found along the coast; from the abundance of all which valuable commodities, the great defect, a want of water, was forgot, and the inhabitants cheerfully submitted to such a great inconvenience. The island of Massuah fell under the power of the Turks in the time of the emperor Selim, soon after the conquest of Arabia Felix by Sinan Buth, and was for some time governed by an officer from Constantinople. From thence the conquest of Abyssinia was for some time attempted, but always without success. Hence it began to lose its value as a garrison for troops, as it had done in the commercial way after the discovery of the passage to India by the Cape of Good Hope. Being thus deprived of its importance in every respect, the Turks no longer thought it worth while to send a bayalh thither as formerly, but conferred the government upon the chief of a tribe of Mahometans named Belaye, who inhabit the coasts of the Red Sea under mountains of Habab, in the latitude of about 14° north. On this officer they conferred the title of Naybe; and on the removal of the bayalh, he remained in fact master of the place, though, to save appearances, he pretended to hold it from the emperor of Constantinople. He was for a time a friend to the Ottoman Porte, by a firman from the Grand Signior for that purpose, and the payment of an annual tribute.

The Turks had originally put into the town of Massuah a garrison of Janizaries; who, being left there on the withdrawing of the bayalh, and intermarrying with the natives, soon became entirely subjected to the Naybe's influence. The latter finding himself at a great distance from his protectors, the Turks, whose garrisons were everywhere failing into decay, and that in consequence of this he was entirely in the power of the emperor of Abyssinia, began to think of taking some method of securing himself on that side. Accordingly it was agreed that one half of the eunuchs should be paid to the Abyssinian, who in return was to allow him to enjoy his government unmolested. Having thus secured the friendship of the emperor of Abyssinia, the Naybe began gradually to withdraw the tribute he had been accustomed to pay to the bayalh of Jidda, to whose government Massuah had been assigned; and at last to pay as little regard to the government of Abyssinia; and in this state of in-
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independence he was when Mr Bruce arrived there in 1769 on his way to Abyssinia. This gentleman found both the prince and his people extremely unapproachable and treacherous; so that he underwent a variety of dangers during his residence there, nor was it without great difficulty that he could get away from thence at last.

The island of Massaiah, as we have said, is entirely deftitute of water; nor can it be supplied with provisions of any kind but from the mountainous country of Abyssinia on the continent. Arkeeko, a large town in the bottom of the bay, has water, but is in the same predicament with regard to provisions; for the adjacent tract of flat land, named Sanbarah, is a perfect desert, inhabited only from the month of November to April by some wandering tribes, who carry all their cattle to the Abyssinian side of the mountains when the rains fall there. Being thus in the territories of the Abyssinians, it is in the power of the emperor of that country, or of his officer the Baharangab, to starve Massaiah and Arkeeko by prohibiting the passage of any provisions from the Abyssinian side of the mountains.

The houses of Massaiah are generally contructed of long poles and bent graps, as is usual with the towns of Arabia; only about 20 are of stone, and six or eight of those two stories high. The graps on which they are built have been drawn out of the sea, and in them the bed of that curious metal found embided in the solid rock at Mahon is frequently to be seen. These are called dalli di mare, or sea dates; but our author never saw any of the fish themselves, though he has no doubt that they may be met with in the rocky islands of Massaiah if they would take the trouble of break the rocks for them. All the necessaries of life are very dear in this place; and their quality is also very indifferent, owing to the distance from whence they must be brought, and the danger of carrying them through the desert of Sambar, as well as to the exigencies of the Navy himself, who under the name of cassone, takes whatever part of the goods he thinks proper; so the profit left to the merchant is sometimes little or nothing. All the money here is valued by the Venetian ducat; and it is owing to commercial intercourse with the Arabian coast that any money at all is to be met with on the island or the eastern coast of Africa. Glass beads of all kinds and colours, whether whole or broken, pass for small money.

Though Massaiah has now left very much of its commercial importance, a considerable trade is still carried on from the place. From the Arabian side are imported blue cotton goods, other cloths; some of them from India, being very fine. Other articles are Venetian beads, crystal, looking and drinking glasses, with cobal or crude antimony. These three last articles come in great quantity from Cairo, first in the coffee-ships to Jidda, and then in small barks to the port of Massaiah. Old copper is also a valuable article of commerce. The Galla and all the various tribes to the westward of Gondar wear bracelets of this metal, which in some parts of that barbarous country is said to fell for its weight of gold. Here is also a hell, an univalve of the species of valves, which sells at an high price, and pays for money among the various tribes of Galla. The Banians were once the principal merchants of Massaiah; but their number is now reduced to six, who are silversmiths, and smiths by making ornaments for the women on the continent. They likewise sell their goods, but make a poor livelihood.

MASSUT (René or Renatus), a very learned Benedictine of the congregation of St Maur, was born at S. Owen de Marcellis, in 1663. He is chiefly known for the new edition of St Jerome, which he published in 1710. He compiled several manuscripts which had never been examined, for that purpose, and made new notes and learned prefaces. He died in 1716, after having written and published several other works.

MAST, a long round piece of timber, elevated perpendicularly upon the keel of a ship, to which are attached the yards, the sails, and the rigging. A mast, with regard to its length, is either formed of one single piece, which is called a pole-mast, or composed of several pieces joined together, each of which retains the name of mast separately. The lowest of these is accordingly named the lower-mast, a, fig. 1, the next in height is the top-mast, b, which is erected at the head of the former; and the highest is the top-gallant mast, c, which is prolonged from the upper end of the top-mast. These two last are no other than a continuation of the first upwards.

The lower-mast is fixed in the ship by an apparatus described in the articles HULK and SHEARS; the foot or heel of it, rests in a block of timber called the foot block, which is fixed upon the keelson: and the top-mast is attached to the head of it by the cap and the trefle-trees. The latter of these are two strong bars of timber, supported by two prominences which are as shoulders on the opposite sides of the mast, a little under its upper end; at which these bars are fixed to the trefle-trees, upon which the figure of the top is supported. Between the lower-mast-head and the foremost of the trefle-trees, a square space remains vacant, the sides of which are bounded by the two trefle-trees. Perpendicularly above this is the foremost hole in the cap, while a hole is solidly fixed on the head of the lower-mast. The top-mast is erected by a tackle, whose effort is communicated from the head of the lower-mast to the foot of the top-mast; and the upper end of the latter is accordingly guided into and conveyed up through the holes between the trefle-trees and the cap, as above-mentioned. The machinery, by which it is elevated, or, according to the sea-phrase, being raised, is fixed in the following manner: the top rope d, fig. 3, passing through a block e, which is hooked on one side of the cap, and afterwards through a hole, furnished with a sheave or pulley f, on the lower end of the top-mast, is again brought upwards on the other side of the mast, where it is at length fastened to an eye bolt in the cap g, which is always on the side opposite to the top-block e. To the lower end of the top rope is fixed the top-tackle h, the effort of which being transmitted to the top-rope d, and thence to the heel of the top-mast j, necessarily lifts the latter upwards, parallel to the lower-mast. When the top-mast is raised to its proper height, fig. 4, the lower end of it becomes firmly wedged in the square hole above described, between the trefle-trees. A bar of wood or iron called the fad, is then thrust through a hole i in the heel of it,
When the vessel is launched, before the places of the masts are determined, extend a rope AB, fig. 6. From the head to the stern. To the extremities A and B attach two other ropes, AD, BC, and apply to the other ends of these ropes two mechanical powers, to draw the ship according to the direction BC, parallel to itself. The whole being thus disposed, let a moveable tube Z, fixed upon the rope AB, have another rope ZR attached to it, whose other end communicates with a mechanical power R, equal to the two powers D and C. This last being applied to the same vessel, in such a manner as to take off the effects of the two others by lifting upon the rope AB, so as to discover some point Z, by the parallelism of the ropes AD, BC feebly extended with the rope ZR; the line ZR will be the axis of the equilibrium of the water's resistance, and by consequence the main-mast should be planted in the point Z.

The figures E, E, E, are three windlasses on the shore, by which this experiment is applied.

With regard to the situation of the other masts, it is necessary, in the same manner, to discover two points; so that the direction of the two mechanical powers operating, will be parallel to the axis of resistance RZ already found.

The exact height of the masts, in proportion to the form and size of the ship, remains yet a problem to be determined. The more the masts are elevated above the centre of gravity, the greater will be the surface of fail which they are enabled to present to the wind; so far an additional height seems to have been advantageous. But this advantage is diminished by the circular movement of the mast, which operates to make the vessel stoop to its effort; and this inclination is increased in proportion to the additional height of the mast, an inconvenience which it is necessary to guard against. Thus what is gained upon one hand is lost upon the other. To reconcile these differences, it is certain, that the height of the mast ought to be determined by the inclination of the vessel, and that the point of her greatest inclination should be the term of this height above the centre of gravity. See the article Tarrow.

With regard to the general practice of determining the height of the masts, according to the different rates of the ships in the royal navy, the reader is referred to the article Sail.

In order to secure the masts, and counterbalance the strain they receive from the effort of the sails impressed by the wind, and the agitation of the ship at sea, they are sustainted by several strong ropes, extended from their upper ends to the outside of the vessel, called shrouds, as represented in fig. 4. They are further supported by other ropes, stretched from their heads towards the fore-part of the vessel.

The mast, which is placed at the middle of the ship's length, is called the main-mast; that which is placed in the forepart, the fore-mast; and that which is towards the stern, is termed the mizen-mast.

N. B. Mizen is applied to this mast by all the nations of Europe, except the French, who alone call the fore-mast mizaine.

MASTER, a title given to several officers and persons of authority and command; particularly to the
Thus this Maller.

Jeffus pretorius, ficer in the lower empire, like a valry, were afterwards called Their power was only a

Diocletian, was an officer of small arms; to confine and plant centuries, which is now performed by the clerk of

They have time out of mind had the honour to fit in the lords house, though they have neither writs nor patent to impose them; but they are received as affidavits to the lord chancellor and master of the rolls. They had ancients the care of inspecting all writs of summons, which is now performed by the clerk of the petty-bag. When any message is sent from the lords to the commons, it is carried by the masters of chancery. Before them also affidavits are made, and deeds and recognizances acknowledged.

Besides these, who may be called masters of chancery ordinary (being 12 in number, whereof the master of the rolls is reputed the chief), there are also masters of chancery extraordinary, appointed to act in the several counties of England beyond 10 miles distance from London, by taking affidavits, recognizances, &c. for the cause of the suitors of the court.

Masters of the Faculties, an officer under the archbishop of Canterbury, who grants licences and dispensations; he is mentioned in the statute 22 and 23 Car. II. See Court of Faculties.

Maser-Gunner, See Gunner.

Maser of the Horse is reckoned the third great officer of the court, and is an office of great honour and antiquity, and always (when not put in commission) filled by noblemen of the highest rank and abilities. He has the management and diplo of all the king's stables and bred horses. He has authority over the equerries and pages, coachmen, footmen, grooms, riders of the great horse, farriers, and smiths. He appoints all the other tradesmen who work for the king's stables; and by his warrant to the avenor, makes them give an oath to be true and faithful. In short, he is
enthusiastic with all the lands and revenues appropriated for the king’s breed of horses, the expenses of the stable, and of the coaches, litters, &c. He alone has the privilege of making use of any of the king’s horses, pages, footmen, &c.; and at any solemn cavalcade he rides next the king, and leads a horde of state. His salary is L. 1276: 13: 4 per annum. There is also a master of the horse in the establishment of her majesty’s household, with a salary of 800l. a-year.

**Master of the household** is an officer under the treasurer of the household, in the king’s gift; his business is to survey the accounts of the household. He has L. 66, 13: 4 a-year wages, and L. 433: 6: 8 board-wages.

**Master of the mint** was anciently the title of him who is now called warden of the mint; whose office is to receive the silver and bullion which comes to the mint to be coined, and to take care thereof. The office of master and worker is now distinct; and this officer is allowed for himself and three clerks 850l. a-year.

**Master of the Ordnance.** See Ordnance.

**Master of the Revels** is an officer with an appointment of 100l. a-year, whose business is to order all things relating to the performance of plays, masques, balls, &c. at court. Formerly he had also a jurisdiction of granting licences to all who travel to act plays, puppet-shows, or the like diversions; neither could any new play be acted at either of the two houses till it had passed his perusal and licence; but these powers were afterwards much abridged, not to lay annihilated, by a statute for regulating playhouses, till the licencing plays by the lord chamberlain was established. This officer has a servant with L. 46: 11: 8 a-year.

**Master of the Rolls** is a patent-officer for life who has the custody of the rolls and patents which pass the great seal, and of the records of the chancery.

In the absence of the lord chancellor or keeper, he also sits as judge in the court of chancery; and is by Sir Edward Coke called his **affiant**.

At other times he hears causes in the rolls-chapel, and makes orders and decrees. He is also the first of the masters of chancery, and has their assistance at the rolls: but all hearings before him are appealable to the lord chancellor.

He has also his writ of summons to parliament, and sits next to the lord chief justice of England on the second woolpack. He has the keeping of the parliament-rolls, and has the rolls house for his habitation; as also the custody of all charters, patents, commissions, deeds, and recognizances, which being made of rolls of parchment gave rise to the name. Anciently he was called clerk of the rolls.

Concerning the authority of the master of the rolls to hear and determine causes, and his general power in the court of chancery, there were (not many years since) divers questions and disputes very warmly agitated; to quiet which it was declared by Stat. 3. Geo. II. cap. 30. that all orders and decrees by him made, except such as by the course of the court were appropriated to the great seal alone, should be deemed to be valid; subject nevertheless to be discharged or altered by the lord chancellor, and so as they shall not be isrolled till the same are signed by his lordship.

In his gift are the six clerks in chancery, the examiners, three clerks of the petty-bug, and the six clerks of the rolls-chapel where the rolls are kept. See Rolls, Clerk, &c.

The master of the rolls is always of the privy council; and his office is of great profit, though much short of what it has been.

**Master of a ship** is an officer to whom is committed the direction of a merchant-vehicle, who commands it in chief, and is charged with the merchandizes aboard.

In the Mediterranean the master is frequently called **patron**, and in long voyages captain.

It is the proprietor of the vessel that appoints the master; and it is the master who provides the equipage, hires the pilots, sailors, &c. The master is obliged to keep a register of the crew and officers, the terms of their contract, the receipts and payments, and, in general, of every thing relating to his commission.

**Master of a ship of War** is an officer appointed by the commissioners of the navy, to take charge of navigating a ship from port to port under the direction of the captain. The management and disposition of the fails, the working of a ship into her station in the order of battle, and the direction of her movements in the time of action, and in other circumstances of danger, are also more particularly under his inspection. It is likewise his duty to examine the provisions, and accordingly to admit none into the ship but such as are found, sweet, and wholesome. He is moreover charged with the pay-wages; and for the performance of these services he is allowed several officers who are properly termed mates and quarter-masters.

**Master of the Temple**. The founder of the order of the templars, and all his successors were called magistri templi magistri; and ever since the dissolution of the order, the spiritual guide and director of the house is called by that name. See Temple and Templar.

There were also several other officers under this denomination, as master of the wardrobe, with a salary of 1000l. a-year; master of the barriques, with 2000l. a-year; master of the flaghounds, with 800l. a-year master of the jewel-office, &c. all now abolished.

**Master and Servant** in England; a relation founded in convenience, whereby a man is directed to call in the assistance of others, where his own skill and labour will not be sufficient to answer the cares incumbent upon him. For the several forts of servants, and how that character is created or destroyed, see the article Servant. In the present article we shall consider, first, the effect of this relation with regard to the parties themselves; and secondly, its effects with regard to others.

1. The manner in which this relation affects either the master or servant. And, first, by hiring and service for a year, or apprenticeship under indentures, a person gains a settlement in that parish wherein he lived ten years. In the next place, persons serving seven years as apprentices to any trade have an exclusive right to exercise that trade in any parts of England. This law, with regard to the exclusive part of
As a beneficiary, according to the prevailing humour of the times; which has occasioned a great variety of resolutions in the courts of law concerning it; and attempts have been frequently made for its repeal, tho' hitherto without success. At common law every man might use what trade he pleased; but this statute restrains that liberty to such as have served as apprentices: the adversaries to which provision says, that all restrictions (which tend to introduce monopolies) are pernicious to trade: the advocates for it allege, that unskilfulness in trades is equally detrimental to the public as monopolies. This reason indeed extends to such trades, in the exercise whereof skill is required; but another of their arguments goes much further; viz. their apprenticeships are useful to the commonwealth, by employing youth, and learning them to be early industrious: but that no one would be induced to undergo a seven years service, if others, tho' equally skilful, were allowed the same advantages without having undergone the same discipline; and in this there seems to be much reason.

However, the resolutions of the courts have in general rather confined than extended the restriction. No trades are held to be within the statute, but such as were in being at the making of it: for trading in a country village, apprenticeships are not requisite, and following the trade seven years is sufficient without any binding; for the statute only says, the person must serve as an apprentice, and does not require an actual apprenticeship to have existed.

A master may by law correct his apprentice for negligence or misbehaviour; so he does with moderation; though, if the master or master's wife beats any other servant of full age, it is good cause of departure. But if any servant, workman, or labourer, assaults his master or dame, he shall suffer one year's imprisonment, and other open corporal punishment, not extending to life or limb.

By service all servants and labourers, except apprentices, become intitled to their wages; according to agreement, if mensal servants; or according to the appointment of the sheriff or seffions, if labourers or servants in husbandry: for the statutes for regulation of wages extend to such servants only: it being impossible for any magistrate to be a judge of the employment of menial servants, or of course to affix their wages.

Let us now see how strangers may be affected by this relation of master and servant; or how a master may behave towards others on behalf of his servant, and what a servant may do on behalf of his master.

And, first, the master may maintain, that is, sue and affit, his servant in any action at law against a stranger: whereas, in general, it is an offence against public justice to encourage suits and animosities, by helping to bear the expense of them, and is called in law maintenance. A master also may bring an action against any man for beating or maiming his servant but in such case he must assign, as a special reason for so doing, his own damage by the loss of his service; and this loss must be proved upon the trial. A master likewise may justify an assault in defence of his servant and a servant in defence of his master: the master, because he has an interest in his servant, not to be deprived of his service; the servant, because it is part of his duty, for which he receives his wages, to stand by and defend his master. Also if any persona d non ore a servant, being in my service, for which the servant departeth from me and goeth to serve the other, I may have an action for damages against both the new master and the servant, or either of them: but if the new master did not know that he is my servant, no action lies; unless he afterwards refuse to restore him upon information and demand. The reason and foundation upon which all this doctrine is built, seems to be the property that every man has in the service of his domestics; acquired by the contract of hiring, and purchased by giving them wages.

As for those things which a servant may do on behalf of his master, they seem all to proceed upon this principle, that the master is answerable for the act of his servant, if done by his command, either expressly given or implied; nam, facit per alium, factum per fe.

Therefore, if the servant commit a trespass by the command or encouragement of his master, the master shall be guilty of it: not that the servant is excused, for he is only to obey his master in matters that are honest and lawful. If an innkeeper's servants rob his guests, the master is bound to restitution; for there is a confidence reposed in him, that he will take care to provide honest servants, his negligence is a kind of implied consent to the robbery: nam, quinon prohibet, ensa prohibere poft, jubes. So likewise if the drawer at a tavern sells a man bad wine, whereby his health is injured, he may bring an action against the master; for although the master did not expressly order the servant to sell it to that person in particular, yet his permitting him to draw and sell it at all is impliedly a general command.

In the same manner, whatever a servant is permitted to do in the usual course of his business, is equivalent to a general command. If I pay money to a banker's servant, the banker is answerable for it: if I pay it to a clergyman's or a physician's servant, whole usual business it is not to receive money for his master, and he imbezzles it, I must pay it over again. If a steward lets a lease of a farm, without the owner's knowledge, the owner must stand to the bargain; for this is the steward's business. A wife, a friend, a relation, that use to transact business for a man, are quod be his servants; and the principal must answer for their conduct; for the law implies, that they act under a general command; and without such a doctrine as this no mutual intercourse between man and man could subsist with any tolerable convenience. If I usually deal with a tradesman by myself, or constantly pay him ready money, I am not answerable for what my servant takes upon trust; for here is no implied order to the tradesman to trust my servant: but if I usually send him upon trust, or sometimes on trust and sometimes with ready money, I am answerable for all he takes up, for the tradesman cannot possibly distinguish when he comes by my order and when upon his own authority.

If a servant, lastly, by his negligence does any damage to a stranger, the master shall answer for his neglect.
This resin is recommended in old coughs, dysenteries, haemoptysis, weakness of the stomach, and in general in all debilities and laxity of the fibres. Geofroy directs an aqueous decoction of it to be used for these purposes; but water extracts little or nothing from this resin. Redhill spirit almost entirely dissolves it, and the solution is very warm and pungent. Mastic is to be chosen in drops, clear, well-scented, and brittle.

We meet with a kind of cement sometimes kept in the shops under the name of mastic. It is composed of this gum and several other ingredients, and is formed into cakes for use. This is intended for the service of lapidaries, to fill up cracks in stones, &c. but this is by no means to be used for any medicinal purposes.

MASTIFIC, or Yellow Lead, is the calx or ashes of lead gently calcined, by which it is changed to a yellow or lighter or deeper tint, according to the degree of calcination. Mastic is sometimes used by painters, and it serves medicinally as a drier in the composition of ointments; it is also used in the composition of mastic. This substance, which is used by the Dutch as the ground of their glazing, is prepared by calcining a mixture of one hundred weight of clean sand, forty-four pounds of soda, sold in Britain under the name of barilla, and thirty pounds of pearl-ashes.

MASTIFF-DOG, or Hound, (canis villaticus or catenarius), is a species of great size and strength, and a very loud Barker. Manwood says, that it derives its name from maffe the thief, being supposed to frighten away robbers by its tremendous voice. Great Britain was formerly so noted for its mastiffs, that the Roman emperors appointed an officer in the island, with the title of Procurator Cynegii, whose sole business was to breed, and transmit from thence to the amphitheatre, such as would prove equal to the combatants of the place. Strabo, lib. iv. tells us, that the mastiffs of Britain were trained for war, and used by the Gauls in their battles. See Canis.

MASTIGADOUR, or SLABBERING-BIT, in the manage, a snaffle of iron; all smooth, and of a piece, guarded with pater-noster, and composed of three halfs of great rings, made into semi-ovals, of unequal bigness; the latter being inclosed with the greater, which ought to be about half a foot high.

MASULAPATAN, a populous town of Asia in the East Indies, and on the coast of Coromandel, in the dominions of the Great Mogul. It carried on a great trade, and most nations in Europe had factories here; but the English have now left it, and even the Dutch themselves have not above a dozen people here to carry on the chintz trade. The inhabitants are Gentooos, who will not feed on any thing that has life; and they had a famous manufacture of chintz, which is greatly decayed since the English left off buying. The Great Mogul has a custom-house here; and the adjacent countries abound in corn, tobacco, and timber for building. It is situated on the west side of the Bay of Bengal, 200 miles north of Fort St. George.

MATAC, or Mantaca, a commodious bay in America, on the north coast of the island of Cuba. Here the galleons usually come to take in fresh water.
MATAMAN, a country of Africa, bounded by Benguela on the north, by Monomotapa on the east, by Cafraria on the south, and by the Atlantic Ocean on the west. There is no town in it, and the inhabitants live in miserable huts, it being a defart country, and but little visited by the Europeans.

MATANS, or MATCAN, an island of Aia in the East-Indian seas, and one of the Philippines. The insulants have thrown off the yoke of Spain; and it was soon that Megellan was killed in April 1521.

Cape M. JAPAN, the most southern promontory of the Marees, between the gulf of Coran and that of Colo China.

MATARAN, a large town of Aia, formerly the capital of an empire of that name in the island of Java. It is strong by intuition, and is seated in a very fertile, pleasant, and populous country, surrounded with mountains.

MATARO, a town of Spain in Catalonia; seated on the coast of the Mediterranean, 15 miles north-east of and 40 miles from the town of Corone. It is a small town, but industrious and well-peopled; and the environs abound in vineyards, which produce wine much famed for its flavour. It likewise contains several manufactories, and is considered as one of the richest and most active towns in Catalonia.

MATCH, a kind of rope slightly twisted, and prepared to retain fire for the uses of artillery, mines, fire-works, &c.

It is made of hempen-tow, spun on the wheel like cord, but very slack: and is composed of three twists, which are afterwards again covered with tow, so that the twills do not appear: lastly, it is boiled in the lees of old wines. This, when once fought at the end, burns on gradually and regularly, without ever going out till the whole be consumed: the hardest and driest match is generally the best.

Quick-Match. See Quick-Match.

MATCHING, in the wine trade, the preparing vessels to preserve wines and other liquors, without their growing four or rapid. The method of doing it is as follows: Melt brimstone in an iron ladle, and when thoroughly melted, dip it into flps of coarse linen-cloth, take these out, and let them cool, and these wine-coopers call a match. Take one of these matches, set one end of it on fire, and put it into the bung-hole of a cask; flop it loolly, and thus suffer the match to burn nearly out; then drive in the bung-tight, and set the cask aside for an hour or two. At the end of this time examine the cask, and you will find that the sulphur has communicated a violent pungent and suffocating scent to the cask, with a considerable degree of acidity, which is the gas and acid spirit of the sulphur.

The cask may after this be filled with a good wine which has scarce done its fermentation; and bunging it down tight, it will be kept good, and will soon clarify: this is a common and very useful method; for many poor wines could scarce be kept possible even a few months without it.

MATE of a Ship of War, an officer under the direction of the master, by whose choice he is generally appointed, to assist him in the several branches of his duty. Accordingly he is to be particularly attentive to the navigation in his watch, &c. to keep the log regularly, and examine the line and gallasses by which the ship's course is measured, and to adjust the falls to the wind in the fore-part of the ship. He is to have a diligent attention to the cables, seeing that they are well cared for, and kept clean when laid in the tier, and sufficiently served when employed to ride the ship. Finally, he is to superintend and assist at the lowering of the yard, taking especial care that all the ballast and provisions are properly flowed therein.

MATE of a Merchant-Ship, the officer who commands in the absence of the master thereof, and shares the duty with him at sea; being charged with every thing that regards the internal management of the ship, the directing her course, and the government of her crew.

The number of mates allowed to ships of war and merchantmen is always in proportion to the size of the vessel. Thus a first-rate man of war has six mates, and an East Indiaman the same number; a frigate of ten guns, and a small merchant-ship, but only one mate in each; and the intermediate ships have a greater or smaller number, according to their several sizes, or to the services on which they are employed.

Dura and Pia MATER, the names given by anatomists to the two membranes which surround the brain. See Anatomy, n° 129, 130.

MATERA, a considerable town of Italy, in the kingdom of Naples, and in the Terra d'Otranto, with a bishop's see, seated on the river Canapre. E. Long. 16° 43'. N. Lat. 40° 51'.

MATERN in their return to Spain. It is 35 miles from the Havannah. W. Long. 85° 6'. N. Lat. 25° 6'.

MATAMAN, a country of Africa, bounded by Benguela on the north, by Monomotapa on the east, by Cafraria on the south, and by the Atlantic Ocean on the west. There is no town in it, and the inhabitants live in miserable huts, it being a desart country, and but little visited by the Europeans.

MATERIA MEDICA.

A GENERAL name for every substance used in medicine, and by some extended even to every article used as food or drink.

Thus the materia medica becomes exceedingly extensive: however, before we enter upon any particular discussion of the subject, it appears proper to give some general idea of medicines and their operation.

A medicine, properly so called, is a substance, which when applied to the living human body, makes such an alteration in it as either to prevent the progress of disease, or to remedy a morbid state when already present.

Such substances as may be used for these purposes without any great preparation are called simple medicines, or simples; and with these the writers on materia medica are chiefly conversant. In treatises written professedly on this subject, it is common to give a particular description of each article, the characteristic marks by which it may be distinguished from all other substances, and the methods by which an adultication or an imperfective may be discovered in it, together with the dose in which it can safely be given; but as all these particulars are taken notice of in different.
**MATERIA MEDICA.**

Of Classification, different parts of this work, it is only necessary here to mention the general classification, and enumerate the names of the various substancess used in medicine, after giving, as hath been already promised, a brief and general account of their mode of operation.

Concerning the manner in which medicines act, physicians have greatly differed, and each hath followed his own particular theory. The followers of Boerhaave have supposed their action to be directly upon the solids and fluids; while those who build their theories on the hypothesis of Hoffman have affected, that all medicines act immediately upon the nervous system, and from thence only in a secondary manner their effects diffused over the solids and fluids. To discuss this question is not our business at present; neither indeed is it a matter of great consequence whether it be discussed or not; seeing all parties must own, that certain effects follow the use of certain particular substances, whether these substances act directly upon the nervous system or upon the solids and fluids.

From their operations on the human body medicines are most usually divided into classes. Some are found to have the property of rendering the solid parts of the body more lax than before, and are therefore called relaxing medicines; Others there are which have an effect directly contrary, and are therefore called indurating medicines: A third kind are found to excite inflammation in the part to which they are applied, and are therefore called inflammatory medicines: And, lastly, a fourth kind are found remarkably either to increase or diminish the vigour of the body, or what is called the tonus of the solids; and have therefore got the name of tonics if they increase, and sedatives if they diminish, this tone.

Some medicines are supposed neither remarkably to increase nor diminish the tone of the solids; but to perform their office either by correcting some morbid matter in the body, or by evacuating it: in the former case they are called alterants, in the latter evacuants.

There are the general divisions or classes into which medicines are commonly divided; but when we begin more particularly to consider their virtues, a great many inferior divisions arise. Of the relaxing medicines, some, when externally applied, are supposed only to soften the part; and in that case are called emollients; while others, which have a power of converting the humours flagging in any inflamed part into pus, are called naturants, or suppuratives. Sedative medicines, externally applied, are sometimes called parergotics: when taken internally, if they take off the pain then existing in the body, they are called anti-paephydotics; if they mitigate pain, anodynes; if they produce a quiet sleep, hypnotics; or if they produce a very deep and unnatural sleep, together with a remarkable fluepcation of the senses, they are then called electorotics.

To these medicines obtain the name of corrosivatories, antieptic, or suppulsive medicines, when they slightly increase the contracible power of the solids; but of astringents, if they do this in a great degree, especially if at the same time that they indurate the solids they also coagulate the fluids. Some of these medicines have received names from their supposed virtue of promoting the growth of the flesh, consolidating wounds, and stopping fluxes of blood: but it is now discovered that no medicines whatever are endowed with any such powers; and therefore the divisions into farctics traumatics, or vulneraries, &c. are seldom used.

If astringent medicines are used with an intention to drive, by the confusion which they occasion, any kind of matter from the surface towards the internal parts of the body, they are called repellents; but if they inoffensively expel any kind of flagging matter from the parts where it is contained, they are then called demulcents; and lastly, stimulants, or attractives, if they bring a greater flux of humours to the part to which they are applied.

As to medicines of the inflammatory kind, they are divided into vesicatories or blisters, which by their application raise watery bladders on the skin; and catarrhatics, ephorotics, or corrosives, if they eat into and destroy the substance of the solid parts themselves. Another subdivision has been added, viz. that of rubefactive medicines, or such as only induce a redness on the part to which they are applied; but those belong to the vesicatories, and what proves only rubefactive to one will frequently blister another.

The alterants are divided into obferrants, such as by their alkaline quality neutralize and destroy any acid matter which may be in the stomach; and antifeptics, or those which correct any putrid matter in it; constringents when they thicken the humours, and repel what they thin them; heating medicines when they increase the velocity of the blood, and refrigerating if they diminish.

The evacuating medicines are divided according to the nature of the humour they evacuate. Thus, if they evacuate the contents of the stomach by vomiting, they are called emetics: if they induce purging, they are called cathartics: if they only evacuate the immediate contents of the intestines, they are named evacutaries; or if a moderate evacuation is produced, without sickness or pain, they are called laxatives. The medicines which gently promote the expulsion of humours through the pores of the skin, are called diaphoretics. If they do this in great quantity and without violence, they are called purgatives. Such as excite urine, are called rectificatives. Such as produce their evacuation by the glands of the palate, mouth, and salivary ducts, are called salivating medicines: those which promote the evacuation of mucus from the throat, are called apophlegmatics; while those which evacuate by the nose, are called ptamatics, etchines, fennatories: and those which promote the menstrual flux, emmenagogues. To the order of evacuants also come reduce those medicines which expel any unnatural bodies, as worms, stones, and flatus. Those which destroy worms are called antihelmintics; those which dilate the stone in the bladder, lithotropics; and such as expel flatus, carminatives.

According to these divisions Mr Vogel classes the articles of his Materia Medica; but Dr Lewis chooses to arrange them according to the natural qualities of the substances themselves, and not their effects on the human body.

Writers on the materia medica (he observes) have taken great pains in arranging the various articles of which
which it is composed, into different divisions and subdivisions, according to their real or reputed medicinal powers.

It has been imagined, that the whole materia medica is reducible under the three distinctions of alteratives, evacuants, and restoratives: the first comprehend all that has any power to alter the constitution, without sensibly increasing or diminishing any of the natural evacuations; the second, whatever visibly promotes those discharges; and the third, all that contributes to lessen them, and make the increase greater than the waste. These divisions being too general, they are broken into subdivisions; and these again are further divided into different classes, under more restricted denominations, as cardiac, carminative, hysteric, homoeopathic, &c.

Specious as this plan may appear to be, he imagines the execution of it, to any useful purpose, would require a far more extensive knowledge of the nature and operation of medicines than has yet been attained to. A just and useful method of simples is scarcely to be expected, while those properties on which the method is founded are imperfectly known, and in many articles only conjectural.

In all the arguments that have been hitherto contrived upon this plan, there appears a striking incongruity among the several articles of which even the first subdivisions are composed; substances extremely dissimilar being classed together, as cantharides and tea, tobacco and bran, hemlock and cowslips, seewry-grafs and raisins, arum root and liquorice, wormwood and parsnips, cinnamon and nettles, raspberries and chalk, artichokes and alum, cloves and coffee, mustard-feed and black cherries, &c. Nor are these incongruities to be laid always to the charge of the authors, the nature of the system itself rendering them often unavoidable; for the particular effect which intitles a medicine to a particular class, may be produced by substances very dissimilar, and even opposite, in their general powers: thus the alvine evacuations are restrained by flax, wax, tormentil-root, opium; amongst the capital diuretics are cantharides, nitre, salt, fixt alkaline ashes, squills. It should seem that the method of arrangement cannot be a just one which requires substances so discordant to be ranked together, and which further requires each of these substances to be ranked over again, in other classes, along with other substances to which they are equally discordant.

There is also a material imperfection in this scheme, even in the primary divisions. Steel and its preparations are, in different circumstances, both as evacuants and restoratives. Mercury and antimony afford, in their different preparations, both evacuants and alteratives; and there are many other drugs which are sometimes used as alteratives, and sometimes as evacuants; indeed, all evacuants, in diminished doses, seem to act merely as alteratives. It should seem therefore, that "the division of the whole materia medica into alteratives, evacuants, and restoratives," is a division not founded in nature, even if there was no objection to the vague meaning of the appellations themselves.

Carthucaer has divided the materia medica on a plan which appears more rational. Instead of the operations of medicines in the human body, which are precarious, complicated, and greatly diversified according to the dose, the preparation, and the circumstances of the patient, he takes for the basis of his arrangement their more simple, obvious, and constant properties, as bitternes, sweetness, astrinency, acidity, &c. Having considered the nature of bitterness, for instance, in general, he examines what effects medicines possessed of this property are capable of producing in the body, and in what circumstances they may be expected to be serviceable, and then proceeds to an account of the particular bitters.

This method is of real use, but its use is limited to a small part of the materia medica. There are many of the medicinal simples, in which we can distinguish no prevailing qualities of this kind: there are many, in which different qualities are blended together; and many which, though similar in these kinds of qualities, are very dissimilar in their operations in the human body: thus though gentian and aloes agree in having a bitter taste, and sugar and manna in being sweet, their medicinal virtues are respectively very different. Accordingly, the author is obliged in some cases to depart from his general plan, and found the division on the medicinal effects; he makes on classes of purgatives and emetics, and another of vaporous in the acids, particularly the native juices of such plants as the camphor, elder-flowers, saffron, opium, and poppy-seeds, substances certainly very discordant in all their qualities that relate to medicinal intentions.

In this article, instead of attempting a medicinal distribution of the simples, which we apprehend not to be practicable to any good purpose, we shall, after Dr Lewis, adopt the alphabetical mode of arrangement, as posposing upon the whole a decided superiority over every other. We shall, however, premise, from the same ingenious author, some general observations on certain classes of medicines, in Carathecaer's manner; and thus preserve the less exceptionable parts of his plan, with some amendments.

**ART. I. ACIDS.**

Class 1. Vegetable produced by fermentation; as vinegar and tartar.


The medical effects of acids, duly diluted and given in proper doses, are to cool, quench thirst, correct a tendency to putrefaction, and allay inordinate motions of the blood. By these qualities, in hot bilious temperaments and inflammatory disorders, they frequently restrain immediate haemorrhage, and promote the natural secretions; in some kinds of fever, they excite a copious diaphoresis, where the warm medicines, called alexipharmic, tend rather to prevent this salutary discharge.

Vegetable acids, particularly the native juices of certain plants and fruits, have some degree of a pungaceous quality; by means of which they attentuate or
Materia Medica.

Absorbents or dissolve viscid phlegm and deters the vesicles, and thus prove serviceable in sundry chronical disorders. Invertebrate creatures have sometimes yielded to their continued use, especially when given in conjunction with medicines of the acid or putrid kind; experience has shown, that the acid antiscorbutics have much better effects when thus managed than when exhibited by themselves; hence in the face of forbidding of our dispensatory, Seville orange juice is usefully joined to that of cochlearia and nasturtium.

The mineral acids instantly coagulate blood; the vegetable dilute it, even when infipid or thickened by heat; in which state, watery liquors will not mingle with it. Hence, in some fevers, where water runs off by the kidneys almost as pale and insipid as it was drank. vegetable acids render the urine of the due colour and quality. The mineral acids (the spirit of niter in particular) combined with vinous spirits, have a like effect.

Acids are prejudicial in cold, pale, phlegmatic habits, where the vesicles are lax, the circulation languid, bile deficient, and the power of digestion weak. In these cases, an acid is often generated in the stomach, from milk and moist vegetable foods; which, whilst it continues in the first passages, occasions uneasiness about the stomach, flatulencies, sometimes gripe pains of the bowels, and vomitings.

Art. II. Insipid Earths capable of Absorbing Acids.

Oyster-shells, Chalk,
Crabs claws and eyes so called, Some marles,
Coral red and white, Limestone,
Pearls, Marbles,
Bezoar, Spurs.

The virtues of these substances are, to absorb or destroy acridities in the first passages, and consequentify to remove such disorders as proceed from that cause. The cordial, alkalinehrmic, antifebrile, and other like virtues attributed to these medicines, appear to have little foundation; or at best are only secondary ones. When united with the acid, they form a neutral saline compound, poeafg some degree of an aperient and deterrent quality, though too inconsiderable to be in general regarded.

The absorbent earths were all strangers to medicine in the earlier times, and their use does not seem to have been established before the 1st century; when some practitioners, from an opinion that most kinds of diseases proceeded from a preternatural acid, introduced a great variety of antacid bones both of the earthy and saline kind, and very liberally exhibited them on almost every occasion.

It is certain, that in children, and adults of a weak constitution, and whose food is chiefly of the vegetable accecfent kind, sundry disorders are occasioned by acidities; these readily discover themselves by four cutations, the pale colour of the face, and in children by the four swell and green colour of the alvine veins, which are sometimes so manifestly acid as to raise a strong effervescence with alkaline fals. In these cases, and these only, the use of absorbent earths is indicated.

If there are really no acid juices in the ventricles, these earths are apt to concretie with the mucous matter usually lodged there, into hard indissoluble maffes; which have sometimes been thrown up by vomit, or found in the flomach upon dissection. Hence indigestion, loss of appetite, nausea, vomiting, obstructions of the bowels, and other disorders. Sometimes the stomach and intestines have been found lined with a crust, as it were, of these earthy bodies, which must not only have prevented the separation of the gastric liquor, but likewise have closed the orifices of the rectal vesicles, to obstruct the passage of the chyle into the mass of blood.

Some suppose the earthy powders capable (without the concurrence of any acid) of pitting the lacerals along with the chyle: and allege, in support of this opinion, that, when triturated with water, they are in part taken up and carried with it through a filter of paper; the filtrated liquor leaving, upon evaporation, a portion of whitish earthy matter. This experiment (allowing the consequence to be justly drawn from it) is itself erroneous; the residuum proceeds from the earth naturally contained in the water, not from that employed in the experiment; for if pure distilled water be made use of, it will leave no residuum, though long triturated or digested with the earth.

All these bodies, particularly those of the animal kind, contain, besides their purely alkaline earth, a portion of glutinous matter. An instance of this we have in crabs-eyes, which if macerated in the weaker acids, or in the stronger sufficiently diluted with water, the earthy part will be dissolved, and the animal glue remain in form of a soft transparent mucilage. The glutinous substance increases their tendency to concretie in the stomach: and hence those which contain least thereof should be preferred to the others. The mineral earths contain the least of this kind of matter, and some of them are very easy of solution; chalk, for instance, which may therefore be given with greater facility than the animal absorbents. These substances dissolved of their coagulating matter by means of fire, are reduced into acrimonious calces or limes, and thus become medicines of a different class.

The teeth, bones, hoofs, and horns of animals consist of the same principles with the animal-absorbents above mentioned, but combined in different proportions; the quantity of glutinous matter is so large, as to defend the earthy part from the action of weak acids whilst the earth, in its turn, procures the gluten from being easily dissolved by watery liquors. Hence these bodies in their crude state, though recommended as poeafing singular virtues, are not found to have any virtue at all.

Experiments have been made for determining the degree of solubility, or comparative strength of these earths; the principal of which are arranged in the two following tables, one taken from Langius and the other from Homberg.
**Materia Medica.**

The table of the quantity of acid destroyed by different Absorbents:

<table>
<thead>
<tr>
<th>Absorbents</th>
<th>Quantity of Acid Destroyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some kinds of Limestones</td>
<td>160</td>
</tr>
<tr>
<td>Oyster shells</td>
<td>120</td>
</tr>
<tr>
<td>Chalk</td>
<td>100</td>
</tr>
<tr>
<td>Shells of Garden-Finals</td>
<td>100</td>
</tr>
<tr>
<td>Calcined Cray-fish</td>
<td>100</td>
</tr>
<tr>
<td>Pearls</td>
<td>80</td>
</tr>
<tr>
<td>Tooth of the Sea-horse</td>
<td>80</td>
</tr>
<tr>
<td>Volatile Salts</td>
<td>80</td>
</tr>
<tr>
<td>Fixed Salts</td>
<td>60</td>
</tr>
<tr>
<td>Coral, red and white</td>
<td>60</td>
</tr>
<tr>
<td>Crabs-eyes</td>
<td>50</td>
</tr>
<tr>
<td>Egg-helks</td>
<td>50</td>
</tr>
<tr>
<td>Mother-of-Pearl</td>
<td>50</td>
</tr>
<tr>
<td>Crabs-claws</td>
<td>40</td>
</tr>
<tr>
<td>Jaw-bone of the Pike fish</td>
<td>30</td>
</tr>
</tbody>
</table>

The table of the quantity of Absorbent Earths soluble in Acids:

<table>
<thead>
<tr>
<th>Absorbents</th>
<th>Quantity of Acid Soluble</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crabs-eyes</td>
<td>216</td>
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<tr>
<td>Mother-of-Pearl</td>
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<tr>
<td>Pearls</td>
<td>128</td>
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<tr>
<td>Oyster shells</td>
<td>136</td>
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<td>Hawthorn</td>
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<td>Coral</td>
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<td>Oriental Bezoar</td>
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<td>Occidental Bezoar</td>
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<td>Quick Lime</td>
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<td>Slacked Lime</td>
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<tr>
<td>Crabs-eyes</td>
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<tr>
<td>Mother-of-Pearl</td>
<td>202</td>
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<tr>
<td>Pearls</td>
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<tr>
<td>Oyster shells</td>
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<td>Hawthorn</td>
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<td>Oriental Bezoar</td>
<td>108</td>
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<tr>
<td>Quick Lime</td>
<td>180</td>
</tr>
<tr>
<td>Slacked Lime</td>
<td>216</td>
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</tbody>
</table>

These experiments do not sufficiently ascertain the point intended by them; in the first, the quantity of acid is too vague and indeterminate; in the second, we are not told whether the acid was perfectly saturated; and in both, the acids made use of were so very different from any that can be supposed ever to exist in the human body, that little can be concluded from them with regard to the medical effects of these absorbents. Trial should have been made with the mild vegetable acids, as the juices of certain fruits, four fermented liquors, or rather with four milk. Nevertheless these tables, though not so perfect as could be wished, have their use in the hands of such as can make proper allowances.

Art. III. Earths not Dissoluble in Acids or other Liquors.

These may be ranged in two classes.

Clas 1. Hard crystalline earths: as the ruby, garnet, emerald, sapphire, hyacinth, and other precious stones, crystal, flint, &c.

These kind of substances were introduced into medicine, and many fabulous virtues attributed to them indissoluble by the superstition of the earlier ages. Some of them are still preserved in foreign pharmacopoeias, but at length very justly expunged from ours, notwithstanding what some late writers of reputation speak of their medical virtue. These indissoluble hard bodies are not capable of producing any other effect, than by their rigid angular particles (which, though levigated with the utmost care, the microscope still discovers in them) to offend or wound the intestines. In leucopytia, they wear off so much from the hardest marble instruments, as will equal or exceed their own weight: from this circumstance we may account for their having sometimes appeared to act as absorbents. Some of these stones, exposed to a vehement fire, become in some measure friable; but nevertheless remain indissoluble. Most of the coloured ones by this treatment lose their colour; and in this state prove nearly of the same quality with common crystal: such are, the sapphire, emerald, amethyst, and cornelian. Others melt into a blackish vitreous matter, from which a portion of iron is obtainable by proper fluxes; as the hyacinth and garnet. Geoffroy concludes from hence, that these stones really possess some medical virtues, depending upon their metallic part; but the quantity of metallic matter sufficient to give them a considerable tincture is so exceedingly small, and so inclosed in a flaky matter not at all soluble by any of the known medicines, as scarce to admit of any possibility of its acting in the human body.

Clas 2. Softer earths; the talky, gypseous, and argillaceous.

The tales and gypsums have rarely been used as medicines. Some of the former, from their mucous softness and silver hue, stand recommended externally as cosmetics; and some of the latter, on little better foundation, internally as astringents. But they have long been deferentially rejected by the judicious practitioners. They seem to possess the dissoluble qualities of the alkaline earth (concreting with the mucus of the stomach, &c.), without any of their good ones.

Several of the clays, boles, and terrae filigitate, were highly celebrated by the ancients as astringents and alexipharmics, and some of them still continue in esteem; though it is certain they have no great claim to the virtues that have been at tributed to them. Their real effects are, to give a greater degree of consistency to the fluids in the first pallsages, and in some measure defend the solids from their acrimony.

Most of these bodies contain, besides the tenacious indissoluble earth, which is their principal characteristic. (1.) A portion of an earth soluble in acids similar to those of the first section. (2.) Of acid, separable by distillation in a strong fire; this acid is always of the same nature with that obtained from vitriol, sulphur, and alum. (3.) The coloured ones contain likewise small quantities of iron, reducible, by inflammable fluxes, into its metallic form. In consequence of the first of these ingredients, these earths may be looked upon in some measure as absorbents; the acid earth into a fatty compound, approaching to an aluminous nature; whereas they have some degree of astringency:
Materia Medica

Art. IV. Glutinous Vegetable and Animal Substances.

Class 1. Vegetable.

Pure gums:
Tragacanth, with mucilage;
Seneca, Orchis root,
The gums of cherry, plum, Althea root, and other European trees. Quince-seeds, &c.

Gums and mucilages are glutinous vegetable productions of no particular taste or smell, soluble in water, but not in vinous spirits or in oils. They differ from one another only in degree of tenacity; the more tenacious are called gums; those which are less so, mucilages. The first naturally exude from certain trees and thorns; the latter are extracted by art. Almost all vegetable substances contain some portion of thefe, which, after the refinous part has been extracted by spirit, may be separated from the remaining matter by means of water.

The general virtues of these kinds of substances are, to thicken the fluids, and defend the solids from them when grown sharp or corrosive. Hence their use in a thin acrimonious state of the juices, and where the natural mucus of the intestines is abraded.

Class 2. Animal.

Most animal substances (the fat excepted) contain a viscid matter, in many respects similar to the foregoing, and capable of being extracted by strong coction in water.

Animal glues and gellers have the general qualities of the vegetable gums and mucilages; with this difference, that the former are more nutrimental, and apt to run into a putrid state. Considered as the subjects of chemistry, the difference between them is very great: those of the animal kind are changed by fire into a volatile alkaline salt, and a fetid oil; the vegetable into an acid liquor, and a very small portion of oily matter considerablv lesser fetid than the former.

Art. V. Soft Unctuous Substances.

Class 1. Insipid vegetable oils; and substances abounding with them; as almonds, and the kernels of most fruits; linseed, and the medullary part of sundry other seeds.

Class 2. Animal fats; as spermaceti.
Sweets and
Acids.

Art. VII. Sweets.

Sugar, Honey, Raisins, Liquorice, &c.

The vegetable sweets are a very numerous tribe; almost every plant that has been examined, discovering in some of its parts a saccharine juice. The bottoms of flowers, and most kinds of seeds and grain when they begin to vegetate, are remarkably sweet.

Vegetable sweets are extracted both by water and vinous spirits, most readily by the first, but in greatest perfection by the latter. Nothing of their taste arises in distillation with either of these liquors; nevertheless by long boiling with water they become somewhat less agreeable; but are not much injured by being treated in the same manner with rectified spirit.

The purer sweets, as sugar, promote the union of distilled oils with watery liquors, and prevent the separation of the butyaceous part from mild: from this quality, they are lapped up to unite the unctuous part of the food with the animal juices. Hence some have concluded, that they increase fat: others, that they have a contrary effect, by preventing the separation of the unctuous matter which forms the fat from the blood: and others, that they render the juces thicker and more fuggish, retard the circulation and cuticular excretion, and thus bring on a variety of disorders. But sweets have not been found to produce any of these effects in any remarkable degree: common experience shows that their moderate, and even liberal, use is at least innocent; that they reconcile, not only to the palate, but to the fluxes also, substances of themselves dis gustful to both; and thus render salutary what would otherwise be injurious to the body.

The unctuous and mucilaginous sweets, as the impure sugars, liquorice, &c. have a considerable degree of emollient and lubricating virtue. Thse accompanied with a manifest acid, as in the juices of most sweet fruits, are remarkably relaxing; and if taken immoderately, occasion diarrheas and dysenteries, which sometimes have proved fatal.

Art. VIII. Acids.

1. Indistillation with water: as horse-radish, mustard, fennel-grass, &c.

Yielding their acrimony

2. By infusion only: as the greater celandine, pyrethrum, &c.

3. Neither to infusion, nor distillation: as arum and dracunculas.

Acids are substances of a penetrating pungency. Applied to the skin, they inflame or excoriate it: chewed, they occasion a copious discharge of saliva: and faulted up the nose, they provoke sneezing.

These substances, considered as the subjects of pharmacy, may be divided into three classes.

The general effects of acid medicines are, to sti mulate the vessels, and diffuse tensions juices. In cold lenothymatic habits, fragmentions of the fluids, and where the contrafdle power of the solids is weak they prove powerful, expectorants, deb looseners, diuretics, and emmenagogues; and if the patient is kept warm, sudorifics. In hot bilious conftitutions, phlethoric habits, inflammatory distempers, where there is al ready a degree of irritation, where the juices are too aromatic thin or acri monious, or the visceras unfound, these stimulat ing medicines prove highly prejudicial, and never fail to aggravate the disease.

Certain acrid substances have been lately recommended in dry convulsive affmias; of the efficacy of the quill in particular, for the cure of this disorder, several instances are related in the commercium Literar um, of Norimberg for the years 1737 and 1739. Car thener thinks, that not the acrid itself, but a particular effect of it, was remedied by this medicine. He observes, that in all affmias the free circulation of the blood through the pulmonary vessels is impeded; and hence, during every paroxysm, the lungs are in a kind of edematous state: that if this edema, becoming habitual, remains after the fit is over, it is either perpetually occasioning fresh ones, or gives rise to a dropy of the breast: that acrid medicines, by removing the edema, remove what was originally an effect of the affma, and in time a cause of its aggravation.

Art. IX. Aromatics.

Aromatics are substances of a warm pungent taste, and a more or less fragrant smell. Some of the spices are purely aromatic, as cubeb, pepper, cloves; some substances have a sweetness mixed with the aromatic matter, as angelica-root, aniseed, fennel-seed; some an astringency, as cinnamon; some a strong musilage, as caflia lignea; some a bitterness, as orange-peel. The aromatic matter itself, contained in different subjects, differs also not a little in its pharmaceutic properties. It is extracted from all by rectified spirit of wine; from some in great part, from others scarcely at all, by water. The aromatic matter of some subjects, as of lemon-peel, rifes wholly in distillation both with spirit and water; that of others, as cinnamon, rifes wholly with water, but scarcely at all with spirit: while that of others as pepper, is in part left behind after the distillation of water itself from the spice.

With regard to the general virtues of aromatics, they warm the stomack, and by degrees the whole habit; raise the pulse, and quicken the circulation. In cold languid cates, phlegmatic habits, and a weak fluid state of the fluids, they support the vis viva, and promote the salutary fermentions. In hot bilious tempaments, phtehoric habits, inflammatory indispositions, dryness and fluctuations of the fibres, they are generally hurtful.

Art. X. Bitters.


Bitters for the most part yield their virtue both to watery and spiritual menstrua; some more perfectly to one, and others to the other. None of the substances of this class, give over any thing considerable of their taste in distillation, either to water, or to spirit; their bitternesses remaining entire, and frequently improved, in the extracts. Such as are accompanied with flavour, as wormwood, by this process, may be reduced into simple flavourless bitters.

These substances participate of the virtues of astringents and aromatics. Their general effects are, to constringe the fibres of the stomack and intestines, to warm the habit, attenuate the bile and juices in the first.
first passages, and promote the natural evacuations, particularly of sweat and urine. In weaknesses of the
flomach, loss of appetite, indigestion, and the like disorders, proceeding from a laxity of the fluids, or cold
flagrant indisposition of the juices, these kinds of medicines do good service. Where the fibres are already
then too tense and rigid, where there is any immediate heat or inflammation, bitters very feinly increase the
dilatation; and, if their use is continued, communicate it to the kidneys: hence the urine becomes high-coloured,
small in quantity, and at length suppressed; a croply soon succeeding. If the kidneys were before
folax as to remain now uninjured, yet the other vifera become gradually more and more rigid, and a
analysis is at length brought on.
Bitter substances destroy insects, and prevent putrefaction. Hence they are recommended as antihelminthic, and externally as antifeptics.

Art. XI. Emetics and Cathartics.

Hellebore, Colocynth, Iapelp, Scammony, Skelp, Gamboge, &c.

These substances consist of a resinous part, in which the purgative or emetic quality resides: and a gummy saline one, which acts chiefly as a diuretic.
The first is extracted or dissolved by vinous spirits; the latter by water. Nothing arises in distillation
from either.
The acid refins, exhibited by themselves, tenaciously adhere to the coats of the intestines, by their
stimulating power irritate and inflame them, and thus produce fundry violent disorders. Hoffman relates,
that he has sometimes observed convulsions, and a paralysis of both fibres, from their use.
These inconveniences may be avoided, by previously triturating them with substances capable of
dividing their tenacious texture, and preventing their adhesion; by this means they become mild and safe,
operate without disturbance, and at the same time

A SOTUALE of the SIMPLES used in the MATERIA MEDICA, exhibiting at one view their
TECHNICAL NAMES, ENGLISH NAMES, PARTS USED IN MEDICINE, VIRTUES, and the different
PREPARATION FROM THEM.-A particular account of the different articles of this list is given in the
course of the alphabet, chiefly under the Linnean names: And the methods of making the preparations
from them are shown under the article PHARMACY. The notes subjoined at the bottom of the following pages
are intended to supply some particulars relating to a few of the detached articles already paid.

TECHNICAL NAMES. ENGLISH NAMES. PARTS USED IN MEDICINE. VIRTUES. PREPARATIONS FROM THEM.


Abrotanum serica, Lavender cotton. The leaves. Stimulant, dierent, and anthelmintic. Decoction, and ointment for
(Santolius cheir-
cypar. Lin.) cutaneous eruptions.

Abrotanum mas, Southernwood. The leaves. Stimulant, dierent, aperient, and sudorific.
( Artenisia abro-
tanum, Lin.) Stomachic. An oil, extract, confervé, and several distilled tincture-

Abinithium maritimum. The tops. waters. They also enter the
(Artentiaum arbor-
theins, Lin.) common fomentation and green oil.

Abinithium vulgare, Common worm. The leaves and flow-
(Artentiaum abrin-

some, Lin.) ering tops.
<table>
<thead>
<tr>
<th>TECHNICAL NAMES</th>
<th>ENGLISH NAMES</th>
<th>PARTS USED IN MEDICINE</th>
<th>VIRTUES</th>
<th>PREPARATIONS FROM THEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia Germanica</td>
<td>The floe.</td>
<td>Infpiffated juice.</td>
<td>Astringent.</td>
<td>Decoction and syrup; its virtues best obtained from an infusion of the herb sweetened with sugar and liqueurice, and drank as tea.</td>
</tr>
<tr>
<td>Acacia vera</td>
<td>Acacia.</td>
<td>Infpiffated juice.</td>
<td>Astringent.</td>
<td></td>
</tr>
<tr>
<td>Acorus. See Calamus arom. infa.</td>
<td></td>
<td></td>
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<tr>
<td>Adiantum verum (Adiantum capillus, Ven. Lin.)</td>
<td>Maiden-hair.</td>
<td>The leaves.</td>
<td>Attenuating and aperient.</td>
<td>Decoction and syrup; its virtues best obtained from an infusion of the herb sweetened with sugar and liqueurice, and drank as tea.</td>
</tr>
<tr>
<td>Aer dephlogisticus.</td>
<td>Dephlogificated air.</td>
<td></td>
<td>Supposed to be antiseptic and corrobative.</td>
<td></td>
</tr>
<tr>
<td>Aer mephiticus.</td>
<td>Fixed air.</td>
<td></td>
<td>Antiseptic and lithotriptic.</td>
<td></td>
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<tr>
<td>Àë. See Cuprum.</td>
<td>Brafs. See Copper.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agaricus, (Boletus)</td>
<td>Agaric.</td>
<td></td>
<td>Cathartic.</td>
<td>An aqueous extract, but now much diffused.</td>
</tr>
<tr>
<td>Agaricus chironorum (Boletus ignis, Lin.)</td>
<td>Female agaric, or agaric of the oak, touchwood, or punk.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Agnus castus (Virg. agnus castus, Lin.)</td>
<td>The chaste-tree.</td>
<td>The seeds.</td>
<td>Antaphrodisiac.</td>
<td></td>
</tr>
<tr>
<td>Agrimonia (A. Eupator. Lin.)</td>
<td>Agrimony.</td>
<td>The leaves.</td>
<td>Attenuant and tonic.</td>
<td>Digested in whey, it forms, a diet-drink used by some in the spring.</td>
</tr>
<tr>
<td>Albomen ovi.</td>
<td>White of an egg.</td>
<td></td>
<td>Difcurent.</td>
<td></td>
</tr>
<tr>
<td>Alnus (Betula alnus, Lin.)</td>
<td>Leaves and bark.</td>
<td></td>
<td>Astringent.</td>
<td>Decoction. The leaves chopped and heated, efficacious for dispersing milk in the breasts.</td>
</tr>
<tr>
<td>Aloe (Aloe perfoliata, Lin.)</td>
<td></td>
<td>Infpiffated juice.</td>
<td>Cathartic.</td>
<td>Ingredient in several tinctures and pills.</td>
</tr>
</tbody>
</table>

Althæa
<table>
<thead>
<tr>
<th>Technical Names</th>
<th>English Names</th>
<th>Parts Used in Medicine</th>
<th>Virtues</th>
<th>Preparations From Them</th>
</tr>
</thead>
<tbody>
<tr>
<td>Althaea (A. officinalis, Lin.)</td>
<td>Marshmallow</td>
<td>The leaf and root</td>
<td>Emollient</td>
<td>A syrup and ointment.</td>
</tr>
<tr>
<td>Alum.</td>
<td></td>
<td>The whole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambragrica.</td>
<td>Ambergric.</td>
<td>The whole</td>
<td>Strongly astringent</td>
<td>A flyptic powder, flyptic water, whey, &amp;c.</td>
</tr>
<tr>
<td>Ammi vulgaris.</td>
<td>Bishops weed.</td>
<td>The leaves</td>
<td>A high cordial</td>
<td>A tincture or essence.</td>
</tr>
<tr>
<td>Anomum verum.</td>
<td>True amomum.</td>
<td>The seeds</td>
<td>Stimulant</td>
<td>An ingredient in the theriac.</td>
</tr>
<tr>
<td>Anomum vulgare</td>
<td>Ballard honeysuckle</td>
<td>The seeds</td>
<td>Aromatic</td>
<td>An ingredient in the theriac.</td>
</tr>
<tr>
<td>(Sifon. anomum, Lin.)</td>
<td></td>
<td></td>
<td>Carminative and diuretic</td>
<td></td>
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<tr>
<td>Ammoniacum. See</td>
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</tr>
<tr>
<td>Amygdala (Am. Sweet and bitter almonds.</td>
<td></td>
<td></td>
<td>Relaxing.</td>
<td>Expressed oil and emulsion.</td>
</tr>
<tr>
<td>Amylum</td>
<td>Starch.</td>
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<tr>
<td>Anacardium occidentale, (Lin.)</td>
<td>Cashew-tree.</td>
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<tr>
<td>Angelica (A. Archangelica, and Angelica, Lin.)</td>
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<td></td>
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<tr>
<td>Aquae minerals.</td>
<td>Mineral waters.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquae sulphureae.</td>
<td>Sulphurous waters.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina (Potentilla argentina, Lin.)</td>
<td>Silverweed.</td>
<td>The leaves</td>
<td>A most powerful Several chemical preparations; see Chemistry-Index.</td>
<td></td>
</tr>
<tr>
<td>Argentum vivum.</td>
<td>Quicksilver.</td>
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</tbody>
</table>

(a) The Angufiura bark was first imported from the West Indies in 1788; but it is a native of Africa. Mr Bruce who had been cured of a dysentery in Abyssinia by the bark of a plant called there *Wogino*, brought the feeds from that country, and the plant is now cultivated in Kew gardens and other places under the name of *Brucia antidysenteria*, or *ferruginea*. He supposed the bark of this was the same with that of the Angufiura; but Dr Duncan, in the Medical Commentaries for 1790, says that they are totally different when compared together. For an account of the Angufiura bark, see Jesuit’s Bark.
(a) This pernicious mineral has some time ago been introduced into medicine as a certain remedy for cancers; but Mr. Jaffamond, who published a treatise on this subject two or three years ago, informs us, that even the most guarded use of it in the external way, while it produces the happiest effects in healing cancerous ulcers, yet occasions such diffigeable symptoms of the paralytic kind, that it cannot be perused in. The latest trials in London are likewise said to confirm this account; notwithstanding which, however, the internal use of it has since gained ground in a variety of disorders, particularly in interrupting fevers, which are said to be readily cured by it sometimes after the bark and all other remedies had failed. A solution of the mineral is given by drops, from one sixteenth to a six part of a grain for a dose, largely diluted in a warm aqueous liquid. Dr. Aikin recommends oil and milk as a certain remedy against this destructive poison. He quotes from Hoffman an instance where several persons of distinction had tasted food mixed with arsenic instead of sugar. All of them were seized with anxiety at the breast, pain at the stomach, tremor of the lips, and reachings. Milk and oil were given in great quantity, and they continued strongly vomiting for half a day. Some vomited no less than 100 times; but all of them recovered. Some instances of a similar kind have come within the Doctor's own knowledge. Sage in his Mineralogy relates, that the regulus is much less dangerous than the calx or glaæ; he says that on giving half an ounce to a cat, the animal only grew meagre for some time, but afterwards became fat again. He says that acids, particularly vinegar, are the antidotes to this poison; and that oils and emulsions do not so effectually obviate this poison as acids do. Of this he has had experience in brutes. He adds, that the regulus is not soluble in water, and that the founders are more afraid of flames of lead than arsenic.

(c) Dr. Aikin informs us, that the insupportable pungency on the tongue, which has hitherto prevented it from being used in a fresh state, so as to exert its full virtues, is effectually covered by unctuous and gummy materials. The fresh root beaten into a smooth mass, with the addition of a little terebinthinous powder which promotes the division of it, may be either mixed with about an equal quantity of powdered gum arabic, and three or four times as much conserve, so as to make them into an electuary; or rubbed with a thick mixture of mucilage of gum arabic and spermaceti, gradually adding any suitable watery liquors, and a little syrup in order to form an emulsion, two parts of the root, two of gum, and one of spermaceti, make an emulsion, which scarce imparts any degree of pungency upon the tongue though kept long in the mouth. In these forms our author has given the fresh root from ten grains to more than a scruple, three or four times a day; it generally occasioned a slight sensation of warmth, first about the stomach and then in the remotest parts; manifestly promoted perspiration, and frequently produced a plentiful sweat. Several obstinate rheumatic pains have been removed by the use of this preparation, which our author therefore recommends to further trial.

(b) The leaves of this plant are by some supposed to be more powerful than the roots as emetics and cathartics, but they are milder as erthines. Geoffroy relates, that a single dose of the erthine of which this root is an ingredient has occasioned a discharge for three days: and that he has known a palpy of the mouth and tongue cured by the same means. He recommends it in stubborn disorders of the head proceeding from viscid matters, in palsy, and lethargic ditempers. During its operation the patient must carefully avoid cold; which is apt to produce pufiles, inflammations, swellings of the face, and sometimes worse symptoms than even those. The empirical herb-stuffs have the leaves of afarum for their basis, but sometimes mixed with its ingredients of a more dangerous nature.
Of Gilead. An

of its nourishing quality. official treatises, electricity, Barytes, and the

bearing and powdered powder, for some cafes of swellcd glands, foul ulcers, enlarged joints, and general cachexy, singular relief was given by the morulated barytes, either alone or joined with mercurials, antimonials, and the bark. The medicine in a few cafes appeared to augment the cuticular secretion; in most it occasioned an uncommon flow of urine, and almost universally improved the appetite and general health of the body. Few feoms, however, could bear more than from six to ten drops of a saturated solution, nor did a continued use of the medicine reconcile the stomach to it, but rather the contrary. Sometimes it produced a vertigo, which probably arose from its nauseating quality. Dr. Crawford is of opinion, that this solution, when injudiciously managed, is capable of producing deleterious effects, by disordering the nervous system, and bringing on violent vomiting and purging. From some experiments made upon dogs, it appears that a large dose would prove fatal.
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#### Technical Names, English Names, Parts Used in Medicine, Virtues, Preparations from Them

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>English Name</th>
<th>Part Used</th>
<th>Virtues</th>
<th>Preparations From Them</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beccabunga (Vero-nia beccabunga, Lin.)</td>
<td>Brooklime</td>
<td>The herb</td>
<td>Attenuating, and antiscorbutic.</td>
<td></td>
</tr>
<tr>
<td>Bechen album (Centaurea bechen, Lin.)</td>
<td>The root</td>
<td>Stimulant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bechen rubrum (Statice limon, Lin.)</td>
<td>The root</td>
<td>Stimulant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belladona (Aconitum belladonna, Lin.)</td>
<td>The juice</td>
<td>Narcotic</td>
<td>An extract of the juice, decoction, infusion, powders.</td>
<td></td>
</tr>
<tr>
<td>Bellis minor (Bell. Common daisy, pereu, Lin.)</td>
<td>The leaves</td>
<td>Attenuant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzoin (Benzoinia benzoin, Lin.)</td>
<td>The resin</td>
<td>Pectoral</td>
<td>Ingredient in the paezoric elixir.</td>
<td></td>
</tr>
<tr>
<td>Betonikis (Berber. or barberry, vulgar, Lin.)</td>
<td>The bark and fruit</td>
<td>Astringent</td>
<td>A jelly.</td>
<td></td>
</tr>
<tr>
<td>Beta, B. vulgaris, The beet. (Lin.)</td>
<td>The root and leaves</td>
<td>Cathartic</td>
<td>Cathartic and er-rhine.</td>
<td></td>
</tr>
<tr>
<td>Betonica B. officinalis, Lin.)</td>
<td>The leaves and flowers</td>
<td>Corroborant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Betula (B. alba, The birch-tree, Lin.)</td>
<td>The bark and sap</td>
<td>Antiscorbutic and diuretic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bezoar (Bezoar-stone)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilis animalis.</td>
<td>The gall or bile of animals.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biforta (Polygonum bistorta, Lin.)</td>
<td>The roots</td>
<td>Powerfully astringent.</td>
<td>An ingredient in a powder.</td>
<td></td>
</tr>
<tr>
<td>Boli</td>
<td>Boles</td>
<td>Astringent and Ingredients in several powders.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borax</td>
<td>Tincal, or borax</td>
<td>Diuretic and emollient.</td>
<td>An ingredient in a powder, menagogue.</td>
<td></td>
</tr>
<tr>
<td>Branca utina (A. Bear’s breech. canthus mollis, Lin.)</td>
<td>The root.</td>
<td>Refrigerant and laxative.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brassica marina, Sea-cole-worts, (Convolvulus foldanella, Lin.)</td>
<td>The leaves.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brueca antidienterica. See note (a), supra.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bryonia (B. alba, White brony Lin.)</td>
<td>The root.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cacao (Theobroma chocolate-tree. cacao, Lin.)</td>
<td>The fruit.</td>
<td>Astringent, but very doubtful.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cajeput (Macleuca Cajeput. leucaden dre, Lin.)</td>
<td>The fruit.</td>
<td>Analieptic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stimulant, healing, Distilled. carminative.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TECHNICAL NAMES</td>
<td>ENGLISH NAMES</td>
<td>PARTS USED IN MEDICINE</td>
<td>VIRTUES</td>
<td>PREPARATIONS FROM THEM</td>
</tr>
<tr>
<td>-----------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td>Calaminaria lapis</td>
<td>Calamine stone</td>
<td>The leaves</td>
<td>Digestive, healing, Aromatic and stimulant</td>
<td>An ingredient in collyria, epulotic cera, &amp;c.</td>
</tr>
<tr>
<td>Calamintha (Melis- fa calamintha, Lin.)</td>
<td>Calamint</td>
<td>The leaves</td>
<td>Aromatic and stomachic</td>
<td></td>
</tr>
<tr>
<td>Calamus aromaticus (acorus calamus, Lin.)</td>
<td>Sweet-flag</td>
<td>The roots</td>
<td>Aromatic and stomachic</td>
<td></td>
</tr>
<tr>
<td>Calendula (C. Offici- nalis, Lin.)</td>
<td>Garden marigold</td>
<td>The flowers</td>
<td>Attenuating and sudorific, but very doubtful</td>
<td>A violent corrosive, A medicated water, and powerful alterant and absorbent.</td>
</tr>
<tr>
<td>Calx viva.</td>
<td>Quicklime</td>
<td>Powder</td>
<td>Aperient and stomachic</td>
<td>Pickled.</td>
</tr>
<tr>
<td>Camphor (Laurus Camphire-tree. camphora, Lin.)</td>
<td>The concrusted essential oil</td>
<td>Refrigerant and diaphoretic, stimulant, and antispasmodic</td>
<td>A solution in rectified spirit, in expressed and essential oils. Ingredient in many other compositions.</td>
<td></td>
</tr>
<tr>
<td>Canella alba (Lin.)</td>
<td>White cinnamon, The bark.</td>
<td>Aromatic and stimulating</td>
<td>An ingredient in several other tinctures.</td>
<td></td>
</tr>
<tr>
<td>Cannabis (C. sativa, Hemp. Lin.)</td>
<td>The seeds</td>
<td>Aperient and re-frigerant, but doubtful. Decoctions and infusions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cantharis (Meloe Spahish fly. vesicatorius, Lin.)</td>
<td>The seeds</td>
<td>Violently stimulating</td>
<td>A Spirituous tincture, a plaster, ointment, &amp;c.</td>
<td></td>
</tr>
<tr>
<td>Caparis (C. spinafo, Caper-bush. Lin.)</td>
<td>The bark of the root, and flower-buds</td>
<td>Aperient and stomachic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardamines (C. pra- tenfis, Lin.)</td>
<td>The flowers</td>
<td>Antispasmodic</td>
<td>Powder.</td>
<td></td>
</tr>
<tr>
<td>Cardamomum makaerus (Amom. cardam. Lin.)</td>
<td>Greater cardamom The seeds</td>
<td>Aromatic and simul-</td>
<td>A spirituous water and tincture. Ingredient also in several official compositions.</td>
<td></td>
</tr>
<tr>
<td>Cardamomum minimus (Amom. repens, Lin.)</td>
<td>Lesser cardamom. The seeds.</td>
<td>Aromatic and stimulant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiaca (Leonurus Mother-wort. cardisia, Lin.)</td>
<td>The leaves.</td>
<td>Antispasmodic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carica (Ficus carica, The fig. Lin.)</td>
<td>The dried fruit.</td>
<td>Emollient, suppository.</td>
<td>Ingredient in the pectoral decoction and lenitive elec- tuary.</td>
<td></td>
</tr>
<tr>
<td>Carpobalfam (Amy- Carpobalfam. ris Gileadensis, Lin.)</td>
<td>The fruit</td>
<td>Aromatic.</td>
<td>In substance applied warm as a cataplasm.</td>
<td></td>
</tr>
<tr>
<td>Carthamus (C. tinc- torius, Lin.)</td>
<td>The seeds.</td>
<td>Cathartic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carvi (Caram carvi, Caraway. Lin.)</td>
<td>The seeds.</td>
<td>Aromatic.</td>
<td>An essential oil, a spirituous water. Ingredient also in some official compositions.</td>
<td></td>
</tr>
<tr>
<td>Caryophylla rubra Clove july-flower. (Dianthus caraphis. Lin.)</td>
<td>The flowers.</td>
<td>Cardiac and alexi- A syrup.</td>
<td></td>
<td></td>
</tr>
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<td>Vol. X.</td>
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### Materia Medica

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<th>Technical Names</th>
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<th>Parts Used in Medicine</th>
<th>Virtues</th>
<th>Preparations From Them</th>
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</thead>
<tbody>
<tr>
<td>Caryophyllum</td>
<td>The clove-tree.</td>
<td>The flower-cups.</td>
<td>Strongly aromatic.</td>
<td>An essential oil. Ingredient also in many officinal compositions.</td>
</tr>
<tr>
<td>Cafcarilla</td>
<td>(Croton caescar, Lin. Croton eleutheria, Swartz Prodr.)</td>
<td>The bark.</td>
<td>Aromatic, and stimulant.</td>
<td>Infusions.</td>
</tr>
<tr>
<td>Cafella lignea</td>
<td>(Laurus caflia, Lin.)</td>
<td>The bark and flower-buds.</td>
<td>Aromatic.</td>
<td>The basis of a distilled water.</td>
</tr>
<tr>
<td>Cafiumalar</td>
<td></td>
<td>The root.</td>
<td>Stomachic and carminative.</td>
<td></td>
</tr>
<tr>
<td>Caflorem</td>
<td>(Castor Castor. seer, Lin.)</td>
<td></td>
<td>Nervine and antispasmodic.</td>
<td></td>
</tr>
<tr>
<td>Catechu</td>
<td>(Mimoso Catechu, vulgo Javcatechu, Lin.)</td>
<td></td>
<td>Astringent.</td>
<td></td>
</tr>
<tr>
<td>Celeri</td>
<td>(Apium graveolens, Lin.)</td>
<td>The leaves.</td>
<td>Laxative.</td>
<td></td>
</tr>
<tr>
<td>Centaurium majus</td>
<td>Greater centaury.</td>
<td>The root.</td>
<td>Astringent, aperient, and vulnerary.</td>
<td></td>
</tr>
<tr>
<td>Cera alba</td>
<td>White wax.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cera flava</td>
<td>Yellow wax.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerasis</td>
<td>(Prunus cerasus, Lin.)</td>
<td>The fruit and gum.</td>
<td>Refrigerant; the gum partaking of the properties of gum-arabic.</td>
<td></td>
</tr>
<tr>
<td>Cerefolium</td>
<td>(Sandix, Chervil. cerefoli, Lin.)</td>
<td>The juice.</td>
<td>Aperient and diuretic.</td>
<td></td>
</tr>
<tr>
<td>Cevadilla</td>
<td>(Veratum album, Lin.)</td>
<td>The seeds.</td>
<td>Violently caustic, (h).</td>
<td></td>
</tr>
<tr>
<td>Chamaedrys</td>
<td>(Teucrium chamadri, Lin.)</td>
<td>The leaves and tops. Sudorific, diuretic, with the seed.</td>
<td>&amp;c.</td>
<td></td>
</tr>
</tbody>
</table>

**Chamaemelum**

(c) M. Morant relates, that these leaves have lately been discovered to have an admirable diuretic virtue; that they were used with great success by Count d'Auteuil, a Spanish naval commander, for the gravel, with which he was violently tormented; and since that time they have come greatly into use at Paris, Verdun, and Grenoble. From observations made in those places it appears, that they carry off sand, cleanse the kidneys, and mitigate pains in the urinary passages; that the method of using them is to drink infusions of the leaves in the morning as tea, adding such other medicines as may be judged proper.

(h) These seeds appear to be the strongest of all vegetable caustics. Monardes relates, that in putrid verminous
minous ulcers and gangrenes, they have the same effects as corrosive sublimate, or the actual cauter; and that the way of using them is to sprinkle a little of powdered feed upon the part; or, for the greater safety, to dilute it with watery liquors, and apply lint dipped in the mixture. In the Amanitas Academiae of Liunens, they are said to be the most powerful of all medicines for destroying cutaneous infects in children.

(1) It is supposed that the juice of this plant was the poison so much used among the Athenians for putting criminals to death; but from some late experiments this seems to be doubtful; or at least that the remedy is very easy. Mr Haram, apothecary at Chartres, informs us, that a large spoonful of the juice given to a cat had no sensible effect; a second produced a visible embarras on the region of the reins; in a little time the animal staggered, but did not fall. A quarter of an hour after, it was found stretched out motionless, with her paws rigid. Half a drachm of theriaca, with two large spoonfuls of wine, were given without effect: but no sooner was a large spoonful of lemon-juice swallowed than the got up as if nothing had happened, and continued afterwards in good health. Our authors likewise inform us, that vinegar is an antidote against the poisonous effects of this plant.

With regard to its medical virtues, Dr Monro, who has seen it tried in a great number of cases, informs us, as that he never saw it cure a confirmed cancer, whether ulcerated or not; that in a few cases of ulcerated cancers it amended the discharge, and changed it from a thin ichor to an appearance of laudable pus; but, notwithstanding this favourable appearance, the distemper at last terminated fatally. In scrophulous cases, some few small tumours were thought to be diffused by it; but large hard swellings were never removed by it, tho' the remedy was continued for weeks and months. The discharge from scrophulous sores of the extremities, however, was often mended by it; and in many cases, it was found to be of more service when joined with the bark than when given alone: the action of the bark and mercury was thought to be rendered more powerful by it. In the chinchough it did not produce any remarkable effects. In some few instances, he imagined that it hurt the health of the patients; and in one or two, that it hastened death. In this last case, indeed, the use of the cicuta had been laid aside for some time, and the patients sunk so gradually, that our author was in doubt what might have been the cause of their death.

The roots of hemlock have been supposed to be more active than the leaves, both when taken internally and when outwardly applied. Dr Storck relates, that on being cut, it yields a bitter acid milk, of which a drop or two applied to the tip of the tongue occasioned a rigidity, pain, and swelling of the part, so as to deprive him of the power of speech. These symptoms, however, disappeared on washing the part with citron juice. When dried, it loses its virulence; so that Dr Storck says, he has taken a grain or two of the powder without injury. Other authors give infusions where 20 and 50 grains have been given with good effect in strictrities of the liver, quartan agues, on the approach of a fit, and even in acute fevers. Dr Aikin informs us, that the fresh root seems not to be at all times of equal virulence; and that he has seen it chewed freely without

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**PARTS USED IN MEDICINE.**

- The single flowers
- The leaves
- The flower
- The leaves and roots
- The leaves and root
- The roots and leaves
- The leaves and seeds

**VIRTUES.**

- Stomachic, carminative, and emollient.
- Aperient and vulnerary.
- Aperient, cordial, and attenuant.
- Stimulating, diuretic, & sudorific.
- Absorbent.
- Levigated.
- Laxative and cordial.
- Diaphoretic and diuretic.
- Lithontriptic and diuretic, but very doubtful.
- Laxative and antiscorbutic.
- Refolvent and astringent.
- Infusipulate juice of the leaves, and an extract from the seeds.

**PREPARATIONS FROM THEM.**

- Refolvent and astringent.
- Infusipulate juice of the leaves, and an extract from the seeds.

---

**CHAMÆMELUM (Anthemis nobilis)**

- Camomile.

- The single flowers

**CHEIRI (Cheiranthus cheiri)**

- Wallflower.

- The flower.

**CHÆLE CRANERORUM (Crab's claws)**

- The leaves and roots

**CHÆLIDONIUM MAJUS (Cheiranthus cheiri)**

- Common celandine

**CHÆLIDONIUM MINUS (Cheiranthus cheiri)**

- Pilewort.

- The leaves and root.

**CHINA (Smilax China)**

- The root.

- Diaphoretic and diuretic.

**CICER (Cicer arietinum)**

- Red chices, or chick peas.

- The seeds.

- Lithontriptic and diuretic, but very doubtful.

**CICHORIUM (C. in-tyb. Lin.)**

- Wild succory.

- The roots and leaves

**CICUTA MAJOR (Cicuta maculata)**

- Hemlock

- The leaves and seeds

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**MATERIA MEDICA.**
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</tr>
</thead>
<tbody>
<tr>
<td>Cinar (Cynara fo-</td>
<td>Artichoke</td>
<td>The leaves</td>
<td>Diuretic (k.)</td>
<td>An essential oil, a simple and spirituous distilled water, and an ingredient in a great number of compositions.</td>
</tr>
<tr>
<td>lyana, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cinnamonum</td>
<td>The cinnamon-</td>
<td>The bark</td>
<td>Aromatic and cor-</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>(Laurus cinnam.</td>
<td></td>
<td></td>
<td>roborant.</td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrullus (Cucurbita, Citrus.</td>
<td>The seeds</td>
<td></td>
<td>Violently cathartic</td>
<td>An ingredient in some cathartic pills and extracts.</td>
</tr>
<tr>
<td>citrullus, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coccinella (Coccus Cochinchin.</td>
<td>The fruit</td>
<td></td>
<td>Sudorific, but chiefly used for colouring.</td>
<td></td>
</tr>
<tr>
<td>calis, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cocculus Indicus, Indian berry.</td>
<td>The fruit.</td>
<td></td>
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</tr>
<tr>
<td>(Menisperm. co-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cul, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cochlearia (C. offic.</td>
<td>The leaves</td>
<td></td>
<td>Stimulating and at-</td>
<td>A conserve and spirit. An ingredient in some other official preparations.</td>
</tr>
<tr>
<td>Scyrv-grafs.</td>
<td></td>
<td></td>
<td>tentuant.</td>
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<tr>
<td>cinallisi, Lin.)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Lin.)</td>
<td></td>
<td></td>
<td>roborant.</td>
<td></td>
</tr>
<tr>
<td>Colocynthis (Cucu-</td>
<td>The medullary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mis cocyntis, bitter-apple.</td>
<td>part of the dried</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td>fruit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Columbo (Ignotia Columbo, or Co-</td>
<td>The root.</td>
<td></td>
<td>A most excellent</td>
<td>A vinous tincture.</td>
</tr>
<tr>
<td>samara, Lin.) lomba</td>
<td></td>
<td></td>
<td>Antiseptic and</td>
<td>Antiseptic and tonic. (t.)</td>
</tr>
<tr>
<td>Conosii (Nerium Conosii.</td>
<td>The bark.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>antidysentericum,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convolida major, Comfrey.</td>
<td>The root.</td>
<td></td>
<td>Emollient.</td>
<td></td>
</tr>
<tr>
<td>(Symphium offic-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>linia, Lin.)</td>
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</tbody>
</table>

Contrayerva

without any other effect than that sweetishness observable in parsley roots or carrots. There are likewise instances, where the cicuta roots have been taken to the quantity of some drachms, or even ounces, without any bad consequence.

The seeds have been recommended as demulcent, purgative, and antiphlogistic; but little more (according to Dr Aikin) is yet known about them, but that they are innocent to some birds. Mr Ray says, that he found the crop of a thistle full of them, and that at a season when the corn was in full growth.

In the first volume of the Medical Commentaries, an extract prepared from hemlock-feeds is preferred to that made from the leaves; and in the last Edinburgh Pharmacopeia, an extract of this kind is ordered as an officinal.

(k) Dr Aikin informs us, that the expressed juice of the leaves has sometimes proved successful in dropsies, when other remedies had failed. For this purpose it is not depurated, but only freed by passing through a strainer from the grosser feculenties, and mixed with an equal quantity of white wine; three or four spoonfuls to be taken every morning and evening—The following decoction (as we are informed by Dr Monro) was long kept a secret by a person at Andover, and is said to have carried off the water from several people labouring under a dropsey. Take of artichoke leaves and thistle three handfuls; of bruised juniper-berries one quart; of scraped horse-radish one handful; of green fir-tops two handfuls; of bruised white mullet-feeds two tablespoonfuls; mix the whole, and boil them in two gallons of water to one, and strain the whole through a cloth. Half a pint to be taken by a grown person morning and evening, adding a little syrup or sugar to make it agreeable.

(l) This bark is reckoned a specific in diarrhoea; the fine powder being made use of in an electuary formed with syrup of oranges, and given to the quantity of half a drachm or more four times a day, after a vomit has been given. The first day it is taken, the number of stools is generally increased, without any increase of the griping; the second, the colour of the stools is modified; and, on the third or fourth, the confidence approaches to the natural, when it makes a cure. It seldom fails in curing a recent diarrhoea, proceeding from irregularities in diet without fever; and it is frequently of service in habitual diarrhoeas.
Lift of Simples.

<table>
<thead>
<tr>
<th>TECHNICAL NAMES</th>
<th>ENGLISH NAMES</th>
<th>PARTS USED IN MEDICINE</th>
<th>VIRTUES</th>
<th>PREPARATIONS FROM THEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrayerva (Dor-</td>
<td>Contrayerva.</td>
<td>The root</td>
<td>Aromatic and dia-</td>
<td>Spirituous tincture, extract, powder.</td>
</tr>
<tr>
<td>enia contrayerva,</td>
<td>Lin.)</td>
<td></td>
<td>phoretic.</td>
<td></td>
</tr>
<tr>
<td>Corallina (Ser-</td>
<td>Coralline.</td>
<td>The root</td>
<td>Suppurative.</td>
<td>Poultice, decoction in milk recommended in some cases of hemorrhage.</td>
</tr>
<tr>
<td>tulata-con-</td>
<td>Lin.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coriandrum (C.</td>
<td>Coriander.</td>
<td>The seeds</td>
<td>Carminative and</td>
<td>Formerly an ingredient in some official compositions.</td>
</tr>
<tr>
<td>sativa, Lin.)</td>
<td></td>
<td></td>
<td>flomachic.</td>
<td></td>
</tr>
<tr>
<td>Cynoglossus (C.</td>
<td>Hound's tongue.</td>
<td>The root</td>
<td>Aromatic, aper-</td>
<td>Narcotic, but doubtful.</td>
</tr>
<tr>
<td>oris, Lin.)</td>
<td></td>
<td></td>
<td>ent and emme-</td>
<td></td>
</tr>
<tr>
<td>Cupra.</td>
<td>Copper.</td>
<td>The fruit</td>
<td>Aromatic and cor-</td>
<td>A spirituous tincture; a syrup; and an ingredient in several official compositions.</td>
</tr>
<tr>
<td>Curcum.</td>
<td></td>
<td>The fruit</td>
<td>dial.</td>
<td></td>
</tr>
<tr>
<td>Curcuma (C.</td>
<td>Turmeric.</td>
<td>The root</td>
<td>Aromatic, aperi-</td>
<td>An ingredient in several offici-</td>
</tr>
<tr>
<td>longa, Lin.)</td>
<td></td>
<td></td>
<td>ent and emme-</td>
<td>nual compositions.</td>
</tr>
<tr>
<td>Curfsa (Cent-</td>
<td></td>
<td>The root</td>
<td>Stomachic.</td>
<td>Stomachic.</td>
</tr>
<tr>
<td>ita purpurea,</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cydonium (Pirus</td>
<td>The quince.</td>
<td>The fruit and seeds</td>
<td>Stomachic and cor-</td>
<td>A syrup and jelly of the fruit, and mucilage of the seeds.</td>
</tr>
<tr>
<td>cydonia, Lin.)</td>
<td></td>
<td></td>
<td>roborative.</td>
<td></td>
</tr>
<tr>
<td>Cynoglossus (C.</td>
<td>Hound's tongue.</td>
<td>The root</td>
<td>Narcotic, but</td>
<td>Refrigerant and</td>
</tr>
<tr>
<td>of-</td>
<td></td>
<td></td>
<td>doubtful.</td>
<td>antiscorbutic.</td>
</tr>
<tr>
<td>Cynoibaum (Ko-</td>
<td>The wild briar,</td>
<td>The fruit and seeds</td>
<td>A distilled water and conserve</td>
<td></td>
</tr>
<tr>
<td>fua canina, Lin.)</td>
<td>The briar, or dog-rose, or hip-tree,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crouton. See Cof-</td>
<td>Croucanilla</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>carilla supra.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubebs (Piper cu-</td>
<td>Cubebs.</td>
<td>The fruit</td>
<td>Aromatic and fi-</td>
<td>An ingredient in several offici-</td>
</tr>
<tr>
<td>beba, Lin.)</td>
<td></td>
<td></td>
<td>liant.</td>
<td>nual compositions.</td>
</tr>
<tr>
<td>Cucumis horten-</td>
<td>The garden cu-</td>
<td>The seeds</td>
<td>Refrigerant.</td>
<td></td>
</tr>
<tr>
<td>tis</td>
<td>cumber.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumis agrifris</td>
<td>Wild cucumber.</td>
<td>The fruit</td>
<td>Violently Cathar-</td>
<td>The juice infused.</td>
</tr>
<tr>
<td>(Momordica ela-</td>
<td></td>
<td></td>
<td>tic.</td>
<td></td>
</tr>
<tr>
<td>terium, Lin.)</td>
<td></td>
<td></td>
<td>Refrigerating.</td>
<td>An expressed oil.</td>
</tr>
<tr>
<td>Cucurbita (C. cepo,</td>
<td>The gourd and</td>
<td>The seeds</td>
<td>Aromatic, fumi-</td>
<td>An essential oil by distillation; and giving a name to a plaster and cataplasm.</td>
</tr>
<tr>
<td>Lin.)</td>
<td>pomion.</td>
<td></td>
<td>lant.</td>
<td></td>
</tr>
<tr>
<td>Cuminum (C. cymi-</td>
<td>Cummin.</td>
<td>The feed</td>
<td>A strong astring-</td>
<td>A violent emetic, calcined, and producing salts by combination with several acids, and with volatile alkali. See Chemistry Index.</td>
</tr>
<tr>
<td>num, Lin.)</td>
<td></td>
<td></td>
<td>ent.</td>
<td></td>
</tr>
<tr>
<td>Cupressus.</td>
<td>The cypresse</td>
<td>The fruit</td>
<td>A violent emetic,</td>
<td></td>
</tr>
<tr>
<td>Cupram.</td>
<td>Copper.</td>
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</tbody>
</table>
### Materia Medica

#### Technical Names and English Names

| Cyperus (C. longus, Long cyperus, Lin.) | The root. | Aromatic and carminative. |
| Dactylus (Phoenix The date-tree, dactylif, Lin.) | The fruit. | Emollient and slightly astringent. |
| Daucus Creticus Candy carrot. (Athamanta Cretenis, Lin.) | The seeds. | Aromatic. |
| Daucus sativus (D. The garden carrot. carota, Lin.) | The roots. | Powerfully anti- |
| Daucus silvestris Wild carrot. (D. carota, Lin.) | The seeds. | |
| Densleonis (Leonodon tarax, Lin.) | The root and herb. | Attenuant, but doubtful. |
| Dictamus Creticus (Origanum dictamus, Lin.) | The leaves. | Aromatic. |
| Dictamus albus Basil dittany. (Lin.) | The root. | Alexipharmac, tonic, and anthelmintic. |
| Digitalis (D. purpurea, Fox-glove. purpurea, Lin.) | The leaves. | Emetic, cathartic. |
| Dolichos (P. pruriens, Couhage, or cow-witch. Lin.) | The hairy matter | Anthelmintic. |
| Dorynicum. See Arnica. | | |
| Dulcamara (Solanum dulcamara, Bitter-sweet, or woody nightshade. Lin.) | The herb and root. | Diaphoretic, at- |
| Ebulus (Sambucus Dwarf-elder, or Danewort. ebulae, Lin.) | The root, bark, | Watery infusions. |
| Elatium. See Eruca. | | |
| Elatine (Veronica officinalis, Lin.) | The leaves. | Diuretic and atte- |
| Elecampane. See Elecampane. | | Gives name to one |
| Elema (Amyris ele- | Gum elema. | Aromatic. |
| Eleutheria. See Eruca. | | Gives name to an ointment. |
| Endivia (Choreum endivia, Lin.) | The leaves and roots. | Aperient and refrige-
| Enula (Inula hel- | Elecampane. | rants. Expectorant, fio- |
| | | Spirituous and watery ex- |
| | | traets. A confection. |
| | | Stimulant. |
| Eruca (Siumbrium Rocket. amphibium, Lin.) | The seeds. | |
| Eryngium (E. ma-rasmi, Lin.) | The root. | Aperient and diuretic. |
| Erysimum (E. officinalis, Lin.) | The recent plants | Attenuant and diuretic. |
| Eupatorium cana- | Hemp-agrimony. | Attenuant, corrosor, and anti- |
| | binum, Lin.) | water-agrimony, | tocorticotic. |
| | or water-hemp. | |

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**Note:** The above text contains the natural representation of a page from a book on materia medica, listing various plants with their technical and English names, parts used, virtues, and preparations from them. The text is structured in a tabular format to enhance readability.
**Materia Medica.**

<table>
<thead>
<tr>
<th>Technical Names</th>
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<th>Parts Used in Medicine</th>
<th>Virtues</th>
<th>Preparations from Them</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faba Indica, siccata</td>
<td>St Ignatiu's bean</td>
<td>The seeds; (the root, the coloc.</td>
<td>Antispasmodic.</td>
<td>A distilled water from the flowers.</td>
</tr>
<tr>
<td>Faba vicia</td>
<td>The garden-bean</td>
<td>The seeds &amp; flow.</td>
<td>Nutritive and cor.</td>
<td>Refrigerant</td>
</tr>
<tr>
<td>Fagopyrum</td>
<td>Snakeweed</td>
<td>The seeds</td>
<td>Difcutient.</td>
<td>Corroborative and Infusions in wine; the metal reduced to a calx by rust, or by fire, and some salts produced from it by combinations with different acids. See Chemistry-Index.</td>
</tr>
<tr>
<td>Farina tritic i vel avenae</td>
<td>Bran</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrum</td>
<td>Iron</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficus</td>
<td>See Carica.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filipendula (Spiraea filipend. Lin.)</td>
<td>Common dropwort</td>
<td>The root</td>
<td>Astringent and corrob.</td>
<td></td>
</tr>
<tr>
<td>Filix (Polypodium filis mas, Lin.)</td>
<td>The male fern</td>
<td>The leaves and root</td>
<td>Anhelemintic and Powder, deod.</td>
<td></td>
</tr>
<tr>
<td>Flammula Jovis</td>
<td>Upright virgin's bower</td>
<td>The leaves and flowers</td>
<td>Very acrid.</td>
<td>Powder for sprinkling on cancerous and venereal ulcers; infusion and extract for internal use, in washings, &amp;c. from lues venerea.</td>
</tr>
<tr>
<td>Foeniculum dulce et vulgare (Aethusa fennel. Lin.)</td>
<td>Sweet and common fennel</td>
<td>The seeds, roots, and leaves</td>
<td>Aromatic stimulant, and carminative.</td>
<td></td>
</tr>
<tr>
<td>Foeniculum aquat. (Fehlandri um aquat. Lin.)</td>
<td>Waterwort</td>
<td>The seeds and feeds</td>
<td>Corroborant.</td>
<td></td>
</tr>
<tr>
<td>Fenum Græcum</td>
<td>Fenugreek</td>
<td>The seeds</td>
<td>Emollient.</td>
<td>Chiefly used in cataplasts, emollients, emollient glynsters, &amp;c.</td>
</tr>
<tr>
<td>Formica (F. rufa, Lin.)</td>
<td>The ant</td>
<td>The whole insect</td>
<td>Stimulant.</td>
<td>An oil and acid spirit.</td>
</tr>
<tr>
<td>Fragaria (F. vesca, The strawberry</td>
<td>The leaves and fruit</td>
<td>Astringent, corrob. and re- refr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frangula (Anus nigra, Lin.)</td>
<td>Black alder</td>
<td>The bark</td>
<td>Violently cathartic.</td>
<td></td>
</tr>
<tr>
<td>Fraxinella (Dillamirus albus, Lin.)</td>
<td>White or bastard dittany</td>
<td>The root</td>
<td>Diaphoretic.</td>
<td></td>
</tr>
<tr>
<td>Fraxinus (F. excelsior, Lin.)</td>
<td>The ash-tree</td>
<td>The bark &amp; feeds</td>
<td>Astringent and stimulant.</td>
<td>A spirituous tincture.</td>
</tr>
<tr>
<td>Fuligo ligni splen dens.</td>
<td>Shining woodfoot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fumaria (F. officinalis, Lin.)</td>
<td>Fumitory</td>
<td>The leaves</td>
<td>Stimulating attenuant, and anti-seborrhoeic.</td>
<td></td>
</tr>
<tr>
<td>Fungus melitenfis (Gynernium coccein. Lin.)</td>
<td></td>
<td>The stems &amp; tops</td>
<td>Tonic and astringent.</td>
<td>Decocition and tincture.</td>
</tr>
<tr>
<td>Galanga minor</td>
<td>Galangal</td>
<td>The root</td>
<td>Stomachic.</td>
<td></td>
</tr>
<tr>
<td>Galbanum (Bubon galbanum, Lin.)</td>
<td></td>
<td>The gum</td>
<td>Antisyphoric.</td>
<td>An ingredient in several officinal compositions.</td>
</tr>
</tbody>
</table>

See also: *Chemistry-Index.*
MATERIA MEDICA.

TECHNICAL NAMES ENGLISH NAMES.

Galega (G. officinalis, Lin.) Goat's rue. The herb. Diaphoretic, but very doubtful.
Galls. Astringent (m.)
Gallium luteum (G. verum, Lin.) Yellow ladies bedstraw, or cheese-reennet.

Gambogia. See Gummi gambogia, infra.
Genista (Spartium scoticum, Lin.) Broom. The leaves, flowers and seeds. Stomachic and stimulating. A spirituous tincture, ingredient in many compositions.


Geoffrrea (G. inermitis, Lin.) Cabbage-hark, or worm-bark tree. Wormy, but very doubtful. Stomachic and corrodorant. Strongly cathartic.


Guajacum (G. officinale, Lit.) Lignum-vitae, or Guajacum. The wood and bark. Sulforific, diuretic, and emollient. Cosmetic. An ingredient in several astringent compositions.

Gummi arabicum (Mimosa nitritica, Lin.) Gum-arabic. Astringent and mucilaginous. An ingredient in a great number of officinal compositions.

Gum ammoniacum (Ferula moesid, Lin.) Gum-ammoniac. Aperient, antispasmodic, and emollient. An ingredient in several pectoral compositions. Tinctures.


Gum bdellium. Bdellium. An ingredient in several astringent compositions.

Gum benzo in (Terebinth, Lin. Styrax benzo, Lond. Ph. Tranf.) Gum benzo in.

Dr Cullen informs us, that an ointment composed of one part of powdered galls and eight of hogs-lard is a common remedy for the haemorrhoids, and has been found efficacious.
### MATERIALIA MEDICA.

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<thead>
<tr>
<th>TECHNICAL NAMES</th>
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<tbody>
<tr>
<td>Gum. elemi</td>
<td>Amyris elemi</td>
<td></td>
<td>Aromatic</td>
<td>An essential oil, and gives name to ointment.</td>
</tr>
<tr>
<td>Gum galbanum</td>
<td>Galbanum</td>
<td></td>
<td>Antispasmodic</td>
<td>An ingredient in many antispasmodic medicines.</td>
</tr>
<tr>
<td>Gum gambogia</td>
<td>Gamboge</td>
<td></td>
<td>Emetic and cathartic</td>
<td>Gives name to a certain kind of pills.</td>
</tr>
<tr>
<td>Gum kino</td>
<td>Kino</td>
<td></td>
<td>Astringent</td>
<td>A tincture.</td>
</tr>
<tr>
<td>Gum labdanum</td>
<td>Labdanum</td>
<td></td>
<td>Stomachic</td>
<td>An ingredient in the stomachic pills and plaster.</td>
</tr>
<tr>
<td>Gum lacea</td>
<td>Gum lac.</td>
<td></td>
<td>Astringent</td>
<td>A tincture.</td>
</tr>
<tr>
<td>Gum. laccus</td>
<td>Cocos laccus</td>
<td></td>
<td>Corroborant</td>
<td>Corroborant.</td>
</tr>
<tr>
<td>Gum. myrrha</td>
<td>Myrrh</td>
<td></td>
<td>Antispasmodic</td>
<td>A tincture, and an ingredient corroborant in many officinal compositions.</td>
</tr>
<tr>
<td>Gum opoponax</td>
<td>Opoponax</td>
<td></td>
<td>Astringent</td>
<td>An ingredient in some powders, and other officinal compositions.</td>
</tr>
<tr>
<td>Gum tragacanth</td>
<td>Gum tragacanth,</td>
<td></td>
<td>Astringent and corroborative</td>
<td>An ingredient in some officinal compositions.</td>
</tr>
<tr>
<td>Hedera arborea</td>
<td>Ivy</td>
<td>The leaves, berries, and resin</td>
<td>Astringent and corroborative.</td>
<td></td>
</tr>
<tr>
<td>Hedera helix</td>
<td>Ground-ivy</td>
<td>The leaves</td>
<td>Astringent and corroborative.</td>
<td></td>
</tr>
<tr>
<td>Helianthus</td>
<td>See Eucalyptus, supra</td>
<td></td>
<td>Diaphoretic</td>
<td></td>
</tr>
<tr>
<td>Helleborus albus</td>
<td>White hellebore</td>
<td>The root</td>
<td>Emetic, purgative, and anthelmintic.</td>
<td>Syrup.</td>
</tr>
<tr>
<td>Helleborus niger</td>
<td>Black hellebore, or</td>
<td>The root</td>
<td>A powerful alterative and emmenagogue.</td>
<td>A tincture and extract.</td>
</tr>
</tbody>
</table>

**VOL. X.**
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<td>Hepatica nobilis</td>
<td>Noble liverwort</td>
<td>The leaves</td>
<td>Cooling and corroborant.</td>
<td></td>
</tr>
<tr>
<td>Hermodactylus</td>
<td>Hermodactyl</td>
<td>The root</td>
<td>Purgative, but doubtful</td>
<td></td>
</tr>
<tr>
<td>Herniaria</td>
<td>Rupture-wort</td>
<td>The leaves</td>
<td>Astringent</td>
<td></td>
</tr>
<tr>
<td>Hippocastanum</td>
<td>Horse-chestnut</td>
<td>The bark and fruit</td>
<td>Corroborant and errhine</td>
<td></td>
</tr>
<tr>
<td>Hordeum</td>
<td>Barley</td>
<td>The leaves</td>
<td>Refrgerant</td>
<td></td>
</tr>
<tr>
<td>Horneum</td>
<td>Garden-clary</td>
<td>The leaves and roots</td>
<td>A decoction</td>
<td></td>
</tr>
<tr>
<td>Hydralapathum</td>
<td>Great water-dock</td>
<td>The leaves and roots</td>
<td>Alterant and laxative</td>
<td></td>
</tr>
<tr>
<td>Hypericum</td>
<td>St John's wort</td>
<td>The leaves, flowers, and seeds</td>
<td>Diuretic, sudorific, gives name to a coloured oil</td>
<td></td>
</tr>
<tr>
<td>Hydrosinhus</td>
<td>Hypocistis</td>
<td>The juice</td>
<td>Astringent</td>
<td></td>
</tr>
<tr>
<td>Hydraspis</td>
<td>Hyssop</td>
<td>The leaves</td>
<td>Aromatic and退出</td>
<td></td>
</tr>
<tr>
<td>Jalappa</td>
<td>Convulvus jalapa</td>
<td>The root</td>
<td>Cathartic</td>
<td></td>
</tr>
<tr>
<td>Japonica terra</td>
<td>See Catechu supra.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imperatoria</td>
<td>Master-wort</td>
<td>The root</td>
<td>Aromatic</td>
<td></td>
</tr>
<tr>
<td>Indian root</td>
<td>See Radix Indica infra.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipecacuanha</td>
<td>Ipecacuanha</td>
<td>The root</td>
<td>Emetic and cathartic</td>
<td></td>
</tr>
</tbody>
</table>

(n) A root has been sometimes imported, under the name of white ipecacuanha (viola ipecacuanha, Lin.) which has little or nothing of the virtues of the true kind. More dangerous abuses, however, have been practised by the fabilution or mixture of the roots of a kind of asapumum, which have been found to operate with great violence both upwards and downwards, so as to prove fatal in some cases. They may however, easily be distinguished by their colour, which is a deep reddish yellow, while the true ipecacuanha is pale coloured or greyish: the poisonous roots are likewise larger, the figures more distinct, and the intermediate spaces smoother, than in the true ipecacuanha. This root is found to increase the purgative virtue of jalap remarkably. Dr Aikin informs us, that 35 grains of jalap, with two or three of ipecacuanha, purge more than twice the quantity of jalap by itself.

Of late (says Dr Monro), a notion has prevailed, that the keeping up a nausea by means of small doses of ipecacuanha, or of watery solution of emetic tartar, was of great service in promoting the cure of fevers, as well as of fluxes, from a belief that they affected the nervous system, and were capable of exciting the action of the extreme vessels, and of increasing the secretions by the skin, and of the internal organs. Hitherto I have not found this method to answer my expectations; and I have always observed, that such a dose of an emetic as emptied the stomack freely, and gave a shake to the whole frame, had a much better effect than those
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</thead>
<tbody>
<tr>
<td>Iris Florentina</td>
<td>Florentine iris</td>
<td>The root</td>
<td>Aromatic and stimulant.</td>
<td>An ingredient in several pectoral medicines.</td>
</tr>
<tr>
<td>Iris pallida</td>
<td>(Lin.)</td>
<td>The fruit</td>
<td>The kernel emollient, the shell astringent.</td>
<td>Emollient and balsamic.</td>
</tr>
<tr>
<td>Juglans (J. regia)</td>
<td>The walnut tree. (Lin.)</td>
<td>The fruit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jujuba, (Rhamnus Jujubas. zizyph, Lin.)</td>
<td>The fruit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lac. See Gum Lacca, supra.</td>
<td>The leaves and seeds.</td>
<td></td>
<td>Supposed corrombific.</td>
<td></td>
</tr>
<tr>
<td>Ladanum (Cistus Ladanum. creticus, Lin.)</td>
<td>The gum-resin.</td>
<td>Supposed corrombific.</td>
<td>An essential oil, a simple and compound spirit, and a conserve. An ingredient in some official preparations.</td>
<td></td>
</tr>
<tr>
<td>Lavandula (L. spike Greater, or broad-leaved lavander. (Lin.)</td>
<td>The flower.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurus (L. nobilis, The bay-tree. (Lin.)</td>
<td>The leaves and berries.</td>
<td>Carminative and antispasmodic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentificus (Pistacia The lentive or mastiff tree. Lin.)</td>
<td>The wood.</td>
<td>Astringent, tonic, and diuretic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levisticum (Ligusticum levisticum Lin.)</td>
<td>The root and seed.</td>
<td>Aromatic.</td>
<td>Ingredients in some compound waters.</td>
<td></td>
</tr>
<tr>
<td>Lichen cinereus. Ash-coloured restris (L. caninus, Lin.)</td>
<td>The whole</td>
<td>Recommended by Dr Mead as a specific against the bite of a mad dog, but without foundation.</td>
<td>Nourishing, antispastic, and laxative.</td>
<td></td>
</tr>
<tr>
<td>Lichen islandicus Eatable liverwort. (Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lignum

Those frequently repeated small doses, which kept the patient in a disagreeable uneasy situation for hours together; and I am persuaded, that no practitioner of experience, who has attended large hospitals, where he has had an opportunity of trying and seeing the effects of different medicines, will ever recommend this nauseating method for general practice in fevers, though it may be of use in some particular cases."
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<tr>
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<th>ENGLISH NAMES</th>
<th>PARTS USED IN MEDICINE</th>
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</thead>
<tbody>
<tr>
<td>Lignum campe-</td>
<td>Logwood</td>
<td>The wood</td>
<td>Astringent</td>
<td>An extract</td>
</tr>
<tr>
<td>chene (Hama-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>toxylon:campech,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lignum rhodium,</td>
<td>Rosewood</td>
<td>The wood</td>
<td>Cordial</td>
<td>An essential oil</td>
</tr>
<tr>
<td>(Genista canari-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>casia, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linium. See</td>
<td>Loevesticum.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. convallium,</td>
<td>Lilly of the valley</td>
<td>The root and flowers</td>
<td>Cephalic and</td>
<td></td>
</tr>
<tr>
<td>(Convall. mai-</td>
<td></td>
<td></td>
<td>nerve</td>
<td></td>
</tr>
<tr>
<td>al., Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. album, (L.</td>
<td>White Lily</td>
<td>The root</td>
<td>Emollient</td>
<td>Powdwise</td>
</tr>
<tr>
<td>candidum, Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limon, (Citrus</td>
<td>The lemon-tree</td>
<td>The fruit</td>
<td>Aromatic,</td>
<td>An essential oil; an</td>
</tr>
<tr>
<td>medic, Lin.)</td>
<td></td>
<td></td>
<td>antiscorbutic</td>
<td>ingredient</td>
</tr>
<tr>
<td>Linaria (distir-</td>
<td>Toad-flax</td>
<td>The leaves</td>
<td>Diuretic and</td>
<td>in several compositions.</td>
</tr>
<tr>
<td>rhinum linaria,</td>
<td></td>
<td></td>
<td>cathartic,</td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td></td>
<td></td>
<td>but</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>doubtful</td>
<td></td>
</tr>
<tr>
<td>Linum cathar-</td>
<td>Purging flax</td>
<td>The leaves</td>
<td>Cathartic</td>
<td>Infusion in whey. Dried</td>
</tr>
<tr>
<td>ticum</td>
<td></td>
<td></td>
<td></td>
<td>powder</td>
</tr>
<tr>
<td>Linum Sativum</td>
<td>Flax</td>
<td>The seed</td>
<td>Emollient</td>
<td>An expressed oil. Cataplasm.</td>
</tr>
<tr>
<td>(L. usitativum,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lin.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquida ambra</td>
<td>Sweet gum, or flow-</td>
<td>The resinous juice</td>
<td>Aromatic and</td>
<td></td>
</tr>
<tr>
<td>(a. Sweet gum,</td>
<td>rer argent, Lin.)</td>
<td></td>
<td>cordial</td>
<td></td>
</tr>
<tr>
<td>L.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithoppermum</td>
<td>(L. Gromwell,</td>
<td>The seeds</td>
<td>Resolvent;</td>
<td></td>
</tr>
<tr>
<td>officinal, Lin.)</td>
<td></td>
<td></td>
<td>lithon-</td>
<td></td>
</tr>
<tr>
<td>Lobelia(L. sphibili-</td>
<td>Blue cardinal</td>
<td>The root (o)</td>
<td>Alterant and deter-</td>
<td>Decoction.</td>
</tr>
<tr>
<td>ca, Lin.)</td>
<td>flower</td>
<td></td>
<td>gent.</td>
<td></td>
</tr>
<tr>
<td>Lufful, or wood-</td>
<td>Torcel. See Aces-</td>
<td></td>
<td>Aperient and ana-</td>
<td>Decoction in milk.</td>
</tr>
<tr>
<td>forel. See Ace-</td>
<td>tose, supra.</td>
<td></td>
<td>Decoction in milk.</td>
<td></td>
</tr>
<tr>
<td>tose, supra.</td>
<td></td>
<td></td>
<td>leptic.</td>
<td></td>
</tr>
<tr>
<td>Lumbrici et limaces</td>
<td>Earth worms and</td>
<td>The seeds</td>
<td>Anthelmintic.</td>
<td></td>
</tr>
<tr>
<td>terreestres.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lupinus (L. albus</td>
<td>White lupines,</td>
<td>The seeds</td>
<td>Teperient and ana-</td>
<td>Decoction in milk.</td>
</tr>
<tr>
<td>(Lin.)</td>
<td></td>
<td></td>
<td>Decoction in milk.</td>
<td></td>
</tr>
<tr>
<td>L. (Humul. Hops.</td>
<td></td>
<td></td>
<td>leptic.</td>
<td></td>
</tr>
<tr>
<td>lup. Lin.)</td>
<td>Diuretic and flo-</td>
<td></td>
<td>Anthelmintic.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>heads which</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>grow upon the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>tops of the stalks.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lycoperdon

(o) This root was long a famous secret among the North American Indians for curing the venereal diseases. The secret was purchased by Sir William Johnson, and has been published in the writings of Bartram, Kalm, &c. The following method of using it is, by Dr Aikin, recommended as the best: "A decoction is made of an handful of the roots in three measures of water. Of this half a measure is taken in the morning fasting, and repeated in the evening; and the dose is gradually increased till its purgative effect becomes too violent, when the medicine is to time to be intermitted, and then renewed till a perfect cure is effected. One dose daily is sufficient during the latter part of the treatment: and the regimen, during the whole process, is to be equally strict with that observed in a course of mercurial salivation. From the third day, the ulcers are to be well washed twice daily with the decoction; and it is said, that when they are very deep and foul, the Indians sprinkle them with powder of the internal bark of the spruce tree. By this method, we are assured that inverteber venereal complaints are cured without the aid of mercury."
### Technical Names English Names

<table>
<thead>
<tr>
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<th>Part Used in Medicine</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Lycoperdon (L. boviis, Lin.)</td>
<td>Puff ball, or dusty mushroom</td>
<td>The whole</td>
<td>Styptic.</td>
<td></td>
</tr>
<tr>
<td>Macis. See Nux vomif, infra.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Majusana (Garigae majus, Lin.)</td>
<td>Sweet marjoram</td>
<td>The leaves and flowers</td>
<td>Aromatic and carminative. Emollient.</td>
<td></td>
</tr>
<tr>
<td>Malabarrum (Lau ros es, Lin.)</td>
<td>Indian leaf</td>
<td>The leaves and flowers</td>
<td>Aromatic.</td>
<td></td>
</tr>
<tr>
<td>Malva (M. folos, Lin.)</td>
<td>The mallow</td>
<td>The leaves and flowers</td>
<td>Emollient.</td>
<td></td>
</tr>
<tr>
<td>Malus (Pyrus malus, Lin.)</td>
<td>The apple-tree</td>
<td>The fruit</td>
<td>Refrigerant and laxative. Narcotic.</td>
<td></td>
</tr>
<tr>
<td>Mandragora (Aro pa Mandreg, Lin.)</td>
<td>The mandrake</td>
<td>The leaves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manna (Frovinus oruus, Lin.)</td>
<td>The manna ash</td>
<td>The concreted juice</td>
<td>Laxative.</td>
<td></td>
</tr>
<tr>
<td>Marrubium (M. White horehound, Lin.)</td>
<td>The leaves</td>
<td></td>
<td>Stomachic and aperient. Aromatic and emollient.</td>
<td></td>
</tr>
<tr>
<td>Marum Syracum, Syrian herb mar, (Teucrium mar, Lin.)</td>
<td>The leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matricaria (M. perforata, Lin.)</td>
<td>Feverfew</td>
<td>The leaves and flowers</td>
<td>Aperient and anti-spasmodic. Cathartic.</td>
<td></td>
</tr>
<tr>
<td>Mechoacan, (Convolvulus mechoac, Lin.)</td>
<td>White jalap, or white horehound</td>
<td>The root</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mel.</td>
<td>Honey</td>
<td></td>
<td>Aperient and detergent.</td>
<td></td>
</tr>
<tr>
<td>Melampodium. See Helichon niger, supra.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melilotus (Trifolium nigrum, Lin.)</td>
<td>Melilot</td>
<td>The leaves and flowers</td>
<td>Emollient and carminative.</td>
<td></td>
</tr>
<tr>
<td>Meliisa (M. officin, Lin.)</td>
<td>Balm</td>
<td>The leaves</td>
<td>Aromatic.</td>
<td></td>
</tr>
<tr>
<td>Melo (Cucumis melo, Lin.)</td>
<td>The melon</td>
<td>The seeds</td>
<td>Refrigerant and emollient.</td>
<td></td>
</tr>
<tr>
<td>Mentha crifpa (Lin.)</td>
<td>Danish or German curled mint</td>
<td></td>
<td>Aromatic and cordial.</td>
<td></td>
</tr>
<tr>
<td>Mentha vulgaris, Spearmint. (M. viridis, Lin.)</td>
<td>The herb</td>
<td></td>
<td>Aromatic and cordial.</td>
<td></td>
</tr>
</tbody>
</table>

(p) The juices of horehound and plantain mixed are remedies of great repute in America against the bite of the rattlesnake. They are given by spoonfuls at short intervals; while at the same time the wounded part is covered with a cataplasm of the same herbs bruised. The good effects are said to be speedy, and the recovery of the patient complete and certain.
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<tr>
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<th>VIRTUES</th>
<th>PREPARATIONS FROM THEM</th>
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<tr>
<td>Mercurialis canna</td>
<td>French mercury</td>
<td>The leaves</td>
<td>Emollient and lax - A syrup.</td>
<td></td>
</tr>
<tr>
<td>Meum spicatum</td>
<td>Spiglet.</td>
<td>The root</td>
<td>Aromatic and car-minative.</td>
<td></td>
</tr>
<tr>
<td>Millefolium</td>
<td>Millefoil.</td>
<td>The leaves and flowers</td>
<td>Aromatic and car-diolic</td>
<td>An ingredient in some other officinal preparations.</td>
</tr>
<tr>
<td>Minium</td>
<td>Red lead.</td>
<td>The leaves and Diaphoretic,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morus nigra</td>
<td>Mulberry.</td>
<td>The fruit and bark of the roots.</td>
<td>Refrigerant, A syrup from the juice of the root.</td>
<td></td>
</tr>
<tr>
<td>Moschus</td>
<td>Musk.</td>
<td>The fruit.</td>
<td>Purgative.</td>
<td></td>
</tr>
<tr>
<td>Myrrh</td>
<td>Olibanum.</td>
<td>The leaves and Diuretic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Myrsina</td>
<td>Myrtle.</td>
<td>The leaves and Diuretic.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Nardus | Indian nard. | The leaves and Aperient and anti-scrobutic. | An ingredient in the mithridate and theriac.
| Nepeta | Catnip. | The leaves. | Aperient and anti-scrobutic, but much weaker than the former. |
| Nephricum | Nephritic wood. | The wood in sub - stance. | |
| Nicotiana | Tobacco. | The leaves. | Violently emetic. An extract recommended by cathartic, and Stahl and other German narcotic physicians. |

Nigella
Nigella (Nigella sativa, Lin.)  Fennel-flower. The seeds. Aperient and diuretic, but uncertain.

Nitrum. Nitre or saltpetre. Diaphoretic, diuretic, and refrigerant. An acid spirit and fixed alkaline salt, an aqueous decoction or solution, troches. An ingredient in many other officinal preparations.

Nummularia (Ly simchvia nummularia, Lin.) The leaves. Antiscorbutic.

Nux mofchata (Mynsifica aromatica, Lin. Myrsica axifolia, Aet. Holm.) The fruit, and covering called mace. An excellent aromatic, cordial, and Romachic.


Ochra White water-lily. The roots and leaves. Astringent and corroborative. Astringent, but very weak.

Oleander (Oe ceratoc thyrsi. Lin.) Emollient and anodyne. A virulent poison: But the juice of the root, or the infusion of the leaf, has been recommended in chronic eruptions. The latter has been also found useful as an emmensagogue.

Olibanum. See Gum olibanum, supra.

Oliva (Olea Europea Lin.) The olive-tree. The fruit. Emollient. An expressed oil used in almost all ointments, plasters, &c.

Omis (Strychnos nux vomica, Lin.) The root. Aperient and diuretic.

Opium (Papaver Orientale, Lin.) The Asiatic poppy. The infusivated juice. Purified by straining, called the Thebaic extract; a viscous and spirituous tincture, called liquid laudanum. Also a capital ingredient in many officinal preparations.

Oponax. See Gum oponax, supra.


Oryza (O sativa, Lin.) Rice. The grain. Emollient and refrigerant. Alterant and laxative.

Oxylapathus (Rumex acutus, Lin.) Sharp-pointed dock. The roots and leaves.

Paeonia (P. officinalis, Lin.) Male and female peony. The roots, flowers, Emollient and aromatic. Ingredients in some anti-epileptic powders.

Palma (Cocos nucifera, Lin.) The palm-tree. The kernels of the fruit. An expressed oil used in Romachic plasters.
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Technical Names English Names.

| Pericaria aquileur (Pericaria aquileur, Lin.) | Bitter artemisia, lake-weed, or water-pepper. | The leaves. | Diuretic and detergent when externally applied. | Anti-leptic and astringent. |
| Peruvianus cortex (Cinchona officinalis, Lin.) | The quinquina, or Jesuit’s bark-tree. | The bark. | An extract, a resin, a spirituous tincture, a compound tincture, a tincture in volatile spirit; also an ingredient in the stomachic tincture. | Astringent. |
| Petroleum. | Rock oil. | | | |
| Petroleum Barbadoes tar. (Bitumen petroleum, Lin.) | Barbadoes tar. | | | |
| Petroleumum (A. Pimentum officinale, Lin.) | Common parsley. | The roots, leaves, and seeds. | Aperient and some what aromatic. | An extract, a resin, a spirituous tincture, a compound tincture, a tincture in volatile spirit; also an ingredient in the stomachic tincture. |
| Pimenta Myrtus (Pimenta, Lin.) | Pimento, Jamaica | The berry. | Aromatic and stimulating. | The basis of a distilled water, a spirit, and an essentail oil. |
| Pimpinella saxifraga (Lin.) | The greater wild | The leaves. | Astringent. | |
| Pimpinella saxifraga (Lin.) | Burnet saxifraga. | The root, leaves and seeds. | | |
| Pinenis sylvatica (Lin.) | The pine-tree. | The kernels of its fruit or cones, and resin. | | |

Piper
MATERIA MEDICA.

Technical Names    English Names.

Piper longum (Linn.) Long pepper.
Piper nigrum (Linn.) Black pepper.
Piper Jamacense. 

See Ointments, suprad.

Piper Indicum (Capeiicum annum, Linn.) Guinea pepper.

Pix liquida (Pitrus sphyceffris, Linn.) Tar.

Pix Burgundica (lirius abies, Linn.) Burgundy pitch.

Plantago latifolia, F. major, Linn. Common broad-leaved plantain.

Plumbum. Lead.

Polium montanum (Thurium polium, Linn.) Polycele-mountain. The tops.

Polygala amara Linn. Milkwort.

Polygala fencka Linn. Rattleback root.

Polypondium (P. vulgaris, Linn.) Polypody.

Populus nigra, (Linn.) black poplar.

Porrum (Allium porrum, Linn.) The leek.

Portulaca (P. oleracea, Linn.) Purfane.

Primula veris (Linn.) Primrose.

Primula Gallica (F. vulgare, Lin.) Primrose.

Prunus nigra, (Linn.) black poplar.

Prunus Syriaca. 

S叙利亚 aluminum, supra.

Pyrethrum (Flamulag: fili, Lin.) Fleawort.

Pyrethrum (Abietis pumila, Lin.) Snerezewort, or ba- rd pellitory.

Pulegium (Liquida puleg.) Pennyroyal.

Palmonaria maculata- Spottedling-wort, The leaves.

Pulsatilla nigricans Meadow anemone. The herb and flower.
<table>
<thead>
<tr>
<th>TECHNICAL NAMES</th>
<th>ENGLISH NAMES</th>
<th>PARTS USED IN MEDICINE</th>
<th>VIRTUES</th>
<th>PREPARATIONS FROM THEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrethrum (A. pyrethrum, L.)</td>
<td>Pellitory of Spain</td>
<td>The root.</td>
<td>Promotes the fa-lival flux.</td>
<td></td>
</tr>
<tr>
<td>Quassia (Q. simaruba L.)</td>
<td>Simarouba.</td>
<td>The bark.</td>
<td>Antiseptic; useful See Ed. Phil. Trans. vol. ii. in dyentery.</td>
<td></td>
</tr>
<tr>
<td>Quassia (Q. amara, L.)</td>
<td>Quassy.</td>
<td>The wood.</td>
<td>Stomachic and to- An extract.</td>
<td></td>
</tr>
<tr>
<td>Quercus marina (Fucus vesiculosus, Lin.)</td>
<td>Sea-wrack or Sea-oak.</td>
<td>The herb.</td>
<td>A powder of the burnt herb.</td>
<td></td>
</tr>
<tr>
<td>Radix Indica (R. gallica, Lin.)</td>
<td>Indian or Lopez root.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raphanus sativus (Cochlearia armata, Lin.)</td>
<td>Horfe-radish.</td>
<td>The root.</td>
<td>Stimulating and astringent.</td>
<td></td>
</tr>
<tr>
<td>Rhamnus catharticus. See Spina cervina, infra.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schaponticum (Rhamphapton, Lin.)</td>
<td>Schapontic.</td>
<td>The roots.</td>
<td>Laxative.</td>
<td></td>
</tr>
<tr>
<td>Ribes nigrum (Lin.)</td>
<td>The black-currant bush.</td>
<td>The fruit.</td>
<td>Decotion and powder; lately found serviceable in the gout and rheumatism.</td>
<td></td>
</tr>
<tr>
<td>Ribes rubrum (Lin.)</td>
<td>The red-currant bush.</td>
<td>The fruit.</td>
<td>Refrigerant and detergent.</td>
<td></td>
</tr>
<tr>
<td>Rubus ideus, (Lin.)</td>
<td>The rasp-berry bush.</td>
<td>The fruit.</td>
<td>Refrigerant.</td>
<td>A syrup.</td>
</tr>
</tbody>
</table>
MATERIA MEDICA.

TECHNICAL NAMES | ENGLISH NAMES | PARTS USED IN MEDICINE | VIRTUES | PREPARATIONS FROM THEM
---|---|---|---|---
Sabadilla. See Cevadilla, supra. | Sabina (Juniperus sabina, Lin.) | The leaves or tops. A stimulating aperient. | An essential oil; a watery extract; and an ingredient in several official compositions. | Emollient and laxative.


Sagapenum (Ferula orientalis, Lin.) | Gum sagapenum. | Ditto. | Ditto. |


Sambucus (S. nigra, Lin.) | Common black-berried alder. The leaves, bark, flowers and berries. | Cathartic, aromatic, and aperient. | Aro for internal use from the berries, and an ointment and oil from the flowers and bark; the flowers are also ingredients in some compound waters. An ingredient in some official compositions. |

Sanguis draconis, Dragon’s blood. (Calamus rotang, Dracaena draco, Pierocarpus, draeco, &c. Lin.) | Supposed to be corroborant. | Essential oil; extract. | Effrential oil; extract. |

Sanicula (S. Europaea, Lin.) | Sanicle. The leaves. | Greatly recommended by Hoffmann as a restorative. | Used only for its colour. |


Santalum rubrum, Red sanders. (Pierocarpus santolinus, Lin.) | The wood. | Esential oil; extract. | Effrential oil; extract. |

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<tr>
<th>MATERIA MEDICA.</th>
<th>VIRTUES.</th>
<th>PREPARATIONS FROM THEM.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapо durus.</td>
<td>Resolvent and stimulating.</td>
<td>The first gives name to a plaster, liniment, balm, and pills; the second is an ingredient in the milder caustic; and the third in an anodyne plaster.</td>
</tr>
<tr>
<td>Sapо mollis.</td>
<td>Aperient, corrombant, and sudorific.</td>
<td>Tincture; extract.</td>
</tr>
<tr>
<td>Sapо niger.</td>
<td>Supposed to be vulnerary.</td>
<td>Ingredient in the pulvis cerae.</td>
</tr>
<tr>
<td>Saponaria (S. officinalis, Lin.)</td>
<td>Alterant, and diaphoretic.</td>
<td>Infusions and extract.</td>
</tr>
<tr>
<td>Sarcocolla (Paeна farcoc. Lin.)</td>
<td>Alterant, aperient, A very pungent ingredient in some officinal preparations.</td>
<td></td>
</tr>
<tr>
<td>Sarсaparilla (Smilax farcап. Lin.)</td>
<td>Aperient, sudorific, and expectorant.</td>
<td>Coagulant and corroborative.</td>
</tr>
<tr>
<td>Saxifraga alba (S. officinalis, Lin.)</td>
<td>Supposed to be aperient, diuretic, and lithotrptic, but without just foundation.</td>
<td>Salep supposed to be a preparation from a root of this kind.</td>
</tr>
<tr>
<td>Saxifraga vulgaris, Meadow saxifrage. (Pсссdссras si-laun, Lin.)</td>
<td>Aperient, sudorific, and expectorant.</td>
<td>Coagulant and corroborative.</td>
</tr>
<tr>
<td>Scabiosa (S. аrvеn. Scabious, fit, Lin.)</td>
<td>Supposed to be very warm aromatic.</td>
<td>Salep supposed to be a preparation from a root of this kind.</td>
</tr>
<tr>
<td>Saxammonium (Convolvulus flam. Lin.)</td>
<td>Supposed to be aperient, diuretic, and lithotrptic, but without just foundation.</td>
<td>Coagulant and corroborative.</td>
</tr>
<tr>
<td>Scilla (S. maritima, Lin.)</td>
<td>Aperient, sudorific, and expectorant.</td>
<td>Coagulant and corroborative.</td>
</tr>
<tr>
<td>Sebeftlen (Cordia myxa, Lin.)</td>
<td>Supposed to be aperient, diuretic, and lithotrptic, but without just foundation.</td>
<td>Coagulant and corroborative.</td>
</tr>
<tr>
<td>Scopolosia (S. nо-dosa, Lin.)</td>
<td>Deobstruent diuretic.</td>
<td>An ingredient in mithridate, therissa, and several other preparations.</td>
</tr>
<tr>
<td>Seckum acre (Lin.)</td>
<td>Cordial and stimulant, but doubtful.</td>
<td>Cordial and stimulant, but doubtful.</td>
</tr>
<tr>
<td>Seckum majus (S. album, Lin.)</td>
<td>Supposed corroborant, but doubtful.</td>
<td>Cordial and stimulant, but doubtful.</td>
</tr>
<tr>
<td>Seckum, Senna (Сассия серена, Senna, Lin.)</td>
<td>Emollient.</td>
<td>Emollient.</td>
</tr>
<tr>
<td>Senna (Genista tinia, Senа, Lin.)</td>
<td>Strongly purgative, emetic, and diuretic.</td>
<td>Strongly purgative, emetic, and diuretic.</td>
</tr>
<tr>
<td>Scrophularia (S. no-dosa, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Scolopendrium.</td>
<td>Deobstruent diuretic.</td>
<td>An ingredient in mithridate, therissa, and several other preparations.</td>
</tr>
<tr>
<td>Scordium (Tеrrуri­um ferrum, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Scrophularia (S. no-dosa, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Sebepflem (Cordia myxa, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Seckum acre (Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Seckum majus (S. album, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Seckum, Senna (Сассия серена, Senna, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
<tr>
<td>Senna (Genista tinia, Senа, Lin.)</td>
<td>Refrigerant.</td>
<td>Refrigerant.</td>
</tr>
</tbody>
</table>
### Materia Medica

<table>
<thead>
<tr>
<th>Technical Names</th>
<th>English Names</th>
<th>Parts Used in Medicine</th>
<th>Virtues</th>
<th>Preparations from Them</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serpentaria Virginiana (Arifoleschia serpentin)</td>
<td>Virginian snake</td>
<td>The root</td>
<td>A warm diaphoretic; a spirituous tincture; and antiseptic and diuretic</td>
<td>Ingredient in a number of tinctures</td>
</tr>
<tr>
<td>Serpyllum (Thymus serpyllum)</td>
<td>Mother of thyme</td>
<td>The herb</td>
<td>Aromatic</td>
<td></td>
</tr>
<tr>
<td>Sefelis vulgaris (Tordylium officinale)</td>
<td>Common hawthorn</td>
<td>The seeds</td>
<td>Agreable aromatic, but neglected</td>
<td>Lewis</td>
</tr>
<tr>
<td>Sefelis maillienfis (Sefelis elatum)</td>
<td>Hartwort of March</td>
<td>The seeds</td>
<td>Probably emollient</td>
<td></td>
</tr>
<tr>
<td>Sigilium Salomonis (Convallaria polygon)</td>
<td>Solomon's seal</td>
<td>The root</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simarouba</td>
<td>See Quassia simarouba</td>
<td>The root</td>
<td>Strongly aromatic, an ingredient in many preparations</td>
<td></td>
</tr>
<tr>
<td>Sinapi (Sinapis alba)</td>
<td>Mustard</td>
<td>The seeds, black and white</td>
<td>Strongly pungent; an expressed oil and stimulant</td>
<td></td>
</tr>
<tr>
<td>Sium (S. nodiflorum)</td>
<td>Creeping stellaria</td>
<td>The herb</td>
<td>The juice serviceable in some cutaneous disorders</td>
<td></td>
</tr>
<tr>
<td>Solanum (S. nigrum)</td>
<td>Nightshade</td>
<td>The leaves</td>
<td>Powerfully evacuant</td>
<td></td>
</tr>
<tr>
<td>Spermatica (Physeter macrocephalus)</td>
<td>Spermatica</td>
<td>The seeds</td>
<td>A mild emollient; gives name to alopecia</td>
<td></td>
</tr>
<tr>
<td>Spigelia (S. Marilandica)</td>
<td>Indian pink</td>
<td>The root</td>
<td>Anthelmintic</td>
<td></td>
</tr>
<tr>
<td>Spina cervina (Rhamnus catharticus)</td>
<td>Buckthorn</td>
<td>The berries</td>
<td>Strongly cathartic; a syrup</td>
<td></td>
</tr>
<tr>
<td>Spiritus vinelic</td>
<td>Vinous spirits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spongia (S. officinalis)</td>
<td>Sponge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stannum</td>
<td>Tin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphisagria (Delphinium staphisagria)</td>
<td>Stavesacre</td>
<td>The seeds</td>
<td>Anthelmintic; powdered</td>
<td></td>
</tr>
<tr>
<td>Stoechas (Lavandula stoechas)</td>
<td>Arabian stoechas</td>
<td>The flowers</td>
<td>Aromatic; an ingredient in mithridate and theriac</td>
<td></td>
</tr>
<tr>
<td>Stramonium (Datura stramon)</td>
<td>Thorn-apple</td>
<td>The herb</td>
<td>Narcotic; an extract</td>
<td></td>
</tr>
<tr>
<td>Styrax calamita (S. storax officinalis)</td>
<td>Liquid storax</td>
<td>The flowers</td>
<td>Aromatic, stimulant, and nerve</td>
<td></td>
</tr>
<tr>
<td>Styrax liquida (Liquid storax officinalis)</td>
<td>Liquid storax</td>
<td>The flowers</td>
<td>Ingredient in some tinctures and pills</td>
<td></td>
</tr>
<tr>
<td>Suaveolent</td>
<td>The cork-tree</td>
<td>The bark</td>
<td>Astringent</td>
<td></td>
</tr>
<tr>
<td>Saccinum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>English Name</td>
<td>Virtues</td>
<td>Preparations from them</td>
<td></td>
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<tr>
<td>--------------------------</td>
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<td>------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Succinum</td>
<td>Amber</td>
<td>Astringent and corrosive</td>
<td>A tincture, balsam, essential oil, and an ingredient in several officinal preparations.</td>
<td></td>
</tr>
<tr>
<td>Sulphur</td>
<td>Sulphur, and flowers of sulphur</td>
<td>Laxative, diaphoretic, and alterant.</td>
<td>Solutions in different kinds of oils called balsam, and an ingredient in some ointments.</td>
<td></td>
</tr>
<tr>
<td>Sumach (Rhus coriaria, Lin.)</td>
<td>Common sumach.</td>
<td>Astringent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tacamahac (Populus balsamifera, Lin.)</td>
<td>Tacamahac-tree.</td>
<td>Diffusent, emollient, and suppulsive.</td>
<td>An ingredient in several plasters.</td>
<td></td>
</tr>
<tr>
<td>Tamarindus (T. Indica, Lin.)</td>
<td>Tamarinds.</td>
<td>Refrigerant and laxative,</td>
<td>Ingredients in some laxative electuaries.</td>
<td></td>
</tr>
<tr>
<td>Tanacetum (T. vulgare, Lin.)</td>
<td>Tanfý.</td>
<td>Attenuating and resolvent.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taraxacum (Leonotodon tarax. Lin.)</td>
<td>Dandelion.</td>
<td>A distilled spirit, recommended by professor Delias of England in asthmatic and hydroptic affections.</td>
<td>Purified from its earthy parts, and called cream of tartar, the basis of some useful purging fats. An alkali is also prepared from it by fire.</td>
<td></td>
</tr>
<tr>
<td>Tartarum</td>
<td>Tartar.</td>
<td>Refrigerant and cathartic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terebinthina Veneta (Pinus larix, Lin.)</td>
<td>Veniceturpentine.</td>
<td>Warmed stimulating diuretics and aperients.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terebinthina Argentoratenis</td>
<td>Strafburgur turpentine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terebinthina Chiana, or Cyprus turpentine.</td>
<td>Chian, or Cyprus turpentine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terebinthina communis.</td>
<td>Common turpentine.</td>
<td>Ufed chiefly in exanthemata.</td>
<td>Astringent oil. The resin forms the resina alba &amp; nigra, or white and black rosin of the hops, used in almost every ointment.</td>
<td></td>
</tr>
<tr>
<td>Terra Japonica. See Catechus supra.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Thapsus barbatus (Verpa setosa hepatica, Lin.)</td>
<td>Great white mullein.</td>
<td>Analeptic.</td>
<td>A spirituous extract from the flowers.</td>
<td></td>
</tr>
<tr>
<td>Thea bohea et viridis (Lin.)</td>
<td>Bohea and green tea.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thalifé (T. arvensis, Lin.)</td>
<td>Treacle, or mithridate mustard.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thus vulgaris.</td>
<td>Common frankincense.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thymus citratus.</td>
<td>Lemon thyme.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thymus vulgaris.</td>
<td>Common thyme.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tilia (T. Europæa, Lin.)</td>
<td>The lime or linden tree.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tithymalus (Euphorbia lathyris, Lin.)</td>
<td>The spurge.</td>
<td>Violently cathartic.</td>
<td>Tormentilla</td>
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</thead>
<tbody>
<tr>
<td>Tormentilla</td>
<td>T. Tormentil, or sept-erecis, Lin.)</td>
<td>The root.</td>
<td>Astringent.</td>
<td>An ingredient in several official compositions.</td>
</tr>
<tr>
<td>Trifolium</td>
<td>Marsh trefoil, or Mentravites, buck bean. trifolia. Lin.)</td>
<td>The leaves.</td>
<td>Laxative and alter-ant.</td>
<td></td>
</tr>
<tr>
<td>Turpethum</td>
<td>Turbid.</td>
<td>The root.</td>
<td>Violently cathartic</td>
<td>An extract.</td>
</tr>
<tr>
<td>Vezatunm.</td>
<td>See Helleborus albus, supra.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbascum.</td>
<td>See Thaspia, supra.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinum.</td>
<td>Wine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vipera</td>
<td>The viper. (Coluber be- rus, Lin.)</td>
<td>The flesh and fat.</td>
<td>Refrorative and emollient. A vinous tincture; an ingredient in theriacas.</td>
<td></td>
</tr>
<tr>
<td>Vitis vinifera.</td>
<td>The vine. (Lin.)</td>
<td>The leaves, top, flowers, and fruit.</td>
<td>Astringent, diuretic, aromatic, and pectoral. Wine. The dried fruit or raisins are ingredients in some pectoral and stomachic medicines.</td>
<td></td>
</tr>
<tr>
<td>Winteranaus</td>
<td>Winter’s bark. (Wintera aromatica, Lin.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uricia</td>
<td>The nettle. (U. disica, Lin.)</td>
<td>The herb.</td>
<td>Rubefacient.</td>
<td></td>
</tr>
<tr>
<td>Zedoaria</td>
<td>Zedoary. (Kampsfe-ria retunda, Lin.)</td>
<td>The root.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zincum.</td>
<td>Zinc.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*General*
MATERIA MEDICA

General Titles including several Simples.

The five opening roots:
- Smallage
- Asparagus
- Fennel
- Parsley
- Butchers broom

The five emollient herbs:
- Marshmallows
- Mallow
- Mercury
- Pellitory of the wall
- Violets

The four cordial flowers:
- Borage
- Bugloss
- Roses
- Violets

The four greater hot feeds:
- Anise
- Caraway
- Cummin
- Fennel

The four lesser hot feeds:
- Bishops weed
- Stone parsley
- Smallage
- Wild carrot

The four greater cold feeds:
- Water melons
- Cucumbers
- Gourds
- Melons

The four lesser cold feeds:
- Succory
- Endive
- Lettuce
- Purlane

The four capillary herbs:
- Maidenhair
- English maidenhair
- Wall rye
- Ceterach

The 4 carminative flowers:
- Camomile
- Feverfew
- Dill
- Ashitot

The simples of each of the above classes have been often employed together under the respective general appellations. This practice has entirely ceased among us; and accordingly these denominations are now expanded both from the London and Edinburgh pharmacopoeias, and they are now retained in very few of the foreign ones. But as these articles are frequently mentioned under their general titles by writers of eminence, it was imagined that the above enumeration of them might be of some use.

General Rules for the Collecting and Preservation of Simples.

Roots.
Annual roots are to be taken up before they shoot out; the flowers or flowers: Biennial ones, chiefly in the collection, autumn of the same year in which the seeds were sown.

The perennial, when the leaves fallen, and therefore generally in the autumn, being washed clean from dirt, and freed from the rotten and decayed fibres, they are to be hung up in a warm, shady, airy place, till sufficiently dried. The thicker roots require to be cut longitudinally, or cut transversely into thin flakes. Such roots lose their virtues by excitation, or are desired to be preferred in fresh state, for the greater conveniency of their use in certain forms, are to be kept buried in dry sand.

There are two seasons in which the bennial and perennial roots are reckoned the most vigorous, the autumn and spring; or rather the time when the stalks or leaves have fallen off, and that in which the vegetation is just to begin again, or soon after it has begun; which times are found to differ considerably in different plants.

The college of Edinburgh, in the two first editions of their pharmacopeia, directed them to be dug in the spring, after the leaves were formed; in the third edition the autumn was preferred. The generality of roots appear, indeed, to be most efficacious in the spring; but as at this time they are also the most juicy, and consequently shrivel much in drying, and are rather more difficultly preserved, it is commonly thought most advisable to take them up in autumn. No rule, however, can be given, that shall obtain universally: arum roots is taken even in the middle of summer, without suspicion of its being less active than at other seasons; while angelica root is inert during the summer, in comparison of what it was in the autumn, spring, or winter.

Herbs and Leaves.

Herbs are to be gathered when the leaves have come to their full growth, before the flowers unfold; but of some plants the flowery tops are preferred. They are to be dried in the same manner as roots.

For the gathering of leaves, there cannot perhaps be any universal rule any more than for roots; for though most herbs appear to be in their greatest vigour about the time of their flowering, or a little before, there are some in which the medicinal parts are more abundant at an earlier period.

Thus mallow and marshmallow leaves are most mucilaginous when young, and by the time of flowering approach more to a woody nature. A difference of the same kind is more remarkable in the leaves of certain trees and shrubs: the young buds, or rudiments of the leaves, of the black popular tree, have a strong fragrant smell, approaching to that of flowers; but by the time that the leaves have come to their full growth, their fragrance is exhausted.

Herbs are directed by most of the pharmacutic writers to be dried in the shade; a rule which appears to be very just, though it has sometimes been misunderstood. They are not to be excluded from the sun's heat, but from the strong action of the solar light; by which last they are more liable to be altered or destroyed than those of roots. Slow drying of them in a cool place is far from being of any advantage; both their colours and virtues are preferred in greatest perfection.
MATERIA MEDICA.

Seeds and Fruits.

Seeds should be collected when ripe, and beginning to grow dry, before they fall off spontaneously. Fruits are also to be gathered when ripe, unless otherwise ordered.

Of the fruits whose collection comes under the notice of the apothecary, there are few which are used in an unripe state; the principal is the floe, whose virtue as a mild astringent is much diminished by maturation. The fruit of the orange tree, railed in our gardens or green-houses, is sometimes gathered in a state of much greater immaturity, soon after it is formed on the tree, before it has acquired its acid juice; at this time it proves an elegant aromatic bitter, nearly resembling what are called Curefors oranges, which appear to be no other than the same fruit gathered at the same period in a warmer climate.

The rule for collecting seeds is more general than any of the others, all the official feeds being in their greatest perfection at the time of their maturity. As feeds contain little watery moisture, they require no other warmth for drying them than that of the temperate air in autumn; such as would with a slow expellible oil, as those commonly called the cold feeds, should never be exposed to any considerable heat; for this would hasten the rancidity, which, however carefully kept, they are very liable to contract. Seeds are best preserved in their natural husks or coverings, which should be separated only at the time of using; the husk, or cortical part, serving to defend the seed from being injured by the air.

Woods and Barks.

The most proper season for the felling of woods, or fowing off their barks, is generally the winter.

No woods of their own growth are now retained by the London or Edinburgh colleges. The only two which had formerly a place in the catalogues of simples were the juniper and the box; the first of which is never kept in the shops, or employed in practice; the other may be procured from the tanner; and it is indifferent at what season it has been cut down, being at all times sufficiently fit for the only use to which it was applied, the yielding an empyreumatic oil by distillation in a strong fire.

It may be doubted, whether barks are not generally more replete with medicinal matter in summer and spring than in winter. The barks of many trees are in summer so much loaded with resin and gum as to burst spontaneously, and discharge the redundant quantity. It is said that the bark of the oak answers best for the tanners at the time of the rising of the sap in spring; and as its use in tanning depends on the same astringent quality for which it is used in medicine, it should seem to be also fittest for medicinal purposes in the spring. It may be observed likewise, that it is in this
MATERIAL, denotes something composed of matter. In which sense the word stands opposed to immaterial. See Material and Metaphysics.

Materialists, a sect in the ancient church, composed of persons who, being possessed with that maxim in the ancient philosophy, Ex nihilo nihil fit, "Out of nothing nothing can arise," had recourse to an internal matter, on which they supposed God wrought in the creation; instead of admitting God alone as the sole cause of the existence of all things. Tertullian vigorously opposes the doctrine of the materialists in his treatise against Hermogenes, who was one of their number.

Materialists is also a name given to those who maintain that the soul of man is material; or that the principle of perception and thought is not a substance distinct from the body, but the result of corporeal organization: See Metaphysics. There are others, called by this name, who have maintained that there is nothing but matter in the universe; and that the Deity himself is material. See Stoicism.

Malham, (Jaques), an engraver of considerable eminence, was born at Harlem in 1571, and after the death of his father, Henry Goltzius, a celebrated painter and engraver, married his mother. From his father-in-law he learned the art of engraving. He went to Italy, to complete his studies from the works of the greatest masters; and in that country he engraved a considerable number of plates. At his return, he worked under the eye of Goltzius, and produced many very valuable prints. Following the example of his father-in-law, he worked entirely with the graver, in a clear, free style, and though he never equalled him in point of taste or correctness of drawing, especially when confined to the naked parts of the human figure, most of his prints are greatly esteemed.

Mathematics, the science of quantity; or a science that considers magnitudes either as computable or measurable.

The word in its original, μαθηματικός, signifies discipline, or science in the general; and seems to have been applied to the doctrine of quantity, either by way of eminence, or becausse, this having the start of all other sciences, the rest took their common name there from. See Science.

For the origin of the Mathematics, Josephus dates it before the flood, and makes the sons of Seth observers of the course and order of the heavenly bodies; he adds, that, to perpetuate their discoveries, and secure them from the injuries either of a deluge or a conflagration, they had them engraved on two pillars, the one of stone, the other of brick; the former of which he says was standing in Syria in his days. See Astronomy.

The first who cultivated mathematics after the flood were the Assyrians and Chaldeans; from whom, the fame Josephus adds, they were carried by Abraham to the Egyptians; who proved such notable proficients, that Aristotle makes no scruple to fix the first rise of mathematics among them. From Egypt, 584 years before Christ, they passed into Greece through the hands of Thales, who having learned geometry of the Egyptian priests, taught it in his own country. After Thales, comes Pythagoras, who, among other mathematical arts, paid a particular regard to arithmetic; fetching the greatest part of his philosophy from numbers; he was the first, as Laertius tells us, who abstrated geometry from matter; and to him we owe the doctrine of incommensurable magnitude, and the five regular bodies, besides the first principles of music and astronomy. Pythagoras was succeeded by Anaxagoras, Chonipides, Brizo, Antipho, and Hipppocrates of Scio; who all applied themselves particularly to the quadrature of the circle, the duplication of the cube, &c., but the last with most success: this last is also mentioned by Proclus, as the first who compiled elements of mathematics.

Democritus excelled in mathematics as well as physics; though none of his works in either kind are extant, the destruction of which some authors lay at Aristotle's door. The next in order is Plato, who not only improved geometry, but introduced it into physics, and laid the foundation of a solid philosophy. Out of his school proceeded a crowd of mathematicians. Proclus mentions 13 of note; among whom was Leodamus, who improved the analysis of elements; by Plato; Theaetetus, who wrote elements; and Archimedes, who has the credit of being the first who applied mathematics to use in life. These were succeeded by Necholes and Theon, the last of whom contributed to the elements. Endoxus excelled in arithmetical and geometry, and was the first founder of a system of astronomy. Menechmus invented the conic sections, and Theodorus and Hermotimus improved the elements.

For Aristotle, his works are so florid with mathematics, that Blancover compiled a whole book of them; out of his school came Eudoxus and Theophratus; the first of whom wrote of numbers, geometry, and invisible lines; the latter, a mathematical history. To Aristotle, Theodorus, and Hypocrates, we owe the books of solids; which, with the other books of elements, were improved, collected, and methodized by Euclid, who died 284 years before Christ.

An hundred years after Euclid, came Eratosthenes and Archimedes. Contemporary with the latter was Conon, a geometerian and astronomer. Soon after came Apollonius Pergusus: whose conics are still extant. To him are likewise ascribed the 14th and 15th books of Euclid, which are said to have been contrac-
MATHEMATICAL, any thing belonging to the science of mathematics.

Mathematical instruments, such instruments as are usually employed by mathematicians, as compasses, sexts, quadrants, &c.


MATHER (Dr Cotton), an eminent American divine, born at Bolton in New England in the year 1663. He was educated in Harvard college, and in 1684 became minister of Bolton; in the diligent discharge of which office he spent his life, and promoted several excellent societies for the public good, particularly one for suppressing disorders, one for reforming manners, and a society of peace-makers, whose professed business it was to compose differences and prevent law-suits. His reputation was not confined to his own country: for in 1710, the university of Glasgow sent him a diploma for the degree of doctor in divinity; and, in 1715, the Royal Society of London chose him one of their fellows. He died in 1723; and is said to have published in his life-time 382 pieces, including single sermons, essays, &c. yet several were of a larger size, among which was Magnalia Christi Americana, or an Ecclesiastical History of New-England, from its first planting in 1620 to 1695, folio. But the most remarkable of all his works was that in which, like Glanville, he defended the doctrine of witchcraft. We shall content ourselves with giving the title at large, which is as follows: "The wonders of the invisible world; being an account of the trials of several witches lately executed in New-England, and of several remarkable curiosities therein occurring. Together with, 1. Observations on the nature, the number, and the operations of the devil. 2. A short narrative of a late outrage committed by a knot of witches in Sweden; very much resembling, and far explaining that under which New-England has laboured. 3. Some counsels directing a due improvement of the terrible things lately done by the unusual and amazing range of evil spirits in New-England. 4. A brief discourse upon the temptations which are the more ordinary devices of Satan. By Cotton Mather; published by the special command of his excellency the governor of the province of Massachusetts's Bay in New England." Printed first at Bolton in New-England, and reprinted at London, in 1736, 4to. MATLOCK, a town or village of Derbyshire, near Wickworth, situated on the very edge of the Derwent; noted for its bath, the water of which is milk-warm; and remarkable for the huge rocks in its environs.

MATHEMATICS. The word mathematics is derived from the Greek words mathema and tikē, meaning "knowledge," "science," and "learning." It is the study of quantity, structure, space, and change. Mathematics is divided into pure mathematics, which is concerned with abstract concepts and structures, and applied mathematics, which is concerned with the application of abstract concepts to various fields. Mathematics is a fundamental discipline in modern science, technology, and engineering.
When types are to be cast, the matrice is fastened to the end of a mould, so disposed as that when the metal is poured on it, it may fall into the creox or cavity of the matrice, and take the figure and impression thereof. See Letter-Founder.

Matrices, used in coining, are pieces of steel in form of dies, whereon are engraved the several figures, arms, characters, legends, &c. wherewith the species are to be stamped. The engraving is performed with several puncheons, which being formed in relieves, or prominent, when struck on the metal, make an indented impression, which the French call en creux.

MATRICULA, a register kept of the admission of officers and persons entered into any body or society whereof a list is made. Hence those who are admitted into universities are said to be matriculated. Among ecclesiastical authors, we find mention made of two kinds of matriculas; the one containing a list of the ecclesiastics called matricula clericorum; the other of the poor subsisted at the expense of the church, called matricula pauperum.

MATRICULA was also applied to a kind of almshouse, where the poor were provided for. It had certain revenues appropriated to it, and was usually built near the church; whence the name was also frequently given to the church itself.

MATRIMONY. See Marriage.

MATRIMONY, in anatomy, the womb, or that part of the female of any kind, wherein the fetus is conceived and nourished till the time of its delivery. See Anatomy, n° 108.

Matrix is also applied to places proper for the generation of vegetables, minerals, and metals. Thus the earth is the matrix wherein seeds sprout; and marcasites are by many considered as the matrices of metals.

The matrix of ores is the earthly and stony substances in which metallic matters are enveloped: these are very various, frequently spar, quartz, flours, or horn-blend.

MATRON, an elderly married woman.

Jury of Matrons. When a widow feigns herself with child in order to exclude the next heir, and a supposititious birth is suspected to be intended, then, upon the writ de vente infictae, a jury of women is to be impanelled to try the question whether the women is with child or not. So, if a woman, is convicted of a capital offence, and, being condemned to suffer death, pleads in stay of execution, that she is pregnant, a jury of matrons is impanelled to inquire into the truth of the allegation; and, if they find it true, the convict is reprieved till after her delivery.

MATRONA (ane. geogr.) a river separating Gal·lia Celtae from the Belgia (Céfire) Now the Meuse, which, rising in Champaign near Langres, runs north-west, and then west, and passing by Mœaux falls into the Seine at Charenton, two leagues to the east of Paris.

MATRONALIA, a Roman festival inftituted by Romulus, and celebrated on the kalends of March, in honour of Mars. It was kept by matrons in particular, and bachelors, were entirely excluded from any share in the solemnity. The men during this feast sent presents to the women, for which a return was made.
MATSYS (quinin), painter of history and portraits, was born at Antwerp in 1460, and for several years followed the trade of a blacksmith or farrier, at least till he was in his 20th year. Authors vary in their accounts of the cause of his quitting his first occupation, and attaching himself to the art of painting. Some affirm, that the first unfolding of his genius was occasioned by the sight of a print which accidentally was shown to him by a friend who came to pay him a visit while he was in a declining state of health from the labour of his former employment, and that by his copying the print with some degree of success, he was animated with a desire to learn the art of painting. Others say, he fell in love with a young women of great beauty, the daughter of a painter, and they allege that love alone wrought the miracle, as he could have no prospect of obtaining her except by a distinguished merit in the profession of painting: for which reason he applied himself with incessant labour to study and practise the art, till he became so eminent as to be invited to demand her in marriage, and he succeeded.

Whatever truth may be in either of these accounts, it is certain that he appeared to have an uncommon genius; his manner was singular, not resembling the manner of any other master, and his pictures were so pretty, that people from all parts of the city, and even from the Low countries, came to see them. To this period belongs the famous statue of St. James, and the picture of the Virgin and Child, by his own hand, which is in the cathedral of Antwerp: and it is justly admired for the spirit, skill, and delicacy of the whole. But the most remarkable and best known picture of Matsys, is that of the two mihers in the gallery at Windsor. He died in 1539. He had a son Joba; who painted in the same style and manner, but not with a reputation equal to his father; though many of his pictures are sold to unpick purchasers for the paintings of Quintin. His most frequent subject was the representation of mihers counting their gold, or bakers examining and weighting it.

MATT, in a ship, is a name given to rope-yarn, junk, &c. beat flat and interwoven; used in order to preserve the yards from galling or rubbing in hoisting or lowering them. MATTER, in common language, is a word of the same import with body, and denotes that which is tangible, visible, and extended; but among philosophers it signifies that substance of which all bodies are composed; and in this sense it is synonymous with the word ELEMENT.

It is only by the senses that we have any communication with the external world: but the immediate objects of sense, philosophers have in general agreed to term qualities, which they conceive as inhering in something which is called their subject or substratum. It is this substratum of sensible qualities which, in the language of philosophy, is denominated matter; to that matter is not that which we immediately see or handle, but the associated subject or support of visible, and tangible qualities. What the moderns term qualities, was by Aristotle and his followers, called forms; but so far as the two doctrines are intelligible, there appears to be no essential difference between them. From the moderns we learn, that body consists of matter and qualities; and the peripatetics taught, the same thing when they said that body is composed of matter and form.

How philosophers were led to analyse body into matter and form, or, to use modern language, into matter and qualities; what kind of existence they attribute to each; and whether matter must be conceived as self-existent or created—are questions which shall be considered afterwards (See METAPHYSICS). It is sufficient here to have defined the term.

MATTHEW, or GOSPEL OF ST. MATTHEW, a canonical book of the New Testament.

ST. MATTHEW wrote his gospel in Judea, at the request of those he had conversed with; and it is thought he began in the year 41, eight years after Christ's resurrection. It was written according to the testimony of all the ancients, in the Hebrew or Syrian language; but the Greek version, called FORTE, for the original, is as old as the apocryphal times.

ST. MATTHEW the Evangelist's Day, a festival of the Christian church, observed on September 21st.

ST. MATTHEW, the son of Alpheus, was also called Leb. He was of Jewish original, as both his names discover, and probably a Galilean. Before his call to the apostolate, he was a publican or toll-gatherer to the Romans: an office of bad repute among the Jews, on account of the covetousness and exaction of those who managed it. Matthew's office particularly confided in gathering the customs of all merchandise that came by the sea of Galilee, and the tribute that passengers were to pay who went by water. And here it was that Matthew sat at the receipt of customs, when our Saviour called him to be a disciple. It is probable, that, living at Capernaum, the place of Christ's usual residence, he might have some knowledge of him before he was called. Matthew immediately expressed his satisfaction in being called to this high dignity, by entertaining our Saviour and his disciples at a great dinner in his own house, whither he invited all his friends, especially those of his own profession, hoping, probably, that they might be influenced by the company and conversation of Christ. St. Matthew continued with the rest of the apostles till after our Lord's ascension. For the first eight years afterwards he preached in Judea. Then he betook himself to propagating the gospel among the Gentiles.
Mathews Gentiles, and chose Ethiopia as the scene of his apostolic ministry; where it is said he suffered martyrdom, but by what kind of death is altogether uncertain. It is pretended, but without any foundation, that Hyrtaeus, king of Ethiopia, desiring to marry Iphigenia, the daughter of his brother and predecessor Aglippus, and the apostle having represented to him that he could not lawfully do it, the enraged prince ordered his head immediately to be cut off. Barisius tells us, the body of St Matthew was transported from Ethiopia to Bithynia, and from thence was carried to Sardennum in the kingdom of Naples in the year 654, where it was found in 1080, and where Duke Robert built a church bearing his name.

St Matthew, a town of Spain, in the kingdom of Arragon, seated in a pleasant plain, and in a very fertile country watered with many springs. W. Long. c. 15. Nat. 40. 22.


Matthew of Westminster, a Benedictine monk and accomplished scholar, who wrote a history from the beginning of the world to the end of the reign of Edward I. under the title of Flores Historiarum, which was afterwards continued by other hands. He died in 1380.

St Matthiæ, an apostle, was chosen, instead of Judas. He preached in Judea and part of Ethiopia, and suffered martyrdom. See the Acts of the Apostles, chap. 1. There was a gospel published under Matthias's name, but rejected as spurious; as likewise some traditions, which met with the same fate.

St Matthias's Day: a festival of the Christian church, observed on the 24th of February. St Matthias was an apostle of Jesus Christ, but not of the number of the twelve chosen by Christ himself. He obtained this high honour upon a vacancy made in the college of the apostles by the treason and death of Judas Iscariot. The choice fell on Matthias by lot; his competitor being Joseph called Baresabas and surnamed Justus. Matthias was qualified for the apostleship, by having been a constant attendant upon our Saviour all the time of his ministry. He was, probably, one of the 70 disciples. After our Lord's resurrection, he preached the gospel first in Judea. Afterwards it is probable he travelled eastwards, his residence being principally near the junction of the rivers Apas and the Paps. He is said to have lived with great rude ness and impiety; and, after many labours and sufferings in converting great numbers to Christianity, he obtained the crown of martyrdom; but by what kind of death, is uncertain. They pretend to show the relics of St Matthias at Rome: and the famous abbey of St Matthias near Treques boast of the same advantage; but doubtless both without any foundation. There was a gospel spurious to St Matthias; but it was universally rejected as such.

Mattiae Aquae, or Mattiae Fontes, (anc. geog.), now Wilbaden, opposite to Mentz, in the Westphalia. E. Long. 8. N. Lat. 50. 6.


Mattins, the first canonical hour, or the first part of the daily service, in the Roman church.

Matthiæus (Peter Andrew), an eminent physician in the 16th century, born at Sienna, was well skilled in the Greek and Latin tongues. He wrote learned commentaries on Dioscorides, and other works which are esteemed; and died in 1577.

Matturants, in pharmacy, medicines which promote the suppuration of tumours.

May (Matthew), M. D. an eminent physician and polite writer, was born in Holland in the year 1718. He was the son of a clergyman, and was originally intended for the church; but in consequence of some mortifications his father met with from the synod, on account of some particular sentiments he entertained about the doctrine of the Trinity, turned his thoughts to physic. He took his degree of M. D. at Leyden: and in 1742 came to settle in England, his father having determined to quit Holland for ever. In order to make himself known, in 1749 he began to publish in French an account of the productions of the English press, printed at the Hague under the name of the Journal Britannique. This journal, which continues to hold its rank amongst the best of those which have appeared since the time of Bayle, answered the chief end he intended by it, and introduced him to the acquaintance of some of the most respectable literary characters of the country he had made his own. It was to their active and uninterrupted friendship he owed the places he afterwards possessed. In 1758 he was chosen fellow, and in 1765, on the resignation of Dr Birch, who died a few months after and made him his executor, secretary to the royal society. He had been appointed one of the under librarians of the British museum at its first institution in 1753, and became principal librarian at the death of Dr Knight in 1772. Useful in all these posts, he promised to be eminently so in the last, when he was fecized with a languishing disorder, which in 1776 put an end to a life which had been uniformly devoted to the pursuit of science and the offices of humanity. He was an early and active advocate for inoculation; and when there was a doubt entertained that one might have the small-pox this way a second time, tried it upon himself unknown to his family. He was a member of the medical club (with the Drs Parson, Templeman, Pothergill, Warson, and others), which met every fortnight in St Paul's churchyard. He was twice married, viz., the first time to Mrs Elizabeth Boitragon; and the second to Mrs Mary Deners. He left a son and three daughters. He had nearly finished the Memoirs of the Earl of Chesterfield; which were completed by his son-in-law Mr Jutson, and prefixed to that nobleman's Miscellaneou Works, 1777, 2 vols 4to.

Mary (Paul Henry), M. A. F. R. S. son of the former, was educated at Westminster and Trinity college Cambridge, and had their travelling fellowship for three years. He was afterwards Chaplain to Lord Stormont at Paris in 17__, and soon after vacated his next fellowship by marrying one of the three daughters of Joseph Clark, Esq.; sister of the late Captain Charles Clark (who succeeded to the command on the death of Captain Cook). On his father's death in 1776, he succeeded to the office of one of the under librarians of
of the British museum, and was afterwards preferred to a superior department, having the care of the anti-
matter which he was qualified. In 1776 he also succeeded his father in the office of secretary to the royal society. On the disputes respecting the reinstatement of Dr Hutton in the department of secretary for foreign correspondence 1784, Mr Maty took a warm and distinguished part, and resigned the office of secretary: after which he undertook to assist gentlewom or ladies in perfecting their knowledge of the Greek, Latin, French, and Italian classics. Mr Maty was a thinking conscientious man; and having conceived some doubts about the articles he had subscribed in early life, he never could be prevailed upon to place himself in the way of ecclesiastical preferment, though his connections were amongst those who could have served him efficiently in this point; and soon after his father's death he withdrew himself from ministering in the established church, his reasons for which he published in the 47th volume of the Gent. Magazine, p. 466. His whole life was henceforward taken up in literary pursuits. He received tool. from the duke of Marlborough, with a copy of that beautiful work the Gemma Murbauriensis, of which only 100 copies were worked off for presents; and of which Mr Maty wrote the French account, as Mr Bryant did the Latin. In January 1792 he let on foot a Review of publications, principally foreign, which he carried on, with great credit to himself and satisfaction to the public, for near five years, when he was obliged to discontinue it from ill health. He had long laboured under an affmatic complaint, which at times made great ravages in his constitution, and at last put a period to his life in Jan. 1797, at the age of 42; leaving behind him one son.—Mr Maty enjoyed a respectable rank in the republic of letters, and by his talents and attainments was fully intituled to it. He was eminently acquainted with ancient and modern literature, and particularly conversant in critical researches. The purity and probity of his nature were unquestionable; and his humanity was as exquisite as it would have been extensive, had it been recorded by his fortune.

MAUCAUCO, MACACO, or MAKI, in zoology. See LEMUR, no 4.

MAVIS, in ornithology, a species of Turdus. See TURDUS.

MAUSEBUGE, a town of the Netherlands, in Hainaut, with an illustrious abbey of canonsellers, who vaulted noth both by the father and mother's side. This place was added to France in 1781, and formed after the murder of Vauban. It is leanted on the river Sambre, in E. Long. 5°. N. Lat 50. 15.

MAUNCH, in heraldry, the figure of an ancient coat sleeve, borne in many gentlemens escutcheons.

MAUNDY THURSDAY, is the Thursday in Passion week: which was called Maunday or Mandate Thursday from the command which our Saviour gave his apostles to commemorate him in the Lord's supper, which he this day instituted: or from the new commandment which he gave them to love one another, after he had washed their feet as a token of his love to them.

MAUPERTUIS (Peter Louis Moreceau de), a celebrated French academician, was born at St Malo in 1698; and was there privately educated till he arrived at his 16th year, when he was placed under the celebrated professor of philosophy M. le Blond, in the college of la Marche, at Paris. He soon discovered a passion for mathematical studies, and particularly for geometry. He likewise practised instrumental music in his early years with great success; fixed on no profession till he was 20, when he entered into the army. He first served in the Grey Musketeers; but in the year 1720, his father purchased him a company of cavalry in the regiment of La Rocheavgou. He remained but five years in the army, during which time he pursued his mathematical studies with great vigour; and it was soon remarked by M. Freret and other academicians, that nothing but geometry could satisfy his active soul and unbounded thirst for knowledge. In the year 1723, he was received into the Royal Academy of Sciences, and read his first performances, which was a memoir upon the construction and form of mechanical instruments, November 16. 1724. During the first years of his admission he did not wholly confine his attention to mathematics; he dip into natural philosophy, and discovered great knowledge and dexterity in observations and experiments upon animals. If the custom of travelling into remote climates, like the fages of antiquity, in order to be initiated into the learned mysteries of those times, had still subsisted, no one would have conformed to it with greater earnestness than M. de Maupertuis. His first gratification of this passion was to visit the country which had given birth to Newton; and during his residence at London he became as zealous an admirer and follower of that philosopher as of any one of his own countrymen. His next excursion was to Bafle in Switzerland, where he formed a friendship with the famous John Bernouilli, and his family, which continued to his death. At his return to Paris, he applied himself to his favourite studies with greater zeal than ever: And how well he fulfilled the duties of an academician, may be gathered by reading a few memoirs of the academy from the year 1724 to 1736; where it appears that he was neither idle nor occupied by objects of small importance. The most sublime questions in geometry and the relative sciences received from his hands thatlegence, clearness, and precision so remarkable in all his writings. In the year 1736, he was sent by the king of France to the polar circle, to measure a degree in order to ascertain the figure of the earth, accompanied by Medic Clairaut. Camus, Le Monnier, L' Abbé Outhier, and Celsius the celebrated professor of astronomy at Uppsala. This distinction rendered him so famous, that, at his return, he was admitted a member of almost every academy in Europe, the figure of an ancient coat sleeve, borne in many gentlemens escutcheons.

In the year 1740 Maupertuis had an invitation from the king of Prussia to go to Berlin; which was too flattering to be refused. His rank among men of letters had not wholly effaced his love for his first profession, namely, that of arms. He followed his Prussian majesty into the field, and was a witness of the dispositions and operations that preceded the battle of Molmitz: but was deprived of the glory of being present, when victory declared in favour of his royal patron, by a singular kind of adventure. His horse, during the heat of the action; running away with him, fell into the hands of the enemy; and was at first
but roughly treated by the Austrian soldiers, to whom he could not make himself known for want of language; but being carried prisoner to Vienna, he received such honours from their imperial majesties as were never effaced from his memory. From Vienna he returned to Berlin; but as the reform of the academy which the king of Prussia then meditated was not yet mature, he went again to Paris, where his affairs called him, and was chosen in 1742 director of the academy of sciences. In 1743 he was received into the French academy; which was the first instance of the same person being a member of both the academies at Paris at the same time. M. de Maupertuis again assumed the foulder at the siege of Fribourg, and was pitched upon by marshall Cognay and the count d‘Argenson to carry the news to the French king of the surrender of that citadel.

He returned to Berlin in the year 1744, when a marriage was negotiated and brought about, by the good offices of the queen-mother, between our author and mademoiselle de Borck, a lady of great wit and merit, and nearly related to M. de Borck at that time minister of state. This determined him to settle at Berlin, as he was extremely attached to his new spouse, and regarded this alliance as the most fortunate circumstance of his life.

In the year 1746, M. de Maupertuis was declared by his Prussian majesty president of the royal academy of sciences at Berlin, and soon after by the same prince was honoured with the order of Merit: However, all these accumulated honours and advantages, so far from lessening his ardour for the sciences, seemed to furnish new allurements to labour and application. Not a day passed but he produced some new project or essay for the advancement of knowledge. Nor did he confine himself to mathematical studies only: metaphysics, chemistry, botany, polite literature, all shared his attention, and contributed to his fame. At the same time, he had, it seems, a strange inquietude of spirit, with a dark satirical humour, which rendered him unendurable amidst honours and pleasures. Such a temperament did not promise a very pacific life; and he was engaged in several quarrels. He had a quarrel with Koenig the professor of philosophy at Franeker, and another more terrible with Voltaire. Maupertuis had inferted into the volume of Memoirs of the Academy of Berlin for 1746, a discourse upon the laws of motion; which Koenig was not content with attacking, but attributed to Leibnitz. Maupertuis, flung with the imputation of plagiarism, engaged the academy of Berlin to call upon him for his proof; which Koenig failing to produce, he was struck out of the academy, of which he was a member. Several pamphlets were the consequence of this; and Voltaire, for some reason or other, engaged against Maupertuis.

We say, for some reason or other: because Maupertuis and Voltaire were apparently upon the most amicable terms; and the latter respected the former as his master in the mathematics. Voltaire, however, exerted all his wit and satire against him; and on the whole was so much transported beyond what was thought right, that he found it expedient in 1753 to quit the court of Prussia.

Our philosopher’s constitution had long been considerably impaired by the great fatigue of various kinds in which his active mind had involved him; though from the amazing hardships he had undergone in his northern expedition, most of his future bodily sufferings may be traced. The intense sharpness of the air could only be supported by means of strong liquors; which helped but to lacerate his lungs, and bring on a spitting of blood, which began at least 12 years before he died. Yet still his mind seemed to enjoy the greatest vigour; for the best of his writings were produced, and most sublime ideas developed, during the time of his confinement by thicknees, when he was unable to occupy his prelidal chair at the academy. He took several journeys to St Malo, during the last years of his life, for the recovery of his health: And though he always received benefit by breathing his native air, yet still, upon his return to Berlin, his disorder like­wise returned with greater violence.—His last journey into France was undertaken in the year 1757; when he was obliged, soon after his arrival there, to quit his favourite retreat at St Malo, on account of the danger and confusion which that town was thrown into by the arrival of the English in its neighbourhood. From hence he went to Bourdeaux, hoping there to meet with a neutral ship to carry him to Hamburg, in his way back to Berlin; but being disappointed in that hope, he went to Toulouse, where he remained seven months. He had then thoughts of going to Italy, in hopes a milder climate would restore him to health; but finding himself grow worse, he rather inclined towards Germany, and went to Neufchatel, where for three months he enjoyed the conversation of Lord Marlitchal, with whom he had formerly been much connected. At length he arrived at Baslé, October 16. 1758, where he was received by his friend Bernouilli and his family with the utmost tenderness and affection. He at first found himself much better here than he had been at Neufchatel: but this amendment was of short duration: for as the winter approached, his disorder returned, accompanied by new and more alarming symptoms. He languished here many months, during which he was attended by M. de la Conamine; and died in 1759.


MAUR (St.), was a celebrated disciple of St Ben­didi. If we can believe a life of St Maur ascribed to Faustus his companion, he was sent by Benedeit on a mission to France. But this life is considered as apocryphal. In rejecting it, however, as well as the circumstances of the mission, we must beware of denying the mission itself. It is certain that it was believed in France as early as the 4th century; and notwithstanding the silence of Bede, Gregory of Tours, and others, there are several documents which prove this, or at least render it extremely probable. A celebrated so­ciety
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Mauriceau, city of benedictines took the name of St. Maur in the beginning of the last century, and received the veneration of Pope Gregory XV. in 1621. This society was early distinguished by the virtue and knowledge of its members, and it still supports the character. There are perhaps fewer eminent men in it than formerly; but this must be ascribed to the levity of the age, and partly to the little encouragement for the researches of learned men. The chief persons of ingenuity which this society has produced are, the Fathers Menard, d'Acheri, Mabillon, Ruinart, Germain, Lami, Monfaucon, Martin, Vaillrette, le Nouri, Martianay, Martene, Mauffret, &c. &c. See L'Histoire Litteraire de la Congregation de St Maur, published at Paris under the title of Bruxelles, in 40, 1770, by Dom Taillin.

MAURICEAU (Francis), a French surgeon, who applied himself with great success and reputation to the theory and practice of his art for several years at Paris. Afterwards he confined himself to the disorders of pregnant and lying-in women, and was at the head of all the operators in this way. His Observations sur la gynécie and sur l'accouchement des femmes, published in 1694, is reckoned an excellent work, and has been translated into several languages; German, Flemish, Italian, English, and the author himself translated it into Latin. It is illustrated with cuts. He published another piece or two, by way of supplement, on the same subject; and died at Paris in 1709.

MAURICE (St.) commander of the Theban legion, was a Christian, together with the officers and soldiers of that legion, amounting to 6600 men.—This legion received its name from the city Thessalonica in Egypt, where it was raised. It was sent by Diocletian to check the Bagaudac, who had excited some disorders, to the general of the Sarmatia in marriage, and invested him with the purple in 138. The Persians still continued to make inroads on the Roman territories, and Maurice went to the assistance of the Romans, and Maurice went to the assistance of the Persians and Mauricius Philippius, his brother-in-law, against them. This general conducted the war with various successes, and at last he gained several splendid victories, but he did not attempt to have a decided superiority. As there was great use for soldiers in these unfortunate times, the emperor issued a mandate in 132, forbidding any soldier to become a monk till he had accomplished the term of his military service. Maurice, however, obtained the glory of restoring Constantine II, king of Persia, to the throne, after he had been deposed by his subjects. The empire was in his reign harassed by the frequent inroads of the Arabian tribes. He purchased peace from them by granting them a pension nearly equal to 100,000 crowns; but these barbarians took frequent opportunities to renew the war. In different engagements the Romans destroyed 50,000, and took 17,000 prisoners. These were restored, on condition that the king of the Abiri should return all the Roman captives in his dominions. Regardless of his promise, he demanded a ransom of 10,000 crowns. Maurice, full of indignation, refused the sum, and the barbarian, equally enraged, put the captives to the sword. While the emperor attempted to avenge this cruelty, was making preparations against the Abiri, Phocas, who from the rank of a centurion had attained the highest military preferment, assumed the purple, and was declared emperor. He pursured Maurice to Chalcedon, took him prisoner, and condemned him to die. The five sons of this unfortunate prince were massacred before his eyes; and Maurice, humbling himself under the hand of God, was heard to exclaim, "Thou art just, O Lord, and thy judgments are without partiality." He was beheaded on the 26th November 602, in the 53d year of his age and 20th of his reign. Many writers have estimated the character of this prince by his misfortunes instead of his actions. They believed him guilty without evidence, and condemned him without reason. It cannot be denied, however, that he allowed Italy to be harassed, but he was a father to the rest of the empire. He re-
Maurice, elector of Saxony, succeeded to the government of the Low Countries after the death of his father William, who was killed in 1584 by the fanatic Gerard. The young prince was then only eighteen years of age, but his courage and abilities were above his years. He was appointed captain general of the United Provinces, and he reared that edifice of liberty of which his father had laid the foundation. Breda submitted to him in 1590; Zutphen, Deventer, Hulst, Nijmegen, in 1591. He gained several important advantages in 1592, and in the year following he made himself master of Gertonenburg. When he had performed these splendid services, he returned to the Low Countries by the way of Zealand. His fleet was attacked by a dreadfull tempest, in which he lost forty vessels, and he himself had very nearly perished. His death would have been conspired by the Hollanders as a much greater calamity than the loss of their vessels. They watched over his safety with exceeding care. In 1594, one of his guards was accused of an intention to take away his life; and it was generally believed that he was bribed to this service by the enemies of the repulic. He fell a sacrifice at Bourges, either to his own fanaticism or to the jealous anxiety of the friends of Maurice. The prince of Orange, increasing in reputation, defeated the troops of the archduke Albert in 1597, and drove the Spaniards entirely out of Holland. In 1600 he was obliged to raise the siege of Dunkirk; but he took ample vengeance in Aixon, where he again defeated in a pitched battle near Newport. Before the action, this great general sent back the ships which had brought his troops into Flanders: My brethren (said he to his army), we must conquer the enemy or drink up the waters of the sea. Determine, my friends; I have determined I shall either conquer your braver or I shall never forgive the disgrace of being conquered by men in every respect my superiors. This speech elevated the soldiers to the highest pitch of enthusiasm, and the victory was complete. Rhinberg, Grave, and the great cities in Flanders, submitted to the conqueror the following year. Maurice, however, not only boured for the commonwealth, but also for himself. He coveted the sovereignty of Holland, and was opposed in the prosecution of his design by the pensioner Barneveldt. The zeal and activity of this wife republican coilt him his life. He was an Arminian; and at this time Maurice defended Gomar against Arminius.

Taking advantage of the general odium under which the Arminians lay, he found means to get Barneveldt condemned in 1619. His death, wholly owing to the cruel ambition of the prince of Orange, made a deep impression on the minds of the Hollanders. The truce with Spain being expired, Spinola laid siege to Breda in 1624, and in six months, by the proper direction of his great talents, though with great slougher of his troops, he took the place. The prince of Orange, unsuccessful in every attempt to raise the siege, died of vexation in 1625, aged 55 years, with the reputation of the greatest warrior of his time.

The life of this Stuclholder (says the Abbe Raynal) was almost an uninterrupted series of battles, of sieges, and of victories. Of moderate abilities in every thing else, he was conspicuous in his military capacity. His camp was the school of Europe, and those who received their military education in his armies augmented, perhaps, the glory of their masters. Like Montecuculi, he discovered inimitable skill in his marches and encampments; like Vauban, he possessed the talent of fortifying places, and of rendering them impregnable; like Eugene, the address of finding subsistence for great armies, in countries barren by nature, or ravaged by war; like Vendome, the happy talent of calling forth, in the moment they became necessary, greater excursions from his soldiers than could reasonably be expected; like Conde, that infallible quickness of eye which decides the outcome of battles; like Charles XII, the art of rendering his troops almost invincible to cold, hunger, and fatigue; like Turenne, the secret of making war with the least possible
Mauritania fable expence of human blood." The Chevalier Folard maintains, that Maurice was the greatest commander of infantry since the time of the Romans. He studied the military art of the ancients, and applied their rules with great exactness in the various occurrences of war. He not only took advantage of the inventions of others, but he enriched the science of war with several improvements. Telescopes were first used by him for a military purpose; and besides a kind of gallery in conducting a siege, and the plan of blockading a strong place, which were of his invention, he greatly improved the whole art by his method of pulling an attack with great vigour, and of defending, for the greatest length of time, and in the best manner, a place besieged. In short, the many useful things which he practiced or invented, placed him in the highest rank among men of a military character. On one occasion, a lady of quality asked him, who was the first general of the age? Spinula (replied he) is the second. It was his constant practice, during sleep, to have two guards placed by his bedside, not only to defend him in case of danger, but to awake him if there should be the least occasion. The war between Spain and Holland was never carried on with greater keenness and animosity than during his administration.

The grand Signior, hearing of the vast torrents of blood shed in the contest, thought that a great empire might depend on the decision. The object of so many battles was pointed out to him on a map, and he said coldly, "If it were my business, I would send my pioneers and order them to call this little corner of earth into the sea." Maurice, like many great men, was impatient under contradiction, and too much devoted to cures, finding it a useless occupation to make him fly from Mount Atlas the notion of the Offspring of Fedon the fon of Miriam, since his descendents mentioned Genius x. are there called Mauri, Mouri or Mauritani. It is certain, that this region, as well as the others to the eastward of it, had many colonies planted in it by the Phoenicians. Procopius tells us, that in his time two pillars of white stone were to be seen there, with the following inscription in the Phoenician language and character, upon them: "We are the Canaanites, that fled from Jeshua the son of Nun, that notorious robber." Ibn Rachio, or Ibn Raquig, an African writer cited by Leo, together with Evagrius and Nicephorus Callistus, attest the same thing.

The Mauritians, according to Ptolemy, were Mauritania divide into several cantons or tribes. The Atlas were situated near the straits of Hercules, now the line of Gibraltar. The Sassisti, or Cosstii, occupied the coast of the Iberian sea. Under these two petty nations the Ptolemy, Veres, and Verica or Verica, were settled. The Salice, or Salissif, were situated lower, towards the ocean; and, still more to the south, the Volubii. The Aures and Heripidians possessed the eastern part of this country, which was terminated by the Oasruta. The Azarhacani or Fangacacani, Nertibii, Zagrenisi, Banibake, and Aeluantae, extended themselves from the southern foot of Ptolemy's Atlas Minor to his Atlas Major. Pliny mentions the Baniare, whose Father Hardouin takes to be Ptolemy's Banibake; and Mola the Atlantes, whom he represents as possessed of the western parts of this district.

The eldest prince of Mauritania mentioned in history is Neptune; and next to him were Atlas and Antaeus his two sons, both famous in the Grecian fables on account of their wars with Hercules. Antaeus, in his contention with that hero, seems to have behaved with great bravery and resolution. Having received large reinforcements of Libyan troops, he cut off great numbers of Hercules's men. But that celebrated commander, having at last intercepted a strong body of Libyans sent to the relief of Antaeus, gave him a total overthrow, wherein both he and the best part of his forces were put to the sword. This decisive action put Hercules in possession of Libya and Mauritania, and consequently of the riches of all those kingdoms. Hence came the fable, that Hercules, finding Antaeus, a giant of enormous size with whom he was engaged in single combat, to receive fresh strength as often as he touched his mother earth when thrown upon her, at last lifted him up in the air and squeezed him to death. Hence likewise may be deduced the fable intimating that Hercules took the globe from Atlas upon his own shoulders, overcame the dragon that guarded the orchards of the Hesperides, and made himself master of all the golden fruit there. Bochart thinks that the fable alluded chiefly to naval engagements, wherein Hercules, for the most part, was victorious: though Antaeus from time to time received succours by sea. But at last Hercules, coming up with one of his squadrons which had a strong reinforcement on board made himself master of it, and thus rendered Antaeus incapable for the future of making head against him. The same author likewise intimates, that the notion of Antaeus's gigantic stature prevailing for so many centuries amongst the Tingiarians, pointed out the size of the vellums of which his fleets and squadrons were composed. As for the golden apples so frequently mentioned by the old mythologists, they were the treasures that fell into Hercules's hands upon the defeat of Antaeus; the Greeks giving the oriental word mnet, richer, the signification affixed to their own term pomum, apples.

With regard to the age in which atlas and Antaeus lived, the most probable supposition seems to be that of Sir Isaac Newton. According to that illustrious author, Ammon the father of Scac was the first king of Libya, or that vast tract extending from the borders of Egypt to the Atlantic ocean: the con-
of whom the Mauritanians were a branch, were eminent for their shields, and the excellent use they made of them, as we learn from Homer, Xenophon, Herodotus, and Herodotus. Nay, Herodotus seems to intimate that the shield and helmet came from them to the Greeks. 5. Notwithstanding the fertility of their soil, the poorer part of the Mauritanians never took care to manure the ground, being strangers to the art of husbandry; but lived over the country in a wild savage manner, like the ancient Scythians or Arabs Scenins. They had tents, or mapalas, so extremely small, that they could scarce breathe in them. Their food was corn, heritage, &c. which they frequently did eat green, without any manner of preparation; being defirute of wine, oil, and all the elegancies as well as many necessaries of life. Their habit was the same both in summer and winter, consisting chiefly of an old tattered, though thick garment, and over it a coarse rough tunic; which answered probably to that of their neighbours the Numidians. Most of them lay every night upon the bare ground; though some of them firew their garments thereon, not unlike the present African Kabyles and Arabs, who, according to Dr Shaw, use their hykes for a bed and covering in the night. 6. If the most approved reading of Horace may be admitted, the Mauritanians shot poisoned arrows; which clearly intimates, that they had some skill in the art of preparing poisons, and were excellent dartmen. This last observation is countenanced by Herodian and Elian, who entirely come into it, affirming them to have been in such continual danger of being devoured by wild beasts, that they durst not flit out of their tents or mapalas without their darts. Such perpetual exercitium must render them exceedingly skilful in hurling that weapon. 7. The Mauritanians sacrificed human victims to their deities. The Phoenicians, Carthaginians, &c. did.

The country people were extremely rude and barbarous; but those inhabiting cities must undoubtedly have had at least some flattering in the literature of the several nations they deduced their origin from. That the Mauritanians had some knowledge in naval affairs seems probable, not only from the intercourse they had with the Phoenicians and Carthaginians, as well as the situation of their country; but likewise from Orphos, or Onomacritus, who affirms them to have made a settlement at the entrance into Colchis, to which place they came by sea. Magic, forcery, divination, &c. they appear to have applied themselves in very early times. Cicero and Pliny say, that Atlas was the inventor of astrology and the doctrine of the sphere, i.e. he first introduced them into Mauritania. This, according to Diodorus Siculus, gave rise to the fable of Atlas's bearing the heavens upon his shoulders. The same author relates, that Atlas instructed Hercules in the doctrine of the sphere and astrology, or rather astronomy, who afterwards brought thole sciences into Greece.

MAURITIA, the GINAGO, or maiden-hair tree: A genus of plants belonging to the natural order of Palmae. The calyx of the male is monophyllous; the corolla monopetalous; with six stamina. It is native of Japan, where it is also known by the names of GINAGO and ISE. It rises with a long, erect, thick, and branched stem, to the size of a walnut tree. The bark
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Mauritius. bark is aht-coloured, the wood brittle and smooth, the pith foott and fungouse. The leaves are large, expanded from a narrow bottom into the figure of a mitten-haired leaf, unequally parted, forked, without fibres or nerves; both surfaces having the same appearance, and supported upon foot-stocks, which are composed upon the upper surface and extended into the substance of the leaf. From the uppermost shoot hang the flowers in long catkins that are filled with the fertilizing powder; and to which succeeds the fruit, adhering to a thick, fliehy pedicle, which proceeds from the bottom of the leaves. This fruit is either exactly or nearly round, and of the appearance and fize of a damask plum. The substance surrounding the fruit is feedy, juicy, white, very harsh, and adheres so firmly to the inclosed nut, as not to be separated from it, except by pureraction. The nut, properly termed Cineva, resembles the pistachio nut, especially a Persian species named bergies piffai; but is almost double in fize, and of the figure of an apricot stone. The shell is somewhat white, woody, and brittle; and incloses a white loofe kernel, having the fecrets of an almond, along with a degree of harminets. These kernels taken after dinner are laid to promote digestion, and to give relief in fearts; whence they never fail to make part of the delft in great feasts and anniversary entertainments.—Many of these plants have been reared by Mr. James Gordon at his nursery near Mile-end. They feem to be very hardy, and thrive in Britain in the open air.

MAURITISS, or MAURICE, an island of Africa, about 400 miles call of Madagascar, lying in the latitude of 20 and 21 degrees south. In the beginning of the 16th century it was discovered by the Portuguese, who, knowing that Pliny and other ancient writers had mentioned the island of Cerne in these seas, took it fally for that of Mauritius; and accordingly we find it styled Cerne or Stave, in their maps; but, notwithstanding this, they did not think fit to settle it; and indeed their force was foon small, in comparison of the vaft dominions they grasped, that it was very execuable. However, according to their laudable cuftom, they put some hogs, goats, and other cattle upon it, that in cafe any of their ships either going to the Indies, or returning to Portugal, should be obliged to touch there, they might meet with refreshments. The Dutch, in the kind voyage they made to the East Indies under their admiral James Cornelius vanneck, came together with five ships on the 15th of September 1616, anchored in a commodious port, to which they gave the name of Warwick Haven; and gave a very good account of the place in their journals. Captain Samuel Caffeton, in the Pearl, an English East India ship, arrived there on the 27th of March 1619, and taking it to be an island undiscovered before, bestowed upon it the name of England's Forest, though others of his crew called it Pearl-Island; and in the account of their voyage, written by John Tatton the master of the ship, celebrated it as a place very convenient for shipping, either outward or homeward bound, to refresh at. This they sometimes accordingly did, and brought some cargoes of ebony and rich wood from thence, but without fixing any settlement.

At length, in 1638, the Dutch fettled themselves here, and it is highly remarkable, that at the very time they were employed in making their first settlement, the French sent a vessel, to take possession of it, who found the Dutch beforehand with them, and refused the affiance of an English Indian, wooding and watering in another port of the island, who very frankly offered it, to drive the Dutch from their half-settled posts. They continued for some time in quiet possession of the place they fortified in this island, to which they gave the name of Mauritius. But having engaged the French, who were settled on Madagascar, to steal 30 of the natives, and fell them for slaves, for the improvement of the Dutch settlements here, this proved the ruin of both colonies: for the negroes surprized and massacred the French in Madagascar; and the slaves in Mauritius fled into the centre of the island; from whence they so much and so incessantly molested those who had been formerly their masters, that they chose to quit a country where they could no longer remain in any tolerable degree of safety. The East India company, however, from motives of convenience, and a very imperfect notion of its value, disapproved this measure, and therefore ordered it to be reflected; which was accordingly done, and three forts erected at the principal havens. Things now went on somewhat better than they did before; but they were still very much disturbed by the revolted negroes in the heart of the isle, whom they could never subdue. One principal ufe that the company made of this place, was to fend thither state-prisoners, who, as they were not men of the best morals, quickly corrupted the rest of the inhabitants, and rendered them such a race of outrageous smugglers, the situation of the place concurring with their bad dispositions, that, after various ineffectual attempts made to reform them, orders at length were given to abandon Mauritius a second-time, which, after some delays, were put in execution in the year 1710.

Two years after this, the French took possession of it, and named it the île de France. This name has obtained among themselves, but the Europeans in general continue to call it Mauritius. It lies in S. Lat. 20. 15. E. Lon. 6. 15. The inconveniences arising from the want of a port at the island of Bourbon, induced the French to take possession of Mauritius, it having two very good harbours, to fortify which no expense has been spared. That on the north-west is called Fort-Louis, that on the south-east side of the island is called Port-Bourbon. The trade-wind from the south-east in these latitudes blows all the year round, excepting for a few days at the summer solstice, when it is interrupted by hard gales and hurricanes from the north. The case with which this wind enables ships to enter the port of Bourbon, caused the French, when they first took possession of this spot, to esteem it the best port in the island; but experience pointing out to them, that the same wind often rendered the passage out of the harbour so difficult, that a ship was sometimes obliged to wait a considerable time before the weather admitted of her putting to sea, this harbour is in a great measure abandoned; and the principal town and seat of government is now fixed at port Louis, which is nearly in the middle of the north side of the island, and its entrance is through a channel for, med by two shoals, which advance about two miles into
the sea. When a ship arrives opposite to this channel, the south-eaft wind hinders her from entering the port under sail, and the mast either warp in with cables or be towed in with boats. The necessity of this operation, joined to the extreme narrowness of the channel, which does not admit of two ships abreast of each other entering at the same time, is one of the best defences the harbour has against an attack by sea; for, from these obstacles, an enemy would find it a matter of the greatest difficulty to force the port; and in addition to this natural strength, they have built two forts and as many batteries, which are mounted with heavy cannon, and entirely command the approach to the harbour, would ships presume to force an entrance under sail. This port is capable of containing 100 sail of ships, and is well provided with every requisite for repairing and even building of ships. This port has proved of the greatest advantage to France in the fever. 111ars which have been carried on between Great Britain and her: and has proved of great utility to the French East India company’s commerce: for here their ships and crews were free to meet with all necessary refreshment after a long voyage. The port of Bourbon is also fortified: and an army landed here would find it an extreme difficult task to pass the mountains to the different parts of the island. There are several places between the north-east extremity and port Louis where boats may land, but all these are defended by batteries; and the country behind them is a continued thicket. The rest of the coast is inaccessible. In the north-eastern quarter is a plain extending about 10 miles from east to west, and in some places five miles inland from the northern coast. All the rest of the island is full of high and steep mountains, lying so near one another, and the intervals between them so narrow, that instead of valleys, they rather resemble the beds of torrents; and these are choked with huge fragments of rocks which have fallen from the steep sides of the impending mountains. On the summits of the mountains ice is frequently to be found, and they are covered with forests of ebony and other large trees. The ground they shelve in such a manner, that the various plants of various forts, from the common grass to the strongest thorn, and that in such profusion, that they form a thicket so closely interwoven that no progress can be made but by means of a hatchet. Notwithstanding these difficulties, plantations have been formed on these mountains, and very considerable progress has been made in the plains: but the productions, although mostly of the same kind, are not only in less quantity, but of an inferior quality to those produced at Bourbon island.

In a couple of years, however, this settlement cost so much, and was considered in every light worth far little, that it had been more than once under deliberation, whether, after the example of the Dutch, they should not leave it again to its old negro inhabitants; which sooner or later in all likelihood would have been its fate, if, in 1735, the famous M. de la Bourdonnais had not been sent thither, with the title of governor-general of the French islands.

He found this island in the worst state possible, thinly inhabited by a set of lazy people, who equally hated industry and peace, and who were continually flattering this man to his face, and obeying him wherever he went as far as they durst. He gave himself no trouble about this, having once found the means to make himself obeyed; he saw the vast importance of the island; he conceived that it might be set up to great advantage; and, without so much as expecting the thanks of those for whom he laboured, he began to execute this great design. His first step was to bring over black boys from Madagascar, whom he carefully trained up in good principles, and in continual exercise; by which he rendered them so good soldiers, that he very quickly obliged the Marones, or wild negroes, either to submit or to quit the island: he taught the planters to cultivate their lands to advantage; he, by an aqueduct, brought fresh water to the sea-side; and whereas they had not so much as a boat at his coming thither, he made a very fine dock, where he not only built sloops and larger vessels, but even a ship of the burden of 500 tons. However incredible it may seem, yet it is certainly fact, that in the space of five years he converted this country into a paradise, that had been a mere wilderness for 5000; and this in spite of the inhabitants, and of the company, who being originally prejudiced by them, behaved ill to him at his return. He soon made the cardinal de Fleury, however, sensible of the true state of things; and compelled the company to acknowledge, though they did not reward, his services. He afterwards turned into the Indies, and perfected the work he had begun, and to him it is owing that the isle of France was rendered one of the finest and most important spots upon the globe. Here no coffee is raised, but by the indefatigable industry of M. de Bourdonnais, sugar, indigo, pepper, and cotton (which are not at Bourbon), came to be cultivated with success. Since the departure of that most excellent governor; the plantations have been neglected, and are fallen off: but if a proper spirit of activity was raised among the inhabitants, they might soon be made to resume their flourishing appearance. Mines of iron have been discovered in the mountains near the great plain in the north-east part of the island; and these mountains affording in great abundance the necessary fuel, forges have been erected: but the iron produced is of a very inferior quality, it being brittle, and only fit for making cannon-balls and bomb-balls. Black cattle, sheep, and goats, are preserved with difficulty; the first generally die before they have been a year in the island, and this occasions frequent importations of them from Madagascar and other parts. Common domestic poultry breed in great plenty; and, with fish and turtle, furnish a great part of the food of the European inhabitants.

The approach to the island is extremely dangerous; it being surrounded with ledges of rocks, and many of them covered by the sea. The shore abounds with coral and shells. This island is said to contain 90 rivers: some are considerable streams, and most of them have their sources from lakes, of which there are several in the middle part of the island. The rivers afford plenty of various kinds of fish, particularly eels. These are of an enormous size, some having been found that were six feet long, and six inches in circumference, and so extremely voracious, that it is dangerous to bathe
MAX

MAURUS, and loft.

Here is sufficient to keep him calm.

The place abounds with insects, which are very troublesome; but there are no serpents. It has been discovered, that off Port Louis the south-east wind generally blows with least strength about noon; and it also happens, on four or five days, at intervals, in the course of a month, that early in the morning the wind ceases in the northern part of the island for an hour or two, when a breeze rises, although but faintly, from the north-west; during which, a ship stationed at the entrance of the channel to avoid hercelf of this breeze, may enter the harbor and attack the forts.

MAURUS, one of the Society-Islands in the South Sea. It is a small island, entirely surrounded with a ridge of rocks, and without any harbour for shipping. It is inhabited; and its productions are the same with those of the neighboring islands. A high round hill rises in the middle of it, which may be seen at the distance of ten or 12 leagues.

MAUSOLEUM, a magnificent tomb or funeral monument. The word is derived from Mausolus, king of Caria, to whom Artemisia his widow erected a most flately monument, esteemed one of the wonders of the world, and called it, from his own name, Mausoleum.

St MAVES, a town of Cornwall, in England, seated on the east side of Falmouth haven, in W. Long. 5. 26. N. Lat. 50. 30. Though but a hamlet of the parish of St Jul, two miles off, without a minister, or either church, or chapel, or meeting-house, it has sent members to parliament ever since 1562, who are returned by its mayor or portrevere. It consists but of one street, under a hill, and fronting the sea, and its inhabitants subsist purely by fishing. King Henry VIII. built a castle here, over against Pendennis, for the better security of Falmouth haven. It has a governor, a deputy, and two gunners, with a platform of guns. Here is a fair the Friday after St Luke's day.

MAXENTIUS (Marcus Aurelius Valerius), a son of the emperor Maximianus Hercules, was, by the voluntary abdication of Diocletian, and of his father, raised to the empire, A. D. 306. He afterwards incited his father to re-assume his imperial authority; and in a perfidious manner destroyed Severus, who had delivered himself into his hands, and relied upon his honour for the safety of his life. His victories and successes were impeded by Galerius Maximianus, who opposed him with a powerful force. The defeat and voluntary death of Galerius soon restored peace to Italy; and Maxentius passed into Africa, where he rendered himself odious by his cruelty and oppression. He soon after returned to Rome, and was informed that Constantine was come to dethrone him. He gave his adversary battle near Rome, and, after he had lost the victory, he fled back to the city. The bridge over which he crossed the Tiber was in a decayed situation, and he fell into the river, and was drowned, A. D. 312. The cowardice and luxury of Maxentius were as conspicuous as his cruelties. He oppressed his subjects with heavy taxes, to gratify the cravings of his pleasures, or the avarice of his favourites. He was oubeathed in his manners, and neither virtue nor innocence were safe whenever he was inclined to voluptuous pursuits. His body was defecrated, and unwholesome. To visit a pleasure ground, or to exercise himself under a marble portico, or walk on a shady terrace, was to him a Herculean labour, which required the greatest exertions of strength and resolution.

MAXILLA, the jaw. See Anatomy, &c.

MAXIM, an established proposition or principle; in which sense it denotes much the same with axiom.

MAXIMILIAN I, emperor of Germany, signified himself against the French while he was king of the Romans, and after he was emperor entered into the army of Henry VIII. of England as a volunteer against that nation: he was a procélor of learned men, and abolished an inquisitorial tribunal, styled Judicium sacrum Westphalise: he composed some poems, and the memoirs of his own life. He died in 1519, aged 60.

MAXIMUM, in mathematics, denotes the greatest quantity attainable in any given case.

If a quantity conceived to be degenerated by motion increases or decreases till it arrives at a certain magnitude or position, and then, on the contrary, grows greater or less, and it be required to determine the said magnitude or position, the question is called a problem de maximis et minimis.

MAXIMUS, a celebrated Cynic philosopher, and magician of Ephesus. He instructed the emperor Julian in magic; and, according to the opinion of some historians, it was in the conversation and company of Maximus that the apostacy of Julian originated. The emperor not only visited the philosopher, but he even submitted his writings to his inspection and censure. Maximus refused to live in the court of Julian, and the emperor, not dissatisfied with the refusal, appointed him high pontiff in the province of Lydia, an office which he discharged with the greatest moderation and justice. When Julian went into the east, the philosopher promised him success, and even said that his conquests would be more numerous and extensive than those of the son of Philip. He persuaded his imperial pupil, that, according to the doctrine of Metempychothis, his body was animated by the soul which once animated the hero whose greatness and victories he was going to eclipse. After the death of Julian, Maximus was almost sacrificed to the fury of the soldiers; but the interposition of his friends saved his life, and he retired to Constantinople. He was soon after accused of magical practices, before the emperor Valens, and beheaded at Ephesias, A. D. 366. He wrote some philosophical and rhetorical treatises, some of which were dedicated to Julian. They are all now lost.

MAXIMUS OF TYRE, a Platonic philosopher, went to Rome in 156, and acquired such reputation there, that the emperor Marcus Aurelius became his scholar, and gave him frequent proofs of his esteem. This philosopher is thought to have lived till the reign of the emperor Commodus. There are still extant 41 of his dissertations; a good edition of which was printed by Daniel.
MAXIMUS MARIUS. See MARINUS.

MAXIMUS (St.), an abbot and confessor of the 7th century, was of a noble family of Constantinople, and distinguished himself by his zeal against the Monothelites, for which he was thrown into prison, and died there on the 13th of August 662. He wrote a Commentary on the books attributed to Dionysius the Areopagite, and several other works, of which an edition has been published by father Combes.

MAY, the fifth month in the year, reckoning from our first, or January; and the third, counting the year to begin with March, as the Romans anciently did. It was called Maius by Romulus, in respect to the senators and nobles of his city, who were named maiores; as the following month was called Junius, in honour of the youth of Rome, in honorem juvenum, who served him in the war; though some will have it to have been thus called from Maia, the mother of Mercury, to whom they offered sacrifice on the first day of it; and Pappas derives it from Maximus, co quid tunc terra modata. In this month the sun enters Gemini, and the plants of the earth in general begin to flower. The mouth of May has ever been esteemed favourable to love; and yet the ancients, as well as many of the moderns, look on it as an unhappy month for marriage. The original reason may perhaps be referred to the feast of the Lemures, which was held in it. Ovid alludes to this in the fifth of his Fasti, when he says,

Nec viridae tarsi cadem, nec virginiis apta
Tempora; quaes nuptis, non diuturna sua.
Hac quoque de causa, ficta proverbia tautum,
Mense malum Maio nuder vinis alt.

MAR. See MAR.

MAY-Duke. See MARY.

MAY (the use of), a small island at the mouth of the Frith of Forth, in Scotland, about a mile and an half in circumference, and seven miles from the coast of Fife, almost opposite to the rock called the Bass. It formerly belonged to the priory of Pittenweem; and was dedicated to St Adrian, supposed to have been martyred in this place by the Danes; and, in times of Popish superstitition, barren women used to come and worship at his shrine, in hopes of being cured of their sterility. Here is a tower and light-house built by Mr Cunningham of Barns, to whom king Charles I. granted the island in fee, with power to exact two-pence per ton from every ship that passes, for the maintenance of a light-house. In the middle of it there is a fresh-water spring, and a small lake. The soil produces pasturage for 100 sheep and 20 black cattle. On the west side the steep rocks render it inaccessible; but to the east there are four landing-places and good riding. It was here that the French squadron, having the chevalier de St George on board, anchored in the year 1708, when the vigilance of Sir George Byng obliged him to relinquish his design, and bear away for Dunkirk. The shores all round the island abound with fish, and the cliffs with water-fowl.

MAY (Thomas), an eminent English poet and historian in the 17th century, was born of an ancient but decayed family in Sussex, educated at Cambridge, and afterwards removed to London, where he contracted a friendship with several eminent persons, and particularly with Endymion Porter, Esq. one of the gentlemen of the bed-chamber to king Charles I. While he resided at court, he wrote the five plays now extant under his name. In 1622, he published a translation of Virgil's Georgics, with annotations; and in 1635 a poem on king Edward III. and a translation of Lucan's Pharsalia, which poem he discontinued down to the death of Julius Caesar, both in Latin and English verse. Upon the breaking out of the civil wars he adhered to the parliament; and in 1647, he published, "The history of the parliament of England, which began November the third MDCLXV. With a short and accedent view of some precedent years." In 1649, he published, Historiae parliamenti Angliae Breviarium, in three parts; which he afterwards translated into English. He wrote the History of Henry II. in English verse. He died in 1652. He went well to rest over-night, after a cheerful bottle as usual, and died in his sleep before morning; upon which his death was imputed to his lying his night-cap too close under his fat cheeks and chin, which caused his suffocation; but the facetious Andrew Marvel has written a poem of 100 lines, to make him a martyr of Bacchus, and die by the force of good wine. He was interred near Camden, in Westminster-Abbey; which caused Dr Fuller to say, that, "if he were a biased and partial writer, yet he lieth buried near a good and true historian indeed." Soon after the reformation, his body, with those of several others, was dug up, and buried in a pit in St Margaret's church-yard; and his monument, which was erected by the appointment of Parliament, was taken down and thrown aside.

MAYER (Tobias), one of the greatest astronomers and mechanicks this century has produced, was born at Mapach, in the duchy of Wirtemburg 1723. He taught himself mathematics, and at the age of fourteen designed machines and instruments with the greatest dexterity and judgment. These pursuits did not hinder him from cultivating the belles lettres. He acquired the Latin tongue, and wrote it with elegance. In 1750, the university of Gottingen chose him for their mathematical professor; and every year of his short life was thenceforward marked with some considerable discoveries in geometry and astronomy. He published several works in this way, which are all reckoned excellent; and some are inserted in the second volume of the "Memoirs of the university of Gottingen." His labours seem to have exhausted him; for he died worn out in 1762.

MAYERNE (Sir Theodore de), baron of Aubonne, was son of Lewis de Mayerne, the celebrated author of "The general history of Spain, and of the Monarchie aristo-democratique," dedicated to the states-general. He was born in 1573, and had for his godfather Theodore Beza. He studied physic at Montpelier, and was made physician in ordinary to Henry IV., who promised to do great things for him provided he would change his religion. James I. of England invited him over, and made him first physician to himself and his queen, in which office he served the whole royal family to the time of his death in 1655.
MAY [ 699 ]

MAYNWARING (Arthur), an eminent political writer in the beginning of the 18th century, held several years at Oxford, and then went to Chehire, where he lived some time with his uncle Mr Francis Channonley, a very honest gentleman, but extremely averse to the government. He was chief to whom he refused the oaths. Here he prosecuted his studies in polite literature with great vigour; and coming up to London, applied to the study of the law. He was hitherto very zealous in anti-revolutionary principles, and wrote several pieces in favour of king James II.; but upon being introduced to the duke of Somerset and the earls of Dorset and Burlington, began to entertain very different notions in politics. His father left him an estate of near 800 l. a-year, but to incumber, that the interest money amounted to almost as much as the revenue. Upon the conclusion of the peace he went to Paris, where he became acquainted with Mr Boileau. After his return he was made one of the commissioners of the customs, in which post he distinguished himself by his skill and industry. He was a member of the kit-cat-club, and was looked upon as one of the chief supporters of it by his pleasantry and wit. In the beginning of queen Anne's reign, the lord treasurer Godolphin engaged Mr Done to quit the office of auditor of the imprests, and made Maynwaring a present of a patent for that office worth about 2000 l. a-year in a time of business. He had a considerable share in the Medley; and was author of several other pieces. The Examiner, his antagonist in politics, allowed that he wrote with tolerable spirit and in a masterly style. Sir Richard Steele dedicated the first volume of the Tat'ter to him.

MAYO, one of the Cape de Verd islands, lying in the Atlantic ocean, near 300 miles from Cape Verd in Africa, about 17 miles in circumference. The soil in general is very barren, and water scarce; however, they have some corn, yams, potatoes, and plantains, with plenty of beesves, goats, and calves. What trees there are, grow on the sides of the hills, and they have some figs and water-melons. The sea round about the island abounds with fish. The commodity is fish, with which many English ships are loaded in the summer-time. The principal town is Pinofa, inhabited by negroes, who speak the Portuguese language, and are stout, lusty, and sly; they are not above 200 in number, and many of them go quite naked. W. Long. 21. 25. N. Lat. 15. 5.

MAYO, a county of Ireland, in the province of Connacht, having Sligo and the fea on the north, Roofcommon on the south, Leitrim and Roofcommon on the east, and the Atlantic ocean on the west. It contains 724,640 Irish plantation acres, 73 parishes, 9 baronies, and one borough; and sends four members to parliament. It gives title of earl to the family of Bourke. This county takes its name from an ancient city, built in 664: the ruins of the cathedral, and some traces of the stone walls which encompassed the city, yet remain on the plains of Mayo. It was a university, founded for the education of such of the Saxon youths as were converted to the Christian faith: it was situated a little to the south of Lough Conn; and is to this day frequently called Mayo of the Saxons, being celebrated for giving education to Alfred the great king of England. As this town has gone
MAY [700] MAZ

Mayor.

The county by the sea is mountainous; but inland has good pastures, lakes, and rivers. It is about 57 miles long, and 48 broad. Caffelbar is the alizze town. — MAYOR, the chief magistrate of a city or town, chosen annually out of the aldermen. The word, alderman, is of note in England but have had a mayor appointed since of Duguela. Fur and not from the Latin. King's oaths of supremacy, &c. is to hold a marriage treaty betwixt the king and the man of mankind, and his being seldomed to secures the laws, rights, franchises, and customs and of a corporation, who are compelled to choose a mayor, by a writ of mandamus out of Antonio, and Louis XIII. who procured him a bill of estate. Where the mayor princes at war in Italy; by which means he was taken with his executors of his will; and during the minority of his son. To the lord mayor also called the chamberlain's court, where every thing relating to the rents and revenues of the city, as also the affairs of servants, &c. are transacted. Lastly, to the lord mayor belong the courts of coroner and of elecator; another court is the confirmation of the river. MAZA, among the Athenians, was a sort of cake made of flour boiled with water and oil, and fed, as the common fare, before such as were entertained at the public houses. It is situated near the sea. W. Long. 7. 4. N. Lat. 5. 5.

MAZARA, an ancient town of Sicily, and capital of a considerable valley of the same name, which is very fertile, and watered with several rivers. The town is a bishop's see, and has a good harbour; is seated on the sea coast, in E. Long. 12. 39. N. Lat. 37. 42.

MAZARINE (Julius), a famous cardinal and prime minister of France, was born at Pichina in the province of Abruzzo, in Naples, in 1602. After having finished his studies in Italy and Spain, he entered into the service of cardinal Sachets, and became well skilled in politics, and in the interests of the princes at war in Italy; by which means he was enabled to bring affairs to an accommodation, and the peace of Queiras was shortly concluded. Cardinal Richelieu being taken with his conduct, did from thenceforward highly esteem him: as did also cardinal Antonio, and Louis XIII. who procured him a cardinal's hat in 1641. Richelieu made him one of the executors of his will; and during the minority of Louis XIV. he had the charge of affairs. At last he became the envy of the nobility, which occasioned a civil war whereupon Mazarine was forced to retire, a price was set on his head, and his library sold. Notwithstanding he afterwards returned to the court in more glory than ever; concluded a peace with Spain, and a marriage treaty between the king and the infanta. This treaty of peace passed for the masterpiece of cardinal de Mazarine's politics, and procured him the French king's most intimate confidence: but at last his continual application to business threw him into a disease, of which he died at Vincennes in 1644. — Cardinal Mazarine was of a mild and affable temper. One of his greatest talents was his knowing mankind, and his being able to adapt himself, and to assume a character conformable to the circumstances of affairs. He preserved at one and the same time the bishopric of Metz, and the abbey of St Arnauld, St Clement, and St Vincent, in the same city; that of St Dennis, Clagny, and Vicar, of Marselles; of St Michael at Soissons, and a great number of others. He founded Mazarine-college at Paris, which is also called the college of the four nations. There has been published a collection of his letters, the most copious
Mazzuoli, a wholesome, agreeable liquor, prepared of honey and water.

MAZZUOLI. See Parmigianino.

MEAD, a wholesome, agreeable liquor, prepared of honey and water.

One of the best methods of preparing mead is as follows: Into twelve gallons of water, set the whites of six eggs; mix these well together, and to the mixture adding twenty pounds of honey. Let the liquor boil an hour, and when boiled add cinnamon, ginger, cloves, mace, and a rosemary. As soon as it is cold, put a spoonful of yeast to it, and turn it up, keeping the vessel filled as it works; when it has done working, stop it up close; and, when fine, bottle it off for use.

Thorley says, that mead not inferior to the best of foreign wines may be made in the following manner: Put three pounds of the finest honey to one gallon of water, and two lemon peels to each gallon; boil it half an hour, well scummed; then put in, while boiling, lemon peel: work it with yeast; then put it in your vessel with the peel, to stand five or six months, and bottle it off for use. If it is to be kept for several years, put four pounds to a gallon of water.

The author of the Dictionary of Chemistry directs to choose the whitest, purest, and best-taifed honey, and to put it into a kettle with more than its weight of water: a part of this liquor must be evaporated by boiling, and the liquor scummed, till its confitence is fuch, that a fresh egg shall be supported on its surface without finking more than half its thickness into the liquor; then the liquor is to be strained, and poured through a funnel into a barrel; this barrel, which ought to be nearly full, must be exposed to a heat as equal as poifible, from 20 to 27 or 28 degrees of Mr Resumer's thermometer, taking care that the bung-hole be kept as fmall as poifible, from 0 to 10 degrees, and that it works; when it has done working, replace the bung with its account of poifons, procuted by the great Dr Beechave, who had been his fellow-student at Leyden: they communicated to each other their obfervations and projects, and never loved each other the lefs for being of different fermentations. In the mean time, intent as Dr Mead was on the duties of his profeflion, he had a greatnefs of mind that extended itsfelf to all kinds of literature, which he furprised neither pains nor money to promote. He caufed the beautiful and splendid edition of Thuanus's hisfory to be published in 1713, in seven volumes folio: and by his interpoftion and difcretion, Mr Sutton's invention of drawing foul air from flips and other clofe places was carried into execution, and the flips in his majesty's navy provided with this ufeful machine.

MEAD (Dr Richard), a celebrated English physician, was born at Stepney near London, where his father, the Reverend Mr Matthew Mead, had been one of the two minif ters of that parish; but in 1663 he was ejected for nonconformity, but continued to preach at Stepney till his death. As Mr Mead had a handsom e fortune, he bestowed, a liberal education, upon thirteen children, of whom Richard was the eleventh; and for that purpofe kept a private tutor in his hoife, who taught him the Latin tongue. At the age of ten years he was sent to Utrecht, where he fludied three years under the famous Gravius; and then choosing the profeffion of phyfic, he went to Leyden, where he attended the lec tures of the famous Pitacini on the theory and praftice of medicine, and Hermon's botanical courses. Having also spent three years in these studies, he went with his brother and two other gentlemen to visit Italy, and at Padua took his degree of doctor of phyfic and phyfic in 1695. Afterwards he spent fome time at Naples and at Rome; and returning home the next year, settled at Stepney, where he married, and prafticed phyfic, with a fuccefs that laid the foundation of his future greatnefs.

In 1703, Dr Mead having communicated to the Royal Society an analyfis of Dr Bonomo's discoveries relating to the cutaneous worms that generate the itch, which they inferred in the Philosophical Transactions; this, with his account of poifons, procured him a place in the Royal Society, of which Sir Hafec Newton was then precent. The fame year he was elected phyfician of St Thomas's hospital, and was alfo employed by the furgew to read anatomical lectures in the hall, which obliged him to remove into the city. In 1707 his Paduan diploma for doctor of phyfic was confirmed by the university of Oxford; and being patronized by Dr Radcliffe, on the death of that famous phyfician he succeeded him in his hoife at Bloomf bury-square, and in the great part of his benefices. In 1672 he was made phyfician to King George II. whom he had alfo served in that capacity while he was prince of Wales; and he had afterwards the pleasure of feeing his two sons-in-law, Dr Nichols and Dr Wilmot, his coadjutors in that eminent fation.

Dr Mead was not more to be admired for the qua lities of the head than he was to be loved for thefhe of his heart. Though he was himself a hearty whig, yet uninfluenced by party-principles, he was a friend to all men of merit, by whatever denomination they might happen to be diftinguifhed. Thus he was intimate with Garth, with Arbutnt, and with Friend; and long kept up a confant correffpondence with the great Boerhaave, who had been his fellow-student at Ley den: they communicated to each other their ob fervations and projects, and never loved each other the lefs for being of different fermentations. In the mean time, intent as Dr Mead was on the duties of his profeflion, he had a greatnefs of mind that extended itsfelf to all kinds of literature, which he furprised neither pains nor money to promote. He caufed the beautiful and splendid edition of Thuanus's hisfory to be published in 1713, in seven volumes folio: and by his interpoftion and difcretion, Mr Sutton's invention of drawing foul air from flips and other clofe places was carried into execution, and the flips in his majesty's navy provided with this ufeful machine. Nothing pleafed him more than to call hidden talents into light; to give encouragement to the greatest projects, and to fee them executed under his own eye. During the half a century he was at the head of his benefices, which brought him one year above seven thoufand pounds, and for several years between five and fix thoufand: yet clergymen, and in general all men of learning, were open to his advice. His library con fisted of 10,000 volumes, of which his Latin, Greek, and oriental manuscripts, made no inconfiderable part. He had a gallery for his pictures and antiques, which coft him great sums. His reputation, not only as a
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physician, but as a scholar, was universally eftablifhed, that he corresponded with all the principal literary people in Europe: even the king of Naples sent to defire a complete collection of his works; and in return, made him a present of the two first volumes of Signior Bajardi, which may be confidered as an introduction to the collection of the antiquities of Herculanum. At the fame time that prince invited him to his palace, that he might have an opportunity of fhowing that thefe valuable monuments of antiquity: and nothing but his great age prevented his undertaking a journey fo fuitable to his tale. No foreigner or learning ever came to London without being introduced to Dr. Mead; and on these occasions his table was always open, and the magnificence of princes was united with the pleasures of philosophers. It was principally to him that the several counties of England and the colonies abroad applied for the choice of their physicians, and he was likewife consulted by foreign physicians from Russia, Prufia, Denmark, &c. He wrote besides the above works, 1. A Treatife on the Scurvy. 2. De variolis et morbilis differentiis. 3. Medicina fcura: fusc de Morbis insigniteribus, qui in Bibliotheca medicorum. 4. Monita et Praecepts medici. 5. A Discourse concerning pelliferous contagion, and the methods to be used to prevent it. The works he wrote and published in Latin were translated into English, under the doctor's inspection, by Thomas Stack, M. D. and F. R. S.

This great physician, naturalift, and antiquarian, died on the 16th of February 1754.

MEADOW, in its general signification, means pasture or grafs-land, annually mown for hay: but it is more particularly applied to lands that are as to be too moist for cattle to graze upon them in winter without spoiling the fward.

An improvement in agriculture by watering of meadows has of late come into much ufe, and been found of very considerable importance. In the Monthly Review for October 1788, the editors acknowledge the favour of a correspondent, who informed them, that watering of meadows was praclifed during the reigns of Queen Elizabeth and James I. A book was written upon the fubjeét by one Rowland Vaughan, who seems to have been the inventor of this art, and who praclifed it on a very extensive plan in the Golden Valley in Herefordshire. Till this note to the Reviewers appeared, the inhabitants of a village called South-Cerney in Gloucefterhire had assumed the honour of the invention to themselves, as we are informed in a treatife upon the fubjeét by the reverend Mr Wright curate of the place. According to a received tradition in that village, watering of meadows has been praclifed there for about a century, and was introduced by one Welsho, a wealthy farmer in South-Cerney. His first experiment was by cutting a large ditch in the middle of his ground, from which he threw the water over some parts, and allowed it to fangrate in others: but finding this not to anfwcr his expectations, he improved his method by cutting drains and filling up the hollows; and thus he proceeded fo well, that his neighbours, who at first had called him a madman, began to change their opinion, and began to imitate his example.

The advantages which attend the watering of meadows are many and great; not only as excellent crops of grafs are thus raised, but as they appear fo early, that they are of infinite service to the farmers for food to their cattle in the spring before the natural grafs rife. By watering we have plenty of grafs in the beginning of March, and even earlier when the feafon is mild. The good effeets of this kind of grafs upon all sorts of cattle are likewise confiderable, especially upon fuch as have been hardly wittered; and Mr Wright informs us, that the farmers in his neighbourhood, by means of watering their lands, are enabled to begin the making of cheese at least a month sooner than their neighbours who have not the fame advantage. Grafs raised by watering is found to be admirable for the nurture of lambs; not only those designed for fattening, but fuch as are to be kept for fowes: For if lambs when very young are stopped and fluffed in their growth, they not only become contrived for life themselves, but in some measure communicate the fame diminutive fize to their young. The beft remedy for preventing this evil is the spring feed from watered meadows; and Mr Wright is of opinion, that if the young of all kinds of farmer's flock were immediately encouraged by plenty of food, and kept continually in a growing flate, there would in a few years be a notable change both in the fize and shape of cattle in general. Such indeed is the forwardnefs of grafs from watered meadows, that the feed between March and May is worth a guinea per acre; and in June an acre will yield two tons of hay, and the after-math is always worth twenty flillings; and nearly the fame quantity is constantly obtained whether the fummer be dry or wet. In dry fummers also, fuch farmers as water their meadows have an opportunity of felling their hay almoft at any price to their neighbours.

Land treated in this manner is continually improving; land ceafing in quality, even though it be mown every year: fteady in the herbage, if coarse at first, becomes finer; the soil, proves by if damp, becomes found; the depth of its mould is augmented, and its quality meliorated every year.

"To thefe advantages (fays Mr Bofwell in his treatife upon this fubjeét) another may be addreffed to the gentleman who wishes to improve his eflate, and who benevolent heart prompts him to extend a charitable hand to the relief of the indiftruous poor, and not to idlenefs and vice: almoft the whole of the expense in this mode of cultivation is the actual manual labour of a clafs of people who have no genius to employ their bodily strength otherwise for their own fupport and that of their families; consequently, when viewed in this light, the expence can be but comparatively small, the improvement great and valuable."

As a proof of the above doctrine, Mr Wright ad-
duces an infance of one year's produce of a meadow in his neighbourhood. It had been watered longer than the eldelf person in the neighbourhood could remem-
ber; but was by no means the beft meadow upon the stream, nor was the preceding winter favourable for watering. It contains fix acres and an half. The spring feed was let for seven guineas, and supported near 200 sheep from the 1st of March till the beginning of May: the hay being fold for 30 guineas, and the after-math for fix. Another and still more remarkable proof of the effe-
cacy of watering, is that two of the most skilled workmen of that place were fent to lay out a meadow of seven acres, the whole crop of which was that year fold for two
The practice of watering ought to be more generally extended.

Meadow. two pounds. Though it was thought by many impossible to throw the water over it, yet the skill of the workmen soon overcome all difficulties; and ever since that time the meadow has been let at the rent of three pounds per acre. From manifold experience, our author informs us, that the people in that part of the country are so much attached to the practice of watering, that they never suffer the smallest spring or rivulet to be unemployed. Even those temporary floods occasioned by sudden showers are received into proper ditches, and spread equally over the lands until its fertilizing property be totally exhausted. "Necessity (says he) indeed compels us to make the most of every drop; for we have near 300 acres in this parish, that will all, if possible, be watered; and the stream that affords the water seldom exceeds five yards in breadth and one in depth; therefore we may say, that a scanty water is almost as much dreaded by us as by the celebrated inhabitants of the banks of the Nile."

Considering the great advantages to be derived from the practice of watering meadows, and the many undoubted testimonies in its favor, Mr. Wright expresses his Surprize that it has not come into more general use, as there is not a stream of water upon which a mill can be erected but what may be made subservient to the enriching of some land, perhaps to a great quantity. "I am confident (says he), that there are in each county of England and Wales 2000 acres upon an average which might be thus treated, and every acre increased at least one pound in annual value. The general adoption therefore of watering is capable of being made a national advantage of more than 100,000 per annum, besides the great improvement of other land arising from the produce of the meadows and the employment of the industrious poor. Such an improvement, one would think, is not unworthy of public notice; but if I had doubled the sum, I believe I should not have exceeded the truth, though I might have gone beyond the bounds of general creditibility. In this one parish where I reside there are about 2000 acres now watered; and it may be easily proved that the proprietors of the land reap from thence 100 yearly profit."

In Mr. Bofwell's treatise upon this subject, published in 1790, the author complains of the neglect of the practice of improving the wet, boggy, rocky lands, which lie at the banks of rivers, and might be meliorated at a very small expense, when much larger sums are expended in the improvement of barren uplands and large tracts of heath in various parts of the kingdom, and he complains likewise of the little information that is to be had in books concerning the method of performing this operation. The only author from whom he acknowledges to have received any information is Blyth; and even his method of watering is very different from that practiced in modern times; for which reason he proposes to furnish an original treatise upon the subject; and of this we shall now give the improvement by watering will be very great, and the expense moderate. On level lands the water runs but slowly, which is also the case with large rivers; and therefore only a small quantity of ground can be overflowed by them in comparison of what can be done in other cases; but the water of large rivers is generally possessed of more fertilizing properties than that of rivulets. In many cases, however, the rivers are navigable, or have mills upon them; both of which are strong objections to the perfect improvement of lands adjacent to them. From these considerations, our author concludes, that the watering of lands may be performed in the best and least expensive manner by small rivulets and springs.

There are three kinds of soils commonly found near the banks of rivers and rivulets, the melioration of which may be attempted by watering. 1. A gravelly or found warm firm soil, or a mixture of the two together. This receives an almost instantaneous improvement; and the faster the water runs over it the better. 2. Boggy, miry, and rally soils, which are always found by the banks of rivers where the land is nearly level. These allo are greatly improved by watering; perhaps equally so with those already described, if we compare the value of both in their unimproved state, this kind of ground being scarce worthy any thing in its unimproved state. By proper watering, however, it may be made to produce large crops of hay, by which horned cattle may be kept through the winter and greatly forwarded; though in its uncultivated state, it would scarce produce anything to maintain fock in the winter, and very little even in summer. Much more skill, as well as expense, however, is requisite to bring this kind of land into culture than the former. 3. The soils most difficult to be improved are strong, wet, and clay soils; and this difficulty is occasioned both by their being commonly on a dead level, which will not admit of the water running over them; and by their tenacity, which will not admit of draining. Even when the utmost care is taken, unless a strong body of water is thrown over them, and that from a river the water of which has a very fertilizing property, little advantage will be gained; but wherever such advantages can be had in the winter, and a warm spring succeeds, these lands will produce very large crops of grass.

The advantage of using springs and rivulets for watering instead of large rivers is, that the expense of raising wares across them will not be great; nor are they liable to the other objections which attend the use of large rivers. When they run through a cultivated country also, the land floods occasioned by violent rains frequently bring with them such quantities of manure as contribute greatly to fertilize the lands, and which are totally lost where the practice of watering is not in use.

Springs may be useful to the coarse lands that lie near them, provided the water can be had in sufficient quantity to overflow the lands. * By Springs (says our author), are not here meant such as rise out of poor heath and boggy lands (for the water rising from them is generally too small in quantity, and always so very lean and hungry in quality, that little if any advantage can be derived from it); but rather the head of rivulets and brooks rising out of a chalky and gravelly
The length and breadth are various as circumstances determine.

4. A **Carriage** is made of timber or of brick. If of timber, oak is the best; if of brick, an arch ought to be thrown over the stream that runs under it, and the sides bricked up: but when made of timber, which is the most common material, it is constructed with a bottom and sides as wide and high as the main in which it lies. It must be made very strong, close, and well-jointed. Its use is to convey the water in one main over another, which runs at right angles to it; the depth and breadth are the same with those of the main to which it belongs; and the length is determined by that which it crosses. The carriage is the most expensive instrument belonging to watering.

5. A **Drain-Sluice**, or **Drain-Trunk**, is always placed in the lower part of some main as near to the head as a drain can be found; that is, situated low enough to draw the main, &c. It is made of timber, of a square figure like a trunk, only much smaller. It is placed with its mouth at the bottom of the main, and let down into the bank; and from its other end a drain is cut to communicate with some trench drain that is nearest. The dimensions are various, and determined by circumstances. The use of it is, when the water is turned some other way, to convey the leaking water that oozes through the sluices, &c. into the drain, that otherwise would run down into the tails of those trenches which lie lowest, and there poison and rot the ground, and probably contribute not a little to the making it more unfound for sheep. This operation is of the utmost consequence in watering; for if the water be not thoroughly drained off the land, the soil is rotted; and when the hay comes to be removed, the wheels of the carriage sink, the horses are mired, and the whole load sometimes sticks fast for hours together. On the other hand, when the drain-trunks are properly placed, the ground becomes firm and dry, and the hay is speedily and easily removed.

6. **Hatches** are best made of oak, elm, or deal; the use of them is to fit the openings of wares, trunks, or sluices; and to keep back the water when necessary, from passing one way, to turn it another. They ought to be made to fit as close as possible. When hatches belong to wares that are erected across large streams, or where the streams swell quickly with heavy rains, when the hatches are in their place to water the meadows; they are sometimes made so, that a foot or more of the upper part can be taken off, so that vent may be given to the superfluous water, and yet enough retained for the purpose of watering the meadows. In this case, they are called **food-hatches**; but Mr Boswell entirely disapproves of this construction, and recommends them to be made entire, though they should be ever so heavy, and require the assistance of a lever to raise them up. For when the water is very high, and the hatches are suddenly drawn up, the water falls with great force upon the bed of the ware, and in time greatly injures it; but when the whole hatch is drawn up a little way, the water runs off at the bottom, and does no injury.

3. A **Head-Main**, is a ditch drawn from the river, rivulet, &c. to convey the water out of its usual current,
Meadow to water the lands laid out for that purpose, by means of lefser mains and trenches. The head-main is made of various dimensions according to the quantity of land to be watered, the length or defect of it, &c. Smaller mains are frequently taken out of the head one; and the only difference is in point of size, the secondary mains being much smaller than the other. They are generally cut at right angles, or nearly so with the other, though not invariably. The use of the mains, whether great or small, is to feed the trenches with water, which branch out into all parts of the meadow, and convey the water to float the land. By some, thefe smaller mains are improperly called Carriages.

9. A Trench is a small ditch made to convey the water out of the mains for the immediate purpose of watering the land. It ought always to be drawn in a straight line from angle to angle, with as few turnings as possible. It is never deep, but the width is in proportion to the length it runs, and the breadth of the plane between that and the trench-drain. The breadth tapers gradually to the lower end.

10. A Trench-Drain is always cut parallel to the trench, and as deep as the tail-drain water will admit, when necessary. It ought always, if possible, to be cut down to a furthun of land, gravel, or clay. If in the latter a spade's depth into it will be of great advantage. The use of it is to carry away the water immediately after it has run over the panes from the trench. It need not be drawn up to the head of the land by five, six, or more yards, according to the nature of the foil. Its form is directly the reverse of the trench, being narrower at the head, and growing gradually wider and wider until it empties itself into the tail-drain.

11. The Tail-Drain is designed as a receptacle for all the water that flows out of the other drains, which are so situated that they cannot empty themselves into the river. It should run, therefore, nearly at right angles with the trenches, though generally it is thought most eligible to draw it in the lowest part of the ground, and to use it to convey the water out of the meadows at the place where there is the greatest defect; which is usually in one of the fence-ditches: and hence a fence-ditch is usually made use of instead of a tail-drain, and answers the double purpose of fomenting a meadow and draining it at the same time.

12. A Pane ground, is that part of the meadow which lies between the trench and the trench-drain, and in which the grass grows for hay. It is watered by the trenches, and drained by the trench-drains; whence there is a pane on each side of every trench.

13. A Way-Pane is that part of the ground which lies in a properly watered meadow, on the side of the main where no trenches are taken out, but is watered the whole length of the main over its banks. A drain for carrying off the water from this pane runs parallel to the main. The use is to convey the hay out of the meadows, instead of the teams having to cross all the trenches.

14. A Bend is made in various parts of those trenches which have a quick descent, to obstruct the water. It is made, by leaving a narrow strip of green sward across the trench where the bend is intended to be left; cutting occasionally a piece of the shape of a wedge out of the middle of it. The use is to check the water, and force it over the trench into the panes; which, were it not for these bends, would run rapidly on in the trench, and not flow over the land as it passes along. The great art in watering consists in giving to each part of the pane an equal proportion of water.

15. A Gutter is a small groove cut out from the tails of those trenches where the panes run longer at one corner than the other. The use is to carry the water to the extreme point of the pane. Those panes which are intersected by the trench and tail-drains, meeting in an obtuse angle, require the assistance of gutters to convey the water to the longest side. They are likewise useful when the land has not been so well levelled, but some parts of the panes lie higher than they ought: in which case, a gutter is drawn from the trench over that high ground, which otherwise would not be overflowed. Without this precaution, unless the flats be filled up (which ought always to be done when materials can be had to do it) the water will not rise upon it; and after the watering season is past, those places would appear rufiy and brown, while the rest is covered with beautiful verdure. Our author, however, is of opinion, that this method of treating water-meadows ought never to be followed: but that every inequality in water-meadows should either be levelled or filled up. Hence the waterman's skill is shown in bringing the water over those places to which it could not naturally rise, and in carrying it off from those where it would naturally stagnate.

16. A Catch-Drain is sometimes made use of when water is scarce. When a meadow is pretty long, and has a quick descent, and the water runs quickly down the drains, it is customary to stop one or more of them at a proper place, till the water flowing higher rises so high as to strike back either into the tail-drains so as to stagnate upon the sides of the panes, or till it flows over the banks of the drains and waters the grounds below, or upon each side. It is then to be conveyed over the land in such quantity as is thought proper, either by a small main, out of which trenches are to be cut with their proper drains, or by trenches taken properly out of it. In case of a stagnation, the design will not succeed; and it will then be necessary to cut a passage to let the stagnating water run off. Even when the method succeeds best, Mr Boswell is of opinion, that it is not by any means eligible: the water having been so lately drained over the ground that it is supposed by the watermen not to be endowed with such fertilizing qualities as at first; whence nothing but absolute necessity can justify the practice.

17. A Pond is any quantity of water stagnating upon the ground, or in the tail-drain, trench-drains, &c. so as to annoy the ground near them. It is occasioned sometimes by the flats not having been properly filled up; at others, when the ware not being close flut, in order to water some grounds higher up, the water is thereby thrown back upon the ground adjacent.

18. A Turn of water signifies as much ground as can be watered at once. It is done by shutting down the
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Meadow: the hatches in all those wares where the water is intended to be kept out, and opening those that are to let the water through them. The quantity of land to be watered at once must vary according to circumstances; but Mr Boswell lays down one general rule in this case, viz. that no more land ought to be kept under water at one time than the stream can supply regularly with a sufficient quantity of water; and if this can be procured, water as much ground as possible.

19. The Head of the meadow, is that part of it into which the river, main, &c. first enter.

20. The Tail is that part out of which the river, &c. last pass.

21. The Upper Side of a main or trench, is that side which (when the main or trench is drawn at right angles, or nearly so, with the river) fronts the part where the river entered. The lower side is the opposite.

22. The Upper Pane in a meadow, is that which lies on the upper side of the main or trench that is drawn at right angles with the river: where the river runs north and south, it enters in the former direction, and runs out in the southern, the main and trenches running east and west. Then all those panes which lie on the north side of the mains are called upper panes; and those on the south side the lesser panes. But when the mains, trenches, &c. run parallel to the river, there is no distinction of panes into upper and lower.

The instruments used in watering meadows are:

1. A Water-Level. The use of this is to take the level of the land at a distance, and compare it with that of the river, in order to know whether the ground can be overflowed by it or not. The instrument, however, is useful only in large undertakings, for such as are on a smaller scale, the workmen dispense with it in the following manner: In drawing a main, they begin at the head, and work deep enough to have the water follow them. In drawing a tail-drain, they begin at the lower end of it and work upwards, to let the tail-water come after them. By this method we obtain the moat exact level.

2. The Line, Reel, and Break-Plough, are absolutely necessary. The line ought to be longer and stronger than that used by gardeners.

3. Spuds. These used in watering meadows are made of a particular form, on purpose for the work; having a stem considerably more crooked than those of any other kind. The bit is iron, about a foot wide in the middle, and terminating in a point: a thick ridge runs perpendicularly down the middle, from the stem almost to the point. The edges on both sides are drawn very thin, and being frequently ground and whetted, the whole soon becomes narrow; after which the spades are used for trenches and drains; new ones being procured for other purposes. The stems being made crooked, the workmen standing in the trench or drain are enabled to make the bottoms quite smooth and even.

4. Wheel and Hand barrows. The former are used for removing the clods to the flat places, and are quite open, without any sides or hinder part. The latter are of service where the ground is too soft to admit the use of wheel-barrowes, and when clods are to be removed during the time that the meadow is under water.

5. Three-wheeled carts are necessary when large quantities of earth are to be removed; particularly when they are to be carried to some distance.

6. Short and narrow Sprayes are made use of to mow the weeds and grass, when the water is running in the trenches, drains, and main.

7. Forks, and long Crooks with four or five tines, are used for pulling out the roots of fedges, rubashes, reeds, &c. which grow in the main and drains. The crooks should be made light, and have long stems to reach wherever the water is to deep that the workmen cannot work in it.

8. Strong Water-boats, the tops of which will draw up half the length of the thigh, are indispensible necessary. They must also be large enough to admit a quantity of hay to be fluffed down all round the legs, and be kept well allowed to reflect the running water for many hours together.

The principles on which the practice of watering meadows depend are few and easy.

1. Water will always rise to the level of the receptacle out of which it is originally brought.

2. There is in all streams a defect greater or smaller; the quantity of which is in some measure shown by the running of the stream itself. If it runs smooth and slow, the defect is small, but if rapidly and with noise, the defect is considerable.

3. Hence if a main be taken out, and the level of the meadow high enough up the stream, water may be brought from that main; for the water over the land by the side of the river, to a certain distance below the head of the main, although the river from whence it is taken should, oppose to that very place, be greatly under it.

4. Water, sunk under a carriage which conveys another stream at right angles over it, one, two, or more feet below its own bed, will, when it has passed the carriage, rise again to the level it had before.

5. Water conveyed upon any land, and there left stagnant for any length of time, does it an injury; destroying the good herbage, and filling the place with pulleys, flags, and other weeds.

6. Hence it is absolutely necessary, before the work is undertaken, to be certain that the water can be thoroughly drained off.

In Mr Wright's treatise upon this subject, the author considers a solution of the three following questions as necessary preliminary to the operation of watering. 1. Whether the stream of water will admit of a temporary dam or weir across it? 2. Can the farmer raise the water by this means a few inches above its level, without injuring his neighbour's land? 3. Can the water be drawn off from the meadow as quick as it is brought on? — If a satisfactory answer can be given to all these questions, he directs to proceed in the following manner.

Having taken the level of the ground, and compared it with the river, as directed by Mr Boswell, cut a deep wide ditch as near the dam as possible, and by it convey the water directly to the highest part of the meadow; keeping the sides or banks of the ditch of an equal height, and about three inches higher than the general surface of the meadow. Where the meadow...
Meadow.

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When a meadow lies cold, flat, and swampy, the width of the bed, or the distance between the trough and drain, ought to be very small, never exceeding six yards: indeed, in this case, you can scarcely cut your land too much, provided the water be plentiful; for the more you cut, the more water you require. The fall of the bed in every meadow should be half an inch in a foot: let this will do, but more is desirable; for when the draught is quick, the herbage is always fine and sweet. The water ought never to flow more than two inches deep, nor less than one inch, except, in the warm months."

Mr Wright proceeds now to answer some objections made by the Reviewers in their account of the to his system of meadow farming, the manner by which they use more water for their lands than is necessary. To this it is answered, That where water is plentiful, they find it advantageous to use even more water than he recommends; and when water is scarce, they choose rather to water only one half, or even a smaller portion of a meadow at a time, and to give that a plentiful covering, than to give a scanty one to the whole. The Reviewers likewise recommend a repeated use of the same water upon different and lower parts of the same meadow, or to make each drain serve the same water as a trough to the bed which is below it. But this method is in some degree recommended by the celebrated Mr Cakewell, and taught by a systematic waterer in Staffordshire, who entirely disapproves of it; excepting where the great declivity of the land will not admit of any other plan. "This cannot (says he) be a proper mode of watering grass-land in the winter; for it can be of no service to the lowest parts of the meadow, unless as a wetting in spring or summer. The first or highest part of a meadow laid out accordingly to this plan will indeed be much improved; the second may reap some benefit; but the third, which receives the exhausted thin cold water, will produce a very unprofitable crop. Our farmers never choose more than a second use in the same meadow, and that very seldom; they call even the second running by the significant name of small beer; which, they say, may possibly satisfy thirst, but can give very little life or strength to land (A). It is a much better method to have a meadow laid out so as to be watered at the

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(A) As by the concurrence of Mr Bofwell with this author, and likewise by the agreement of so many practical farmers, it seems established as a fact, that water does really lose its fertilizing properties by running over grass, it may not here be amiss to explain the principle on which it does so.

Under the article Agriculture, we have shown at some length, that the true food of plants is the parts of animal and vegetable substances diffused and volatilized by purefication, in such a manner that they can be absorbed by the vessels of other plants, and thus become part of their substance. There are two ways in which these effluvia may be diffused, viz. in air and in water; of consequence, air and water are the two media by which the food of plants is applied to them, and by means of which they are augmented in bulk. From the analysis of these two elements, it is known that both of them, at least in their ordinary state, contain a great quantity of volatilized earthy matter, which sometimes strikes our senses very forcibly when first emitted by putrefying bodies; but on being thoroughly diffused by the atmosphere, it totally eludes them, and becomes the Phlogiston concerning which such violent disputes have arisen. This fine volatilized matter is absorbed from the atmosphere by the leaves of the plants, and from the water by their roots. Hence both elements, when loaded with vapours of this kind, are more favourable to vegetation than when in their pure state. Thus plants will thrive very well in putrid air, while they languish and die in the pure dephlogisticated wind. Just so it is with the element of water. When this is loaded with a great quantity of putrid matter, it readily parts with it not only to the roots of plants, but to the atmosphere also; whence such vegetables as it
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veral times, and to be at the expense of several small flood-hatches, than to water the whole of it at once by means of catch-drains.

"Sometimes it is necessary, in a large meadow, to convey the water that has been used under the works and troughs; and then the water above is supported by means of boards and planks, which we call a carry-bridge. Sometimes, the better to regulate the course of the water on the surface, especially in the spring, narrow trenches are dug, and the mould laid by the side of them, in order to be refored to its former place when the watering is finished. The earth and mud thrown out in cleaning and paring the ditches should be carried to fill up the low hollow parts of the meadow, and be trodden down with an even surface; which will easily be done when the water is on, the waterman being always provided with a strong pair of water-proof boots. If the mould thus used has upon it a turf that is tolerably fine, place it uppermost; but if it is muddy and coarse, turn it under, and the water if it runs quick will soon produce a fine herbage upon it.

"The grounds that are watered in the earliest and most effectual manner, are such as have been ploughed and ridged up in landsboat twelve yards wide. Here the water is easily carried along the ridge by means of a small ditch or trough cut along its summit, and then, by means of the flos in it, is made to run down the sides or beds into the furrows, by which it is carried into the matter drain, which empties itself into the river. Every meadow, before it is well watered, must be brought into a form something like a field that has been thus left by the plough in a ridged state. Each side of the ridge should be as nearly as possible an exact inclined plane, that the water may flow over it as equally as may be." Mr Wright does not, like Mr. Boswell, disapprove of the use of flood-hatches; he only gives the following hint, viz. that their basis should be deep and firmly fixed, well secured with stone and clay, that it be not blown up. The following directions are given for each month of watering:

In the beginning of November, all the ditches, troughs, and drains, are to be thoroughly cleaned by the spade and breast-plough, from weeds, grays, and mud; and well repaired, if they have received any injury from cattle. After a shower, when the water is thick and muddy, turn over the meadow as much water as you can without injuring the banks of the works, especially if the land be poor; as in this month, according to our author, the water contains many more fertilizing particles, which he calls fult and richnes, than later in the winter. In defence of this position, of which it seems the Monthly Reviewers have doubted, our author urges, that though he is not able to prove it by any chemical analysis, yet it seems evident, that "after the first washing of farm yards, various dinks, ditches, and the surface of all the adjoining fields, which have lain dry for some time, the common stream should then contain much more fatnes than when the same premises have been repeatedly washed." This is confirmed by the experience of the Gloucestershire farmers; who, if they can at this season of the year procure plenty of muddy water to overflow their grounds for one week, look upon it to be equally valuable with what is procured during all the rest of the winter. In support of this, he quotes the following words of Mr Forbes, in a treatise on watering: "The water should be let in upon the meadow in November, when the first great rains make it muddy, for then it is full of a rich sediment, brought down from the lands of the country through which it runs, and is washed into it by the rain; and as the sediment brought by the first floods is the richest, the carriages and stains of the meadow should all be scourcd clean and in order, before these floods come."

"In opposition (adds Mr Wright) to the opinion of practical waterers, that the maddeness of the water is of little consequence, I hesitate not to affirm, that the mud is of as much consequence in winter-watering, as dung is in the improvement of a poor upland field. For each meadow in this neighbourhood is fruitful in proportion to the quantity of mud that it collects from the water. And, indeed, what can be conceived more enriching than the abundant particles of patrid matter which float in the water, and are distributed over the surface of the land, and applied home to the roots of the grass. It is true, that any the most simple water thrown over a meadow in proper quantity, and not suffered to stagnate, will fertilize it in winter, and in the warmth of spring will force a crop; but this unusual force must exhaust the strength of the land, which will require an annual supply of manure in substance, or in a course of years, the foil will be impaired rather than improved. The meadows in this country, which lie next below a market-town or village, are invariably the best; and those which receive the water after it has been two or three times used, reap proportionably less benefit from it: For every meadow that is well laid, and has any quantity of grass upon its surface, will act as a fine sieve upon the water, which, though it flow in ever so muddy, will be returned back to the stream as clear as it came from the fountain. This circumstance, when there is a range of meadows to be watered, the property of different persons, when water is scarce, creates vehement contentions and struggles for the first use of it. The proprietors are therefore compelled to agree among themselves, either to have the first use alternately, or for the higher meadows to dam up, and use only one half or a less portion of the river. Our farmers know
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know the mud to be of so much consequence in watering, that whenever they find it collected at the bottom of the river or the ditches, they hire men whole days to disturb and raise it with rakes made for the purpose, that it may be carried down by the water, and spread upon their meadows. One meadow in South Cerney, I think, is an incontestible proof of the consequence of muddy water. It is watered by a branch of the common stream that runs for about half a mile down a public road. This water, by the mud on the road being continually disturbed by carriages and the feet of cattle, becomes very thick, and when it enters the meadow is almost as white as milk. This field, which consists of seven acres, was a few years ago let for 10s. an acre, but is already become the richest land in the parish, and has produced at one crop eighteen loads of hay, and each load more than 25 hundred weight.

In further confirmation of what our author afferts, he quotes, from the Annals of Agriculture, the following words of Mr Wimpey: "As to the forts of water—a little is to be found, I believe, which does not encourage and promote vegetation, even the most simple, elementary, and uncompounded fluid: heat and moisture, as well as air, are the non quanta of vegetation as well as animal life. Different plants require different proportions of each to live and flourish; but some of each is absolutely necessary to all. However, experience as well as reason universally shows, that the more turbid, feculent, and replete with purefient matter the water is, the more rich and fefiliarizing it proves. Ha9y and impetuous rivers of continualfence fufficient to produce a flood, not only dissolve the flats, but wash the nature in substance off the circumjacent land into the rapid current. Such turbid water is both meat and drink to the land; and, by the undewous fefiment and mud it depofits, the soil is amazingly improved and enriched. The virtue of water from a fpring, if at all fuperior to pure elementary water, is derived from the feveral friftas or beds of earth it paffes through, that, according to the nature of fuch friftas, it may be friendly or otherwife to vegetation. If it paffes through chalk, marl, foffil shells, or any thing of a calcareous nature, it would in moft fols promote the growth of plants; but if through metallic ores, or earth impregnated with the vitriolic acid, it would render the land unfertile, if not wholly barren. In general the water that has run far is fuperior to that which immediately flows from the fpring, and more efpecially that which is fuculent and muddy, confiftitg chiefly of putrid animal fubfances washed down the fream."

To the fame purpofe also fays Mr Forbes: "There is great difference in the quality of water, arifing from the particles of different kinds of matter mixed with them. Thofe rivers that have a long course through good land are full of fine particles, that are highly fefilizing to fuch meadows as are finally overflowed by them; and this chiefly in floods, when the water is full of a rich fediment: for when the water is clear, though it may be raised by art high enough to overflow the adjoining lands, and be of fome service to them, the improvement thus made is far from what is obtained from the fame water when it is thick and muddy."

Mr Bofwell, though quoted by Mr Wright as an advocate for the doctrine juft now laid down, seems, in one part of his work at leaft, to be of a contrary opinion. This is in the 14th chapter of his book, where he remarks upon another publication on the fame subjeft, the name of which he does not mention: "In page 4th of that pampllet (fays Mr Bofwell), the writer informs us, if the water used be always pure and fimple, the effect will by no means be equal to the above: that is, of a fream that is fometimes thick and muddy. We have a fimilar infance of this in two of our meadows, which are watered immediately from fprings that arise in the grounds themselves. Their crops are early and plentiful, but not of a good quality, and the land remains unimproved after many years' water." "The writer of this treatife (Mr Bofwell), in a former edition, had afferted, and in this repeated, the contrary effects from a fream very near the spring-head, as clear as cryftal."

"The gentleman (Mr Beverley of Keld) whom that writer mentions in his preface, made a fhort vitfl fpring into Dorfethire, to fatisfy himself of the fact. The editor had the peflure to fhew him the fream alluded to, which he traced almost to the fountain-head. It was perfectly clear, and the water was then immediately conveyed out of the fream upon the lands adjoining, some of which was then running over; others it had been upon, and the verdure was then appearing. The gentleman expreffed himself perfectly fatisfied with the fact. To him the editor wishes to refer, &c. Mr George Culley of Fenton near Wolter in Northumberland, with a truly noble and public spirit that does him great honour as a friend to his country, fent a very fensible young man from thence into Dorfethire, to learn the art of watering meadows, and to work the whole fefon in thofe meadows under different watermen. This man was often over thofe meadows, and worked in fome juft below that were watered by the fame fream. Might the editor presume to offer his opinion upon this feeming contradiétion, it is very probable that the folls, both the upper and under friftas, are very different, as well as thofe through which the different springs ran."

From this paffage, the latter part of which is not very intelligible, we might conclude that Mr Bofwell prefers clear to muddy water for overflowing meadows. In this chapter on land-floods, however, he expreffes himfelf as follows: "They will (fays he) always be found of great ufe where the sweeping of tages of towns, farm-yards, &c. are carried down by them, and the fea at all fime any other eiefion is wanting besides a flute or fmall ware to divert and convey them over the lands. If the situation of the lands happens to be on the fide of a hill, catch-drains are absolutely neceffary for watering the lower part of the hill, after the water has been used upon the upper. In many parts of the kingdom, where there are large hills or extensive rolling lands, great quantities of water run from them into the valleys after heavy rains: These might with proper attention be collected together before they get to the bottom or flat ground, and from thence be diverted to the purpose of watering thofe lands that lie below, with great advantage to the occupier, and at
Of converting arable land into pasture.

...and should the land thus situated be arable, yet it would be found a beneficial exchange to convert it into pasture; particularly if pasture-ground should be a desirable object to the occupier. The method of performing it is thus recommended. Observe the piece of land or field best adapted to the purpose, both for situation and soil. If it should be arable, make it first very level; and with the crop of corn, sow all sorts of hay seeds: and as soon as it has got a green sward it may be laid out. In the lowest part of the ground a deep ditch for the current to run in through it; and continue it into some ditch or low part in the lands below, that the water may be freely carried off, after it has been and while it is in use. Draw ditches above the field intended to be watered affluent the sides of the hill, in such a manner that they may all empty themselves into the head of the ditch abovementioned, just where it enters the field to be watered: then erecting a ware across this ditch, the field will be capable of being watered according to the situation of the ditch in the middle or on the side of the field. It must then be conveyed by small mains or trenches, and subdivided again by branch trenches, according to the size of the field and the quantity of water that can be collected; trench drains must be drawn, and the water conveyed into the ditch by means of tail-drains. A person unacquainted with water meadows cannot conceive the advantage arising from water thus collected and conveyed over this species of water meadow (if it may be so called), being generally a firm good soil; for the water running down from rich cultivated hills, eminences, &c. sweeps away with it, when the rain falls very heavy, vast quantities of dung dropped by sheep and other cattle, and the manure carried upon arable lands; all which being now diverted, and carried over the meadow with an easy descent, gives time for the particles of manure to subside upon the ground at one season, or of being filtered from it as it dribbles through the grasses at another; after which the warm weather pulses on vegetation amazingly. Meadows thus situated would be vastly superior to any other, if they had the advantage of a constant stream; but even as they are, taking the opportunity of watering them by heavy rain or flood that happens, they will be found to be very valuable. The occupier of such lands is strenuously advised to let no time be lost in appropriating them to this use; because these lands are healthy for all kinds of cattle at almost all seasons; and the expense of converting them into this kind of water meadow is exceedingly small, the annual charges afterwards quite trifling, and the produce very considerable."

Mr. Wright having discussed the subject of the quality of the water, proceeds to give directions for watering through the different months of the year:—

"In December and January, the chief care consists in keeping the land sheltered by the water from the severity of frothy nights. It is necessary, however, through the whole winter, every ten days or fortnight to give the land air, by taking the water off entirely, otherwise it would rot and destroy the roots of the grass. It is necessary, likewise, that a proper person should go over every meadow at least twice every week, to see that the water is equally distributed, and to remove all obstructions arising from the continual influx of weeds, leaves, fitches, and the like. In February a great deal depends upon care and caution. If you now suffer the water to remain on the meadow for many days without intermission, a white scum is raised, very destructive to the grass; and if you take off the water, and expose the land to a severe frothy night, without its being previously dried for a whole day, the greatest part of the tender grass will be cut off. The only ways to avoid these two injuries are, either to take the water off by day to prevent the scum, and to turn it over again at night to guard against the frost; or, if this practice be too troublesome, both may be prevented by taking the water entirely off for a few days and nights, provided the first day of taking off be a dry one; for if the grass experience one fine drying day, the frost at night can do little or no injury. The scum is generated chiefly by the warmth of the sun, when the water is thin and useless plentifully. Towards the middle of this month we vary our practice in watering, by using only about half the quantity of water which is made use of earlier in the winter, all that is now required being to keep the ground in a warm moist state, and to force vegetation.

"At the beginning of March, the crop of grass in the meadows is generally sufficient to afford an abundant pasturage for all kinds of stock, and the water is taken off for near a week, that the land may become dry and firm before the heavy cattle are turned in. It is proper, the first week of eating grass, if the scum be cold, to give the cattle a little hay each night."

"It is a custom (says Mr. Wright) with some of the farmers in Hampshire, to eat of the spring-grass of the meadows with ewes and lambs, in the same manner that we do a field of turnips, by including a certain portion each day with hurdles or flakes, and giving them hay at the same time. This is certainly making the most of the grass, and an excellent method to fine and sweeten the future herbage. In this month and April, you may eat the grass as short and close as you please, but never later; for if you trefpafs only one week on the month of May, the hay-crop will be very much impaired, the grass will become soft and woolly, and have more the appearance and quality of an after-math than a crop. At the beginning of May, or when the spring feeding is finished, the water is again used for a few days by way of wetting.

"It is rather remarkable, that watering in autumn, winter, or spring, will not produce that kind of herbage which is the caufe of the rot in sheep; but has been known to remove the caufe from meadows, which before had that baneful effect. If, however, you use the water only a few days in any of the summer months, all the lands thus watered will be rendered unsafe for the pasturage of sheep. Of this I was lately convinced from an experiment made by a friend. At the beginning of July, when the hay was carried off, and the water rendered extremely muddy and abundant by several days rain, he thought proper to throw it over his meadows for ten days, in which time a large collection of extremely rich manure was made upon the land. In about a month the meadow was covered with uncommon luxuriance and blackness of herbage. Into this grass were turned eight
Meadow. eight found ewes and two lambs. In six weeks time the lambs were killed, and discovered strong symptoms of rotteness, and in about a month afterwards one of the ewes was killed, and though it proved very fat, the liver was putrid and replete with the insect called theiske or weevil; the other ewes were sold to a butcher, and all proved unfound. This experiment, however, convinces me, by the very extraordinary improvement made thereby in the meadow, that muddy water in the summer is much more enriching than it is in autumn or winter: and ought, therefore, to be used for a week at least every wet summer, notwithstanding standing its inconveniences to sheep, the most profitable species of stock."

Mr Bofwell, besides his general directions for watering, gives many plans of the ditches, drains, &c. for particular meadows, some of them done from an actual survey. But these being confined to particular situations, we shall here only speak of his method in general. In his third chapter, intitled "A general Description of water-meadows," he observes, that "lands capable of being watered, lie sometimes on one side and sometimes on both sides of the stream designed to supply them with water. In the former case, when they have a pretty quick deficient, the land may be often watered by a main drawn out of the stream itself, without any ware; though he acknowledges that it is by far the best way to erect a ware, and to draw mains on each side, to dispose of the water to the best advantage."

Boggy lands require more and longer continued watering than such as are sandy or gravelly; and the larger the body of water that can be brought upon them, the better. The weight and strength of the water will greatly afflict in compreelling the soil, and destroying the roots of the weeds that grow upon it nor can the water be kept too long upon it, particularly in the winter season; and the clover itis fed, the better. To improve strong clay soils, we must endeavour to the utmost to procure the greatest possible descent from the trench to the trench-drain; which is best done by making the trench-drains as deep as possible, and applying the materials drawn out of them to raise the trenches. Then, with a strong body of water, taking the advantage of the autumnal floods, and keeping the water some time upon them at that season, and as often as convenient during the winter, the greatest improvement on this fort of soils may be made. Warm sand or gravelly soils are the most profitable under the watering system; provided the water can be brought over them at pleasure. In soils of this kind, the water must not be kept long at a time, but often shifted, thoroughly drained, and the land frequently refreshed with it; under which circumstances the profit is immense. A spring-feeding, a crop of hay, and two aftermaths, may be obtained in a year; and this probably, where in a dry summer scarce grasss enough could be found to keep a sheep alive. If the stream be large, almost any quantity of land may be watered from it; and though the expence of a war over it is great, it will soon be repaid by the additional crop. If the stream is small, the expence will be fo in proportion.

The following method of improving a water-mea-

dow that was springy has been tried by Mr Bofwell Meadow, with success. The meadow had been many years watered by a spring rising just above it from a barren sandy heath; the soil near the surface was in some places a gravelly sand, in others a spongy cork, both a strong clay and sand mixture, which retained the draining of the lands above it. Whenever it had been watered, and left to itself dry, a yellowish-red water flood in many parts, and oozed out of others; the herbage being no other than a poor, miserable, hairy grass and small sedge. Chalk and ashes have been thrown over it to very little purpose. It was then drained underground allant all the different defects, and all these drains carried into one large drain, which had been already cut for the purpose of carrying off the water when the meadow was overflowed. These drains were cut quite through the mixture of clay and sand, and as much deeper as the fall of the ground below would admit of; then, with chalk cut for the purpose, small hollow drains were formed at the bottom of these; the drains were then filled up with the materials that came out.

This was done in the beginning of summer, and the work frequently examined through the season; the soil was found firmer than before, and none of that naffy red water to be met with upon the surface, though it continually oozed into the drains. In autumn the meadow was again prepared for waterings, by repairing those trenches and drains that were properly situated: cutting others where wanted, for the purpose of watering meadows. The water being then brought over it from the same spring as before, the event answered the most sanguine wishes of the proprietor; the effects were visible the first year, and the ground has been constantly improving ever since. Mr Bofwell also informs us, that a gentleman in Scotland had applied to him for directions to watering lands lying on the sides of hills, where the descent is quick; and of which there are many in this country as well as in the north of England. It would be difficult to water such lands by means of drains and trenches according to the directions already given; because the bends in the trenches must be very near together and large; as the water must flow out of the trench above the bend to flow over the pane below it; the number and size would likewise be inconvenient, and greatly offend the eye.

Lands of this fort are generally capable of being ploughed; in which case our author directs them to be once ploughed in the spring, and tawn with oats or any other kind of grain that will rot the fward. When the grain is harvested, plough the land across; the left ploughing with the Kentish plough, which has a moveable mold-board, and is called a turn-wriff plough. This turns the furrows down the side of the hill, the herbes going forwards and backwards in the same furrows. By this means the land is laid flat without any open furrows in it; dres its down in the spring very fine, and sow it with oats, and mix with some kinds of grass seeds very thick. Thus the ground will have but few irregularities; and as soon as the corn is carried off, or the following spring at farthest, the mains and drains may be cut out.

For watering coarse lands that are firm enough to bear
bear the plough, and situated near a stream, our author gives the following directions.

"Let the land thus situated be ploughed once in the spring, and sown with any grain that will rot in the ground. As soon as the crop is off, plough it again, and leave it rough through the winter. Work it down early in the spring, and plough it in the direction the trenches are to lie, making the ridges of a proper size for watering, ten or twelve yards wide for infields; work it fine; then gather the ridges up again in the same manner, making the last furrows of each ridge as deep as possible. If the land be not fine, dress it down again, and gather it up a second time if necessary; and with a shovel throw the earth from the sides of the furrows to the tops of the ridges, to give the greatest possible deficient from the trench to the drain. Sow it with oats and grasses feed very thick; and after the corn is carried off, the trenches may be formed upon the top of each ridge, deripping the furrows with a spade as much as the fall of the land will admit of for the drains; taking care to preserve the sufficient fall at all events, to drain the lands after they have been watered. By this method the crops of corn will nearly pay all the expense, and the land will be in excellent order.

After the work of watering a meadow is totally finished, and the hay carried off, cattle may be let in to eat the after-math. When this is done, it will then be necessary to examine whether or not the mains have suffered any injury from their feet; whether there be quantities of mud or sand collected at the angles, &c. of which must be thrown out and the breaches repaired; by which means the trenches, drains, &c. will last three years, but otherwise not more than two. The roots, mud, &c. may be used in repairing the breaches, but never left upon the ridges out of which they are taken. The tail-drains require to be cleaned oftener than any of the other works, for this obvious reason, that the mud, &c. is carried down from all the others into them; where if it be allowed to accumulate, it occasions a stagnation of water upon the meadow itself. In repairing the trenches, particular care ought to be taken that the workmen do not make them any wider than before, which they are apt to do; neither are they to be allowed to throw the materials which they dig out in a ridge behind the edge of the trench, which both widens it and promotes weeds.

During the time of watering, it will be necessary to examine the meadow every two or three days in order to remove obstructions, &c. If the drains should be filled with water and run over, they ought to be made deeper: or if this cannot be done, they should be widened. In the winter time a regular strong water should be kept, avoiding very strong great floods. In this season the water may be kept on the ground with safety for a month or even six weeks if the soil be soky or boggy or a strong clay; but not quite so long if it be gravel or sand. At the second watering a fortnight or three weeks will be sufficient; and after Candlemas a fortnight will be rather too long. At the third watering a week will be sufficient, which will bring it to about the middle of March; by which time if the weather be tolerably mild, the grass will be long enough for the ewes and lambs, or fattening lambs; which may then be turned into the meadow Meadow with great advantage. Even in the end of February, if the winter has been very mild, the grass will be long enough for them. Here they may be permitted to feed till the beginning of May, changing them into different meadows. As soon as they are taken out, the water must be turned in for a week, carefully examining every trench and drain for the reasons already given. The water is then to be shifted into others, alternately watering and draining, lessening the time the water remains upon it as the weather grows warmer; and in five, six, or seven weeks, the grass will be fit to be mown for hay, and produce from one or two tons, or even more, an acre upon good ground.

Mr Bofwell directs, that about a week before the grass is to be mown, the water should be let into the meadow for 24 hours; which, he says, will make the ground moist at the bottom, the scythe will go thro' it the more easily, and the grass will be mown closer to the ground. This practice, however, is entirely disapproved of by Mr Wright. "Though it may prevail in Dorsetshire (says he), it is very seldom advisable, for the following reasons: Water made to run through a thick crop of grasses, though it may appear ever so pure, will leave a certain quantity of adherent scum or sediment, which can never be separated from the hay, but will render it unpalatable, if not prejudicial, to the cattle that eat it. And this wetting of the land and grasses will impede the drying or making of the hay perhaps some days, which in difficult seasons is of very great consequence; and it will likewise make the turf too soft and tender to support the wheels of a loaded wagon in carrying off the hay. Besides, there is reason to believe that one day's wetting in the summer will, upon most meadows, endanger the soundness of every sheep that feeds upon the after-math."

The spring-feeding ought never to be done by heavy cattle than sheep or calves; for larger cattle do feeding, much hurt by poaching the ground with their feet, destroying the trenches, and spoiling the grases. Mr Bofwell likewise greatly recommends a proper use of spring floods, from which he fays much benefit may be derived; but if there is any quantity of grases in the meadows not eaten, these floods must be kept out, otherwise the grases will be spoiled; for they bring with them such quantities of sand and mud, which stick to the grases, that the cattle will rather starve than taste it. Great quantities of egrases or aftermath are frequently spoiled in flat countries by the floods which take place in the fall. In the winter-time however, when the ground is bare, the sand and mud brought down by the floods is soon incorporated with the soil, and becomes an excellent manure. The certain rule with regard to this matter is, "Make use of the floods when the grases cannot be fed: avoid them when the grases is long or soon to be cut."

"It has often been a subject of dispute (says Mr Of water-Bofwell), whether, from the latter end of autumn till from the end of winter, the throwing a very strong body of water, where it can be done, over the meadows, is of any es- sential service or not? Those who consider it as advan-tageous, affirm, that when the waters run rude and strong over the ground, they beat down and rot the tufts
Meadow. - tufts of foggy rough arrow, fedge, &c. that are always to be found in many parts of coarse meadow-ground; and therefore are of peculiar service to them. On the other side it is alleged, that by coming in so large a body, it beats the ground (in the weak places particularly) so bare, that the sward is destroyed; and also forcing the water, it obstructs the drainage of waters, that at the next hay season the land in all those bare calves: a reason equally cogent may be given, with the after-grass ought not to be fed by them, because it will infallibly rot them. "No sheep (says our author), except those which are just fat, must ever be suffered for an hour in water-meadows except in the spring of the year; and even then care must be taken that every part of the meadows have been well watered; and that they are not longer kept in them than the beginning of May. Although at present it is unknown what is the occasion of the rot, yet certain it is that even half an hour's feeding in unhealthy ground has often proved fatal. After a short time they begin to lose their flesh, grow weaker and weaker: the best feeding in the kingdom cannot improve them after they once fall away; and when they die, animalcula-like places are found in the rivers. Scarce-ly any ever recover from a flight attack; but when farther advanced, it is always fatal. Guard by all means against keeping the water too long upon the meadow in warm weather; it will very soon produce a white substance like cream, which is prejudicial to long upon the grazes, and shows that it has been too long upon meadows, the ground already. If it is permitted to remain a little longer, a thick cum will settle upon the grass, the confidence of glue, and as tough as leather, which will quite destroy it wherever it is suffered to be produced. The same bad effects seem to arise from rude waters; neither can the cum easily be got off. "Rolling meadows in the spring of the year is an excellent method. It should be done after Candlemas, when the meadow has been laid dry a week. It should be always rolled lengthwise of the panes up one side of the trench and down the other. Rolling also contributes much to the grass being cut close to the surface when mown, which is no small advantage; for the little hillocks, except those, ant-hills, &c. are by this means profiled close to the ground, which would otherwise obstruct the scythe and take off its edge; and to avoid that inconvenience, the workmen always mow over them.

MEAL, the flour of grain. The meal or flour of Britain is very fine and white. The French is usually browner, and the German browner than that. British flour keeps, at home but in carrying abroad it often contracts damp, and becomes bad. All flour is subject to breed worms; these are white in the white flour, and brown in that which is brown: they are therefore not always distinguishable to the eye; but when the flour feels damp, and smells rank and musty, it may be conjectured that they are there in great abundance. The colour and the weight are the two things which denote the value of meal or flour; the whiter and the heavier it is, other things being alike, the better it always is. Pliny mentions these two characters as the marks of good flour; and tells us, that Italy in his time produced the finest in the world. This country indeed was famous before his time for this
this produce; and the Greeks have celebrated it; and Sophocles in particular says, that no flour is so white or so good as that of Italy. The corn of this country has, however, lost much of its reputation since that time; and the reason of this seems to be, that the whole country being full of sulphur, alum, vitriol, marcasites, and bitumens, the air may have in time affected them so far as to make them diftinct themselves through the earth, and render them so as to be fit for vegetation; and the taking fire of some of these inflammable minerals, as has sometimes happened, is alone sufficient to alter the nature of all the land about the places where they are.

The flour of Britain, though it pleases by its whiteness, yet wants some of the other qualities valuable in flour; the bread that is made of it is brittle and does not hold together, but after keeping a few days becomes hard and dry as if made of chalk, and is full of cracks in all parts.

The flour of Picardy is very like that of Britain; and after it has been kept some time, is found improper for making into paste or dough. The French are forced either to use it immediately on the grinding, or else to mix it with an equal quantity of the flour of Brittany, which is coarser but more nutritious and fatty; but neither of these kinds of flour keep well.

The flour of almost any country will do for the home consumption of the place, as it may be always fresh ground; but the great care to be used in selecting it is in order to the sending abroad, or furnishing ships for their own use. The fatine humidity of the sea-air ruins metals, and fouls every thing on board, if great care be not taken in the preserving them. This also makes the flour damp and mouldy, and is often the occasion of its breeding insects, and being wholly spoiled.

The flour of some places is confantly found to keep better at sea than that of others; and when that is once found out, the whole caution needs only to be to carry the flour of those places. Thus the French find that the flour of Poitou, Normandy, and Guinée, all bear the sea-carriage extremely well; and they make a considerable advantage by carrying them to their American colonies. But the flour of Pennsylvania and the neighbouring States is esteemed the belt in the world, and the mott part of the West India Islands are supplied from thence, and large quantities of wheat and flour are sent to Europe.

The choice of flour for exportation being thus made, the next care is to preserve it in the ships; the keeping it dry is the grand consideration in regard to this; the barrels in which it is put up ought to be made of dry and well-seasoned oak, and not to be larger than to hold two hundred weight at the most. If the wood of the barrels have any sap remaining in it, it will moisture and spoil the flour; and no wood is so proper as oak for this purpose, or for making the bins and other vessels for keeping flour in at home, since when once well dried and seasoned it will not contract humidity afterwards. The bee-ch wood, of which some make their bins for flour, is never thoroughly dry, but always retains some sap. The fir will give the flour a taste of turpentine; and the ash is always subject to be eaten by worms. The oak is preferable, because of its being free from these faults; and when the several kinds of wood have been examined in a proper manner there may be others found as fit, or possibly more so, than this for the purpose. The great leaf is their having more or less sap. See FLOUR and WOOD.

MEAN, in general, denotes the middle between two extremes; thus we say the mean distance, mean proportion, &c.

MEARN, or KINCAIDISHIRE, a county of Scotland, bounded on the north by Aberdeenshire, on the east by the British Ocean, and on the south-west by Angushire. In form it resembles a harp, having the lower point towards the south. Its length along the coast is scarce 30 miles; its greatest breadth is about 10. Some derive the first name from Meaun a valiant nobleman, who subdued the country, received it in reward from his prince Kenneth II. Camden, with much probability, supposes it to retain part of the name of the old inhabitants, the Vernicorns of Ptolemy, it being common for the Britons in discourse to change the V into M. The other name is taken from its ancient capital Kincaid, an inconsiderable village.

The tract of country through which the Dee passes, and the plain along the sea-coast are well cultivated, and produce much corn and flax. The fields are in many places screened by woods; and the heaths afford sheep-walks and much good pasture for cattle. Near Stonehaven, to the south, are the ruins of Dunottar castle, the ancient seat of the earls Marithal of Scotland, situated on a high perpendicular rock, almost surrounded by the sea. In this neighbourhood is a precipitous cliff over-hanging the sea, called Teall's Cleeves; noted as the resort of Kittiwakes, the young of which are much sought after in the hatching season, being esteemed a great delicacy. At a little distance from Stonehaven, up the river, stands Urie, the birth-place of Barclay the famous apologist for the Quakers. The Quakers have here a burying ground and in the vicinity are seen the traces of a Roman station. The great valley called Strathmore commences here, and extends in a south-west direction nearly as far as Benlomond in Stirlingshire, bounded all along to the north-west by the Grampian mountains. The village of Fordun, a little south from the centre of the county, is supposed to be the birth-place of the celebrated author of the Scotchchronicon. St Davy's church, or Talley kirk in this neighbourhood, is famous for being the burial-place and residence of St Palladius; whose chapel is still to be seen on the south side of it, 40 feet by 12, now the burial-place of the Halkerton family. Near the village, and along the river Bervie, the country is flat and well cultivated. The small town of Inverurie was made royal borough by David Bruce, who landed there with his queen at Craig David after his long retreat into France. Near the village of Fettercairn was Den Finnel, the residence of Finella, daughter of a nobleman off large possessions in this country, or, as Major calls her, countess of Angus, who was necessary to the murder of Kenneth II. About two miles from this place, on the road side, is a cairn of a stupendous size and uncommon form, which probably ought to give name to the parish. About six miles west from Bervie, is situated Laurence-kirk, which some years back was only an insignificant village of six or seven houses; but by the judicious and liberal exertions of its proprietor Lord Gardenstone, has
MEASURE has become a handsome little town, with a right to elect magistrates, and to hold an annual fair and a weekly market. He has established here a flourishing and extensive manufacture of lawn, cambric, linen, and various other articles. He has also freely renounced all the oppressive service due by his tenants; services which have been so long and so justly complained of as a check to agriculture in many parts of Scotland.

—The north-west part of the isle, being mountainous, is more employed in pasturage than in cultivation.

MEASLES, a cutaneous disease attended with a fever, in which there is an appearance of eruptions or a pustule, must nearly be the same in all ages, as one, or unity, to which the ratio of the nature of the law which restricted the property of a Roman citizen to seven acres, and this is sufficient to render history intelligible; but it is too inaccurate to regulate measures for commercial purposes. The same may be paid of standards, deduced from the measure of a barley-corn, or the weight of a grain of wheat. If the distance of two mountains be accurately measured and recorded, the nature of the measure used will be preferred in a more permanent manner than by any standard; for if ever that measure fall into disuse and another be substituted in its place, the distance may be measured again, and the proportion of the standards may be ascertained by comparing the new and ancient distances.

But the most accurate and unchangeable manner of establishing standards is, by comparing them with the length of pendulums. The longer a pendulum is, it vibrates the flower; and it must have one precise length in order to vibrate in a second. The slightest difference in length will occasion a difference in the time; which will become abundantly sensible after a number of vibrations, and will be easily observed if the pendulum be applied to regulate the motion of a clock. The length of a pendulum which vibrates seconds in London is about 394 inches, is constantly the same at the same place; but it varies a little with the latitude of the place, being shorter as the latitude is less. Therefore though all standards of weights and measures were lost, the length of a second pendulum might be found by repeated trials; and if the pendulum be properly divided, the just measure of an inch will be obtained; and from this all other standards may be reared. See Whitehurst on Invariable Measures.

Measures are various, according to the various kinds and dimensions of the things measured. Hence arise linear or longitudinal measures, for lines or lengths; square measures, for areas of surfaces; and solid or cubic measures, for bodies, and their capacities; all which again are very different in different countries and in different ages, and even many of them for different commodities. Whence arise other divisions of ancient and modern measures, domestic, and foreign ones, dry measures, liquid measures, &c.

1.] Long Measures or Measures of Application.

1. The English and Scotch Standards.

The English linear standard in the yard, containing 3 English feet, equal to 3 Paris feet 1 inch and \( \frac{1}{4} \) of
The measure of an inch, or ⅓ of a Paris ell. The use of this measure was established by Henry I. of England, and the standard taken from the length of his own arm. It is divided into 3½ inches, and each inch is subdivided into 3 barley-corns. When used for measuring cloth, it is divided into four quarters, and each quarter subdivided into 4 nails. The English ell is equal to a yard and a quarter, or 45 inches, and is used in measuring lengths imported from Germany and the Low-Countries.

The Scots ell was established by king David I. and divided in 37 inches. The standard is kept in the council-chamber of Edinburgh, and being compared with the English yard, is found to measure 37½ inches; and therefore the Scots inch and foot are larger than the English, in the proportion of 180 to 183; but this difference being so inconsiderable, is seldom attended to in practice. The Scots ell, though forbidden by law, is still used for measuring some coarse commodities, and is the foundation of the land-measure of Scotland.

Itinerary measure is the same both in England and Scotland. The length of the chain is 4 poles, or 22 yards; 83 chains make a mile. The old Scots computed miles were generally about a mile and a half each.

The rod for yarn is 2½ yards, or 10 quarters, in circuit; 120 threads make a cut, 12 cuts make a half or half and a half, and 4 halves make a spindl.

1. The French Standard is the same or ell, containing 3 Paris feet 7 inches 8 lines, or 1 yard; English; the Paris foot royal exceeding the English by two parts, as in one of the following tables. This ell is divided two ways, viz. into halves, thirds, sixths, and twelfths; and into quarters, half-quarters, and sixteenths.

This ell holds throughout the greatest part of France; excepting at Troyes in Champagne, at Arc in the Barrois, and in some parts of Picardy and Burgundy, where the ell contains only 2 feet 5 inches 1 line; in Bretagne, where it contains 4 feet 2 inches 11 lines; and at St. Geroux in Berry, where it exceeds the Paris ell by 8 lines. See Ex. But in Languedoc, particularly at Marseille, Montpelier, Toulouse in Provence, and in Guienne, they measure by the canna, which at Toulouse and in Guienne contains 5 Paris feet 5 inches and 6 lines; or one Paris ell and a half. But at Montpellier, and throughout the Lower Languedoc, as also in Provence and Avignon, and even Dauphine, the canna is 6 feet and 6 lines, or 1 Paris ell and 3/4. See CANNA.

We have lately had some accurate comparisons between some of the French weights and measures and those of England, the result of which is, (1.) The Paris ell of toise, as set off on the standard kept in the Royal Society, contains of English inches by the same standard 38.335, whence it appears, that the English yard and foot is, to the Paris half toise and foot, nearly as 107 to 114; for as 107 to 114, is 39 to 38.3354.

(2.) The Paris 2 marc, or 16 ounce weight, weighs English Troy grains 7560; whence it appears, that the English Troy pound of 12 ounces, or 5760 grains, is to the Paris 1 marc, or 10 ounce weight, as 16 to 21; that the Paris ounce weighs English Troy grains 472.5, and that consequently, the English Troy ounce is to the Paris ounce as 64 is to 63.

(3.) The English Avordupois pound weighs Troy grains 7004; whence the Avordupois ounce, whereof it is made a pound, is found equal to 437.75 Troy grains. And it follows, that the Troy pound to the Avordupois pound as 88 to 107 nearly; for as 88 to 107, so is 5760 to 7004.636; that the Troy ounce is to the Avordupois ounce, as 80 to 73 nearly; for as 80 to 73, so is 480 to 438. And, lastly, that the Avordupois pound and ounce, is to the Paris two marc weight and ounce, as 63 to 68 nearly; for as 63 to 68, so 7004 to 7559.873. See WEIGHT.

(4.) The Paris foot expressed in decimals, is equal to 0.654 of the English foot, or contains 12.783 English inches. See FOOT.

3. The standard in Holland, Flanders, Sweden, a part of Germany, many of the Hans-towns, as Danzick, and Hamburg, and at Geneva, Franche-Comté, &c. is likewise the ell; but the ell, in all these places, differs from the Paris ell. In Holland, it contains one Paris foot eleven lines, or four sevenths of a Paris ell. The Flanders ell contains two feet one inch five lines and half a line; or seven twelfths of the Paris ell. The ell of Germany, Brabant, &c. is equal to that of Flanders.

4.] The Italian measure is the braccio, brace, or fathom. This obtains in the states of Modena, Venice, Florence, Lucca, Milan, Mantua, Bologna, &c. but is of different lengths. At Venice, it contains one Paris foot eleven lines, or four sevenths of the Paris ell. The Flanders ell contains two feet one inch five lines and half a line; or seven twelfths of the Paris ell. The ell of Germany, Brabant, &c. is equal to that of Flanders.

5. The Spanish measure is the vara or yard, in some places called the barra; containing seventeen twenty-fourths of the Paris ell. At Milan, the brace for measuring of filks is one Paris foot seven inches four lines, or four-ninths of a Paris ell; that for woollen cloths is the same with the ell of Holland. Lastly, at Bergama, the brace is one foot seven inches six lines, or five-ninths of a Paris ell. The usual measure at Naples, however, is the canna, containing fix feet ten inches and two lines, or one Paris ell and fifteen seventeenths.

6. The Portuguese measure is the cruzado, containing two feet, eleven lines, or four-sevenths of a Paris ell; and the vara, a hundred and fix whereof make a hundred Paris ells.

7. The Piedmontese measure is the ras, containing one Paris foot nine inches ten lines, or half a Paris ell. In Sicily, their measure is the canna, the same with that of Naples.

8. The Muscovite measures are the cubit, equal to one Paris foot four inches two lines; and the arcon, two whereof are equal to three cubits.

9. The Turkish and Levant measures are the picq, containing two feet two inches and two lines, or three fifths of the Paris ell. The Chinese measure, the

The English Troy ounce is to the Paris ounce as 64 is to 63.
Measure... cobre; ten whereof are equal to three Paris ells. In Persia, and some parts of the Indies, the guzez, whereof there are two kinds; the royal guzez, called also the *guzez mogulaker*, containing two Paris feet ten inches eleven lines, or four-fifths of the Paris ell; and the shorter guzez, called simply guzez, only two thirds of the former. At Goa and Ormuz, the measure is the vara, the same with that of the Portuguese, having been introduced by them. In Pegu, and some other parts of the Indies, the cando or candi, equal to the ell of Venice. At Goa, and other parts, they use a larger cando, equal to seventeen Dutch ells; exceeding that of Babel and Balora by 2 per centum, and the vara by 6½. In Siam, they use the ken, short of three Paris feet by one inch. The ken contains two sok, the sok two keubs, the keub twelve nions or inches, the nion to be equal to eight grains of rice, i.e. to about nine lines. At Cambodia, they use the haffer; in Japan, the tatam; and the span on some of the coasts of Guiana.

### TABLES OF LONG MEASURE.

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<tr>
<td>1½ Uncia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 3 Palmus minor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 12 4 Pes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 15 5 1½ Palmipes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 18 6 1½ Cubitus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 30 10 2½ 2 1½ Gradus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80 60 20 5 4 3½ 2 Passus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10000 7500 2500 625 500 416 125 Stadium</td>
<td>120 4 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30000 15000 5000 2000 1000 500 333 200 100 50 8 Milliare</td>
<td>967 0 0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Proportions of several Long Measures to each other, by Mr. Picard.

The Rhinland or Leyden foot (12 whereof make the Rhinland perch) supposed 696
The English foot                              675½
The Paris foot                                720
The Amsterdam foot, from that of Leyden, by Snellius  629
The Danish foot (two whereof make the Danish ell) 607½
The Swedish foot                              658½
The Brussels foot                            609½
The Dantzie foot, from Hevelius's Selenographia 636
The Lyons foot, by M. Auzout                  757½
The Bologna foot, by the same                  843

The braccio of Florence, by the same, and Father Merfenne 1290
The palm of the architects at Rome, according to the observations of Messrs Picard and Auzout 494½
The Roman foot in the Capitol, examined by Messrs Picard and Auzout 653 or 653½
The same from the Greek foot 652
From the vineyard Mattei 657½
From the palm 658½
From the pavement of the pantheon, supposed to contain ten Roman feet 653
From a slip of marble in the same pavement, supposed to contain three Roman feet 650
From the pyramid of Cælius, supposed to contain 95 Roman feet 653½
MEAS.

From the diameters of the columns in the arch of Septimius Severus - - 653'.

From a slip of porphyry in the pavement of the pantheon - - 653'.

See on this subject Phil. Trans. Vol. LII. art. 59. p. 774.

7. Proportions of the Long Measures of several nations to the English foot, taken from Mr. Greaves, Axout, Picard, and Esfinuch. See Foot.

The English standard foot being divided into 1000 equal parts, the other measures will have the proportions to it, which follow:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>English foot</td>
<td>1000</td>
<td>12</td>
</tr>
<tr>
<td>Paris foot</td>
<td>1068</td>
<td>12,816</td>
</tr>
<tr>
<td>Venetian foot</td>
<td>1162</td>
<td>13,994</td>
</tr>
<tr>
<td>Rhineland foot</td>
<td>1033</td>
<td>12,396</td>
</tr>
<tr>
<td>Strafsburgh foot</td>
<td>952</td>
<td>11,424</td>
</tr>
<tr>
<td>Norimberg foot</td>
<td>900</td>
<td>12</td>
</tr>
<tr>
<td>Dantzick foot</td>
<td>944</td>
<td>11,328</td>
</tr>
<tr>
<td>Danish foot</td>
<td>1042</td>
<td>14,504</td>
</tr>
<tr>
<td>Swedish foot</td>
<td>977</td>
<td>11,733</td>
</tr>
<tr>
<td>Derahor cubit of Cairo</td>
<td>1824</td>
<td>21,888</td>
</tr>
<tr>
<td>Persian arith</td>
<td>2197</td>
<td>38,364</td>
</tr>
<tr>
<td>Greater Turkish pike</td>
<td>2200</td>
<td>26,4</td>
</tr>
<tr>
<td>Lesser Turkish pike</td>
<td>2131</td>
<td>25,572</td>
</tr>
<tr>
<td>Braccio at Florence</td>
<td>1913</td>
<td>22,936</td>
</tr>
<tr>
<td>Braccio for woollen at Siena</td>
<td>1242</td>
<td>14,904</td>
</tr>
<tr>
<td>Braccio for linen at Siena</td>
<td>1974</td>
<td>23,688</td>
</tr>
<tr>
<td>Cannia at Naples</td>
<td>4880</td>
<td>82,566</td>
</tr>
<tr>
<td>vera at Almaria and Gibraltar</td>
<td>2750</td>
<td>33,12</td>
</tr>
<tr>
<td>Palmo di Architetti at Rome</td>
<td>732</td>
<td>87,84</td>
</tr>
<tr>
<td>Cannia di Architetti</td>
<td>7320</td>
<td>87,84</td>
</tr>
<tr>
<td>Palmo braccio di mercantia</td>
<td>6952</td>
<td>8,346</td>
</tr>
<tr>
<td>Genoa Palm</td>
<td>815</td>
<td>9,785</td>
</tr>
<tr>
<td>Bologna feet</td>
<td>1250</td>
<td>15</td>
</tr>
<tr>
<td>Antwerp ell</td>
<td>2283</td>
<td>27,396</td>
</tr>
<tr>
<td>Amsterdam ell</td>
<td>2268</td>
<td>27,216</td>
</tr>
<tr>
<td>Leyden ell</td>
<td>2260</td>
<td>27,12</td>
</tr>
<tr>
<td>Paris draper's ell</td>
<td>3929</td>
<td>47,148</td>
</tr>
<tr>
<td>Paris mercer's ell</td>
<td>3957</td>
<td>47,244</td>
</tr>
</tbody>
</table>

8. Different Itinerary Measures.

A French league is about 21 English miles.
A German mile 4 ditto.
A Dutch mile 3½ ditto.
An Italian mile 1½ ditto.
A Spanish league 3½ ditto.
A Russian verit ½ ditto.

II. Square, Superficial, or Land Measure.

1. English square measures are raised from the yard of 36 inches multiplied into itself, and thus producing 1296 square inches in the square yard; the divisions of this are square feet and inches; and the multiples, poles, roods, and acres. Because the length of a pole is 51 yards, the square of the same contains 301 square yards. A square mile contains 640 square acres. In measuring fens and woodlands, 18 feet are generally allowed to the pole, and 21 feet in forest lands.

A hide of land, frequently mentioned in the earlier part of the English history, contained about 100 arable acres; and 5 hides were esteemed a knight's fee. At the time of the Norman conquest, there were 243,600 hides in England.

2. Scotch square or land measure is regulated by the Scotch ell: 36 square ells = 1 fall, 40 falls = 1 rood, 4 roods = 1 acre. The proportion between the Scotch and English acre, supposing the feet in both measures alike, is as 1369:1089, or nearly as 3 to 4. If the difference of the feet be regarded, the proportion is as 10,000 to 9869. The length of the chain for measuring land in Scotland is 24 ells, or 74 feet. A husband-land contains 6 acres of fock and feythe land, that is, of land that may be tilled with a plough or mown with a fcythe: 13 acres of arable land make one ox-gang, and 4 ox-gangs make a pound-land of old extent.

3. French square measures are regulated by 12 square lines in the inch square; 12 inches in the foot, 22 feet in the perch, and 100 perches in the arpent or acre.

TABLES OF SQUARE MEASURE.

I. English.

<table>
<thead>
<tr>
<th>Inches</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>144</td>
<td>1296</td>
</tr>
<tr>
<td>1296</td>
<td>9</td>
</tr>
<tr>
<td>3600</td>
<td>25</td>
</tr>
<tr>
<td>3600</td>
<td>25</td>
</tr>
<tr>
<td>3924</td>
<td>272</td>
</tr>
<tr>
<td>3924</td>
<td>301</td>
</tr>
<tr>
<td>10890</td>
<td>1120</td>
</tr>
<tr>
<td>10890</td>
<td>10890</td>
</tr>
<tr>
<td>227240</td>
<td>240</td>
</tr>
<tr>
<td>227240</td>
<td>240</td>
</tr>
<tr>
<td>227240</td>
<td>240</td>
</tr>
<tr>
<td>227240</td>
<td>240</td>
</tr>
</tbody>
</table>

2. Grecian square measures were the plethron or acre, by some said to contain 1444, by others 10,000 square feet; and around half the plethron. The area of the Egyptians was the square 100 cubits.

3. Roman square measure reduced to English. The integer was the jugerum or acre, which the Romans divided like the libra or as: thus the jugerum contained.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Feet</th>
<th>Cubits</th>
<th>Perches</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>As</td>
<td>2880</td>
<td>288</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Deunx</td>
<td>2640</td>
<td>264</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Dextans</td>
<td>2400</td>
<td>240</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Dodrans</td>
<td>2160</td>
<td>216</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Bes</td>
<td>1920</td>
<td>192</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Septunx</td>
<td>1680</td>
<td>168</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Semis</td>
<td>1440</td>
<td>144</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Quincunx</td>
<td>1200</td>
<td>120</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Tiens</td>
<td>960</td>
<td>96</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Quadrans</td>
<td>720</td>
<td>72</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Sexians</td>
<td>480</td>
<td>48</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Uncia</td>
<td>400</td>
<td>40</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Note: Aethus major was 14,400 square feet equal to a femis: clima, 3600 square feet, equal to a felucca; and aethus minor equal to a fectans.

III.
As to the liquid measures of foreign nations, it is to be observed, that their several vessels for wine, vinegar, &c. have also various denominations according to their different sizes and the places wherein they are used. The wasters of Germany, for holding Rhenish and Moselle wines, are different in their gauges; some containing 7¼ gallons of Amsterdam measure, and others more or less. The name is reckoned at Amsterdam for 8 flecksans, or 29 verges, or for 5 of a ton of 2 pipes; or 4 barrels of French or Bordeaux, which 2 at this latter place is called tierce, because 3 of them make a pipe or 2 barrels, and 6 the said ton. The fleckan is 16 minims, or 32 pints; and the verge is, in respect of the said Rhenish and Moselle, and some other sorts of wine, 6 minigs; but, in the measuring brandy, it consists of 6½ minigs. The name is divided into 4 ankers, and the ancker into 2 fleckans, or 32 minigs. The ancker is taken sometimes for ¼ of a ton, or 4 barrels; on which footing the Bourdeaux-barrel ought to contain at Amsterdam (when the cask is made according to the jutt gauge) 102 flecksans, or 200 minigs wine and lees; or 12 flecksans, or 192 minigs racked wine; so that the Bourdeaux-ton of wine contains 50 flecksans, or 800 minigs, wine and lees; and 48 flecksans, or 768 minigs of pure wine. The barrels or points of Nantes and other places on the river Loire, contain only 12 flecksans Amsterdam measure. The wine-ton of Rochelle, Cognac, Charente, and the Isle of Râ, differs very little from the ton of Bourdeaux, and consequently from the barrels and pipes. A ton of wine of Chalons, Bayonne, and the neighbouring places, is reckoned 60 flecksans, and the barrel 1½ Amsterdam-measure.

The modi of Paris contains 150 quarts, or 300 pints, wine and lees; or 280 pints clear wine; of which modis 3 make a ton, and the fractions are

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cont.</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>The modi</td>
<td>36 fletiers</td>
<td></td>
</tr>
<tr>
<td>The feter</td>
<td>4 quarters</td>
<td></td>
</tr>
<tr>
<td>The quart</td>
<td>2 pints</td>
<td></td>
</tr>
<tr>
<td>The pint</td>
<td>2 chhips</td>
<td></td>
</tr>
<tr>
<td>The chopin</td>
<td>2 demi-fletiers</td>
<td></td>
</tr>
<tr>
<td>The demi-fletier</td>
<td>2 pottions</td>
<td></td>
</tr>
</tbody>
</table>

The modi is also composed of pipes, or poignons, quartcans, quiues, and demipiqures: those poignons of Paris and Orleans contain about 15 flecksans Amsterdam measure, and ought to weigh with the cask 660 lb. a little more or less. In Provence they reckon by milleroles, and the milleroile of Toulon contains 66 Paris pints, or 100 pints of Amsterdam, nearly; and the Paris pint is nearly equal to the English wine-quart.

The butts or pipes from Cadiz, Malaga, Alicante, Benecarlo, Saloe, and Martaro, and from the Canaries, from Lisbon, Oporto, and Faysal, are very different in their gauges, though in all estimations they are all reckoned two to the ton.

Vinegar is measured in the same manner as wine; but the measures for brandies are different: these spirits from France, Spain, Portugal, &c. are generally shipped in large casks called pipes, butts, and pieces, according to the places from whence they are reported, &c. In France, brandy is shipped in casks called pieces at Bourdeaux, and pipes at Rochelle, Cognac, the isle of Râ, and other neighbouring places,
TABLE OF LEAGUE MEASURE.

1. ENGLISH.

<table>
<thead>
<tr>
<th>Solid inches.</th>
<th>Pint</th>
<th>Gallon</th>
<th>Rundlet</th>
<th>Tierce</th>
<th>Barrel or pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>281</td>
<td>231</td>
<td>4158</td>
<td>7276</td>
<td>9702</td>
</tr>
</tbody>
</table>

For Pints [ale.]
Pints | Gallon | Firkin |
---|--------|--------|
| 8 Gallon | 8 Gallon |
| 64 Firkin | 72 Firkin |
| 128 Kilderkin | 144 Kilderkin |
| 256 1/2 Barrel | 288 1/2 Barrel |
| 512 1/2 Hog. | 576 1/2 Hog. |

2. JEWISH reduced to English Wine-measure.

<table>
<thead>
<tr>
<th>Caph</th>
<th>Log</th>
<th>Cab</th>
<th>Hin</th>
<th>Seah</th>
<th>Bath, or Ephraim</th>
<th>Coron, or Chomer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Log</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cab</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>24</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>72</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>960</td>
<td>720</td>
<td>180</td>
<td>60</td>
<td>30</td>
<td>10 Coron, or Chomer</td>
<td>75 5 7.265</td>
</tr>
</tbody>
</table>

2. ATTIC.
### 3. Attic Reduced to English Wine-Measure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cochliarton</td>
<td>0 1/4</td>
<td>0.756 1/4</td>
<td></td>
</tr>
<tr>
<td>2 Cheme</td>
<td>0 1/4</td>
<td>0.712 1/4</td>
<td></td>
</tr>
<tr>
<td>1½ Mystron</td>
<td>0 1/4</td>
<td>0.689 1/4</td>
<td></td>
</tr>
<tr>
<td>2×2 Conche</td>
<td>0 1/4</td>
<td>0.784 1/4</td>
<td></td>
</tr>
<tr>
<td>10 Cyathos</td>
<td>0 1/4</td>
<td>0.536 1/4</td>
<td></td>
</tr>
<tr>
<td>15 Oxybaphon</td>
<td>0 1/4</td>
<td>0.535 1/4</td>
<td></td>
</tr>
<tr>
<td>60 Cotyle</td>
<td>0 1/4</td>
<td>2.141 1/4</td>
<td></td>
</tr>
<tr>
<td>120 Xeltes</td>
<td>0 1/4</td>
<td>4.283</td>
<td></td>
</tr>
<tr>
<td>360 6 Metretes</td>
<td>0 1/4</td>
<td>25.692</td>
<td></td>
</tr>
<tr>
<td>360</td>
<td>10 2</td>
<td>19.629</td>
<td></td>
</tr>
</tbody>
</table>

### 4. Roman Reduced to English Wine-Measure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ligula</td>
<td>0 1/4</td>
<td>0.117 1/4</td>
<td></td>
</tr>
<tr>
<td>4 Cyathus</td>
<td>0 1/4</td>
<td>0.469 1/4</td>
<td></td>
</tr>
<tr>
<td>6 Acetabulum</td>
<td>0 1/4</td>
<td>0.704 1/4</td>
<td></td>
</tr>
<tr>
<td>3 2 Quartarius</td>
<td>0 1/4</td>
<td>1.409</td>
<td></td>
</tr>
<tr>
<td>24 4 Hemina</td>
<td>0 1/4</td>
<td>2.818</td>
<td></td>
</tr>
<tr>
<td>48 2 Sextarius</td>
<td>0 1/4</td>
<td>5.636</td>
<td></td>
</tr>
<tr>
<td>288 6 Congius</td>
<td>0 7</td>
<td>4.942</td>
<td></td>
</tr>
<tr>
<td>1152 8 Urna</td>
<td>3 4</td>
<td>5.33</td>
<td></td>
</tr>
<tr>
<td>2304 8 Amphora</td>
<td>7 1</td>
<td>10.66</td>
<td></td>
</tr>
<tr>
<td>4608</td>
<td>143 3</td>
<td>11.095</td>
<td></td>
</tr>
</tbody>
</table>

### IV. Measures of Capacity for Things Dry

1. **English Dry or Corn Measure.** The standard for measuring corn, salt, coals, and other dry goods in England, is the Winchester gallon which contains 27 2/3 cubic inches. The bushel contains 8 gallons, or 2178 inches. A cylindrical vessel, 18 inches diameter, and 8 inches deep, is appointed to be used as a bushel in levying the malt-tax. A vessel of these dimensions is rather less than the Winchester bushel of 8 gallons, for it contains only 2150 inches; though probably there was no difference intended. The denominations of dry measure commonly used, are given in the first of the subjoined tables. Four quarters corn make a chaldron, 5 quarters make a wey or load, and 10 quarters make a ton. In measuring sea-coal, 5 pecks make a bushel, 9 bushels make a quarter or varis, 4 quarters make a chaldron, and 21 chaldrons make a score.

2. **Scotch Dry Measure.** There was formerly only one measure of capacity in Scotland; and some commodities were heaped, others stroke, or measured exactly to the capacity of the standard. The method of heaping was afterwards forbidden as unequal, and a larger...
The wheat-firlot, used also for rye, peas, beans, salt, and grass-seeds, contains 21 pints 1 mutchkin, measured by the Stirling jug. The barley-firlot, used also for oats, fruit, and potatoes, contains 31 pints. A different method of regulating the firlot was appointed, from the dimensions of a cylindrical vessel. The diameter for both measures was fixed at 19½ inches, the depth 7½ inches for the wheat-firlot, and 10½ for the barley-firlot. A standard constructed by these measures is rather less than when regulated by the pint; and as it is difficult to make vessels exactly cylindrical, the regulation by the pint has prevailed, and the other method gone into disuse.

If the Stirling jug contain 10½ inches the wheat-firlot will contain 2109 inches; which is more than 2 1/2 per cent. larger than the legal muid-bushel of England, and about 1 per cent. larger than the Winchester bushel: and the barley-firlot will contain 3208 inches. The barley-boll is nearly equal to six legal malt bushels.

In Stirling-shire, 17 pecks are reckoned to the boll; in Inverness-shire, 18 pecks; in Ayrshire, the boll is the same as the English quarter. And the firlots, in many places, are larger than the Lintilagh standard.

3. French dry, are, the litron, bushel, minot mine, septier, muid, and tun. The litron, is divided into two demilitrons, and four quarter-litrons, and contains 36 cubic inches of Paris. By ordonnance, the litron is to be three inches and a half high, and three inches ten lines broad. The litron, for sail, is larger, and is divided into two halves, four quarters, eight demiquarters, and 16 mefurettes. The French bushel is different in different jurisdictions. At Paris, it is divided into demi-bushels; each demi-bushel into two quarths; the quart into two half-quarths; and the half-quart into two litrons; so that the bushel contains 16 litrons. By ordonnance the Paris bushel is to be eight inches two lines and a half high, and ten inches broad, or in diameter within-side. The minot consists of three bushels, the mine of two minots or six bushels, the septier of two mines or 12 bushels, and the muid of 12 septiers, or 144 bushels. The bushel of oats is estimated double that of any other grain; so that there go 24 bushels to make the septier, and 288 to make the muid. It is divided into four pictons, the picton containing two quarths, or four litrons. The bushel for salt is divided into two half-bushels, four quarters, eight half-quarters, and 16 litrons; four bushels make a minot, 16 a septier, and 192 a muid. The bushel for wood is divided into halves, quarters, and half-quarters. Eight bushels make the minot, 16 a mine; 20 mines, or 320 bushels, the muid. For plaster, 12 bushels make a latt, and 36 laths a muid. For lime, three bushels make a minot, and 48 minots a muid. The minot is by ordonnance to be 11 inches 9 lines high, and 14 inches 8 lines in diameter. The mine is composed of three bushels, or 16 litrons; four minots make a septier, and 48 a muid. The French mine is no real vessel, but an estimation of several others. At Paris the mine contains 12 bushels, and 24 make the muid; at Rouen the mine is four bushels; and at Dieppe, 18 mines make a Paris muid. The septier differs in different places: at Paris it contains two mines, or eight bushels, and 12 septiers the muid. At Rouen the septier contains two mines or Mene.

Twelve septiers make a muid at Rouen as well as at Paris; but of the latter are equal to 14 of the former. At Toulon the septier contains a mine and a half; three of which mines make the septier of Paris. The muid or mvy of Paris consists of 12 septiers; and is divided into mines, minots, bushels, &c. That for oats is double that for other grain, i.e. contains twice the number of bushels. At Orleans the muid is divided into mines, but those mines only contain two Paris septiers and a half. In some places they use the tun in lieu of the muid; particularly at Nantes, where it contains 10 septiers of 16 bushels each, and weighs between 2200 and 2250 pounds. Three of these tuns make 28 Paris septiers. At Rochelle, &c. the tun contains 42 bushels, and weighs two per cent. less than that of Nantes. At Breit it contains 20 bushels, is equal to 10 Paris septiers, and weighs about 2240 pounds. See Tun.

4. Dutch, Swedish, Polish, Prussian, and Muscovite. In these places, they estimate their dry things on the foot of the left, left, left, or lecht; to called according to the various pronunciations of the people who use it. In Holland, the left is equal to 10 Paris septiers, or 38 Bourdeaux bushels, and weighs about 4560 pounds; the last they divide into 27 mudes, and the made into four schepels. In Poland, the left is 40 Bourdeaux bushels, and weighs about 4800 Paris pounds. In Prussia, the left is 123 Paris septiers. In Sweden and Muscovy, they measure by the great and little left; the first containing 12 barrels, and the second half as many. See Last. In Muscovy, they likewise use the chesdor, which is different in various places:

5. Italian. At Venice, Leghorn, and Lucca, they estimate their dry things on the foot of the staro or stasio; the staro of Leghorn weighs 54 pounds 112 stari and seven eights are equal to the Amsterdam last. At Lucca, 119 stari make the last of Amsterdam. The Venetian staro weighs 128 Paris pounds; the staro is divided into four quarters. Thirty-five stari and one-fifth, or 140 quarters and five fourths, make the last of Amsterdam. At Naples and other parts, they use the tomolo or tomalo, equal to one-third of the Paris septier. Thirty-five tomoli and a half make the caro; and a carro and a half, or 54 tomoli, make the last of Amsterdam. At Palermo, 16 tomoli make the salma, and four mondili the tomola. Ten salmas and three-fevenths, or 172 tomoli and three-fevenths, make the last of Amsterdam.

6. Flemish. At Antwerp, &c. they measure by the vierelt; 32 and one half whereof make 19 Paris septiers. At Hamburgh, the schepel; 90 whereof make 19 Paris septiers.

7. Spanish and Portuguese. At Cadiz, Bilboa, and St. Sebastian, they use the fanega; 23 whereof make the Nantes or Rochelle tun, or nine Paris septiers and a half; though the Bilboa fanega is somewhat larger, infomuch that 21 fanegas make a Nantes tun. At Seville, &c. they use the anagoras, containing a little more than the Paris mine; 36 anagoras make 10 Paris septiers. At Bayonne, &c. the concha; 20 whereof are equal to nine Paris septiers and an half. At Lisbon, the alquiver, a very small measure, 220 whereof of make 19 Paris septiers, 60 the Lisbon muid.
### TABLES of Dry Measure.

#### 1. ENGLISH.

<table>
<thead>
<tr>
<th>Solid inches</th>
<th>1 Pint</th>
<th>8 Gallon</th>
<th>2 Peck</th>
<th>4 Bushel</th>
<th>8 Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.6</td>
<td>268.8</td>
<td>537.6</td>
<td>2150.4</td>
<td>17203.2</td>
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</tr>
</tbody>
</table>

#### 2. SCRiPTURe dry reduced to English.

<table>
<thead>
<tr>
<th>Gachal</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>0</th>
<th>0.031</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Cab</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0.073</td>
</tr>
<tr>
<td>36 1/3 Gomor</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>1.211</td>
</tr>
<tr>
<td>120 6 3/4 Seah</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>4.036</td>
</tr>
<tr>
<td>360 18 10 3/8 Epha</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>12.107</td>
</tr>
<tr>
<td>1800 90 50 15 3/8 Leeteh</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>26.500</td>
</tr>
</tbody>
</table>

#### 3. ATTic Measures of Capacity for Things dry, reduced to English Corn Measure.

<table>
<thead>
<tr>
<th>Cochliarion</th>
<th>0.274 3/4</th>
<th>0.274 3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Cyathos</td>
<td>0.000</td>
<td>2.763 3/4</td>
</tr>
<tr>
<td>15 1/3 Oxybaphon</td>
<td>0.000</td>
<td>4.144 3/4</td>
</tr>
<tr>
<td>60 6 4 Cotyle</td>
<td>0.000</td>
<td>16.579</td>
</tr>
<tr>
<td>120 12 8 2 Xestes</td>
<td>0.000</td>
<td>33.158</td>
</tr>
<tr>
<td>180 18 12 11 3 Choechip</td>
<td>0.001</td>
<td>15.705 3/4</td>
</tr>
<tr>
<td>8640 864576 144 7248 Medimnos</td>
<td>4 0 6</td>
<td>3.501</td>
</tr>
</tbody>
</table>

#### 4. ROMAN Measures of Capacity for Things dry, reduced to English Corn Measure.

<table>
<thead>
<tr>
<th>Ligula</th>
<th>0.01</th>
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</thead>
<tbody>
<tr>
<td>4 Cyathus</td>
<td>0.04</td>
</tr>
<tr>
<td>6 1/3 Acetabulum</td>
<td>0.06</td>
</tr>
<tr>
<td>24 6 4 Hemina</td>
<td>0.24</td>
</tr>
<tr>
<td>48 12 8 Sextarius</td>
<td>0.48</td>
</tr>
<tr>
<td>384 96 64 16 8 Semimodiace</td>
<td>3.84</td>
</tr>
<tr>
<td>768 192 128 32 16 2 Modii</td>
<td>7.68</td>
</tr>
</tbody>
</table>
Measure.

MEASURE of Wood for Firing, is usually the cord; four feet high, and as many broad, and eight long; this is divided into two half-cords, called wages, and by the French membrures, from the pieces stuck upright to bound them: or, poyes, as being hipped off half a wagon-load.

Measur. for Horses, is the hand, which by statute contains four inches.

Measures, among botanists, in describing the parts of plants, Tournefort introduced a geometrical scale, which many of his followers have retained. They measured every part of the plant; and the essence of the description consisted in an accurate measurement of the whole.

As the parts of plants, however, are liable to variation in no circumstance so much as that of dimension, Linnaeus very rarely admits any other measurement than that arising from the respective length and breadth of the parts compared together. In cases that require actual measurement, the same author recommends, in lieu of Tournefort's artificial scale, the following natural scale of the human body, which he thinks is much more convenient, and equally accurate.

The scale in question consists of 11 degrees, which are as follows: 1. A hair's-breadth, or the diameter of a hair (capillus). 2. A line, (linea), the breadth of the crescent or white appearance at the root of the finger, (not thumb), measured from the skin towards the body of the nail: a line is equal to 12 hair-breaths, and is the 12th part of a Parisian inch. 3. A nail, (unguis), the length of a fingernail: equal to six lines, or half a Parisian inch. 4. A thumb, (pollex), the length of the first or uttermost joint of the thumb: equal to a Parisian inch. 5. A palm, (palma), the breadth of the palm exclusive of the thumb: equal to three Parisian inches. 6. A span, (pitama), the distance between the extremity of the thumb and that of the first finger when extended: equal to seven Parisian inches. 7. A great span, (dodran), the distance between the extremity of the thumb and that of the little finger, when extended: equal to nine inches. 8. A foot, (pied), measuring from the elbow to the base of the thumb: equal to 12 Parisian inches. 9. A cubit, (cubitus), from the elbow to the extremity of the middle finger: equal to 17 inches. 10. An arm-length, (brachium), from the arm-pit to the extremity of the middle finger: equal to 24 Parisian inches, or two feet. 11. A fathom, (orga), the measure of the human stature; the distance between the extremities of the two middle fingers, when the arms are extended: equal, where greatest, to six feet.

Measure is also used to signify the cadence and time observed in poetry, dancing, and music, to render them regular and agreeable.

The different measures or metres in poetry, are the different manners of ordering and combining the quantities, or the long and short syllables. Thus, hexameter, pentameter, iambic, sapphic verses, &c. consist of different measures.

In English verses, the measures are extremely various and arbitrary, every poet being at liberty to introduce any new form that he pleases. The most usual are the heroic, generally consisting of five long and five short syllables, and verses of four feet; and of three feet and a cælura, or single syllable.

The ancients, by variously combining and transposing their quantities, made a vast variety of different measures. Of words, or rather feet of two syllables, they formed a sponde, consisting of two long syllables, a pyrrhic, of two short syllables; a trochee, of a long and a short syllable; and an iambic, of a short and a long syllable.

Of their feet of three syllables they formed a mollius, consisting of three long syllables; a sponde, of three short syllables; a dactyl, of one long and two short syllables; and an anapest, of two short and one long syllable. The Greek poets contrived 124 different combinations or measures, under as many different names, from feet of two syllables to those of fix.

Measure in Music, the interval or space of time which the person who beats time takes between the raising and falling of his hand or foot, in order to conduct the movement, sometimes quicker, and sometimes slower, according to the kind of music, or the subject that is sung or played.

The measure is that which regulates the time we are to dwell on each note. See Time.

The ordinary or common measure is one second, or 60th part of a minute, which is nearly the space between the beats of the pulse or heart; the sylloge, or contraction of the heart, answering to the elevation of the hand; and its dilatation, or dilatation, to the letting it fall. The measure usually takes up the space that a pendulum of two feet and an half long employs in making a swing or vibration. The measure is regulated according to the different quality or value of the notes in the piece; by which the time that each note is to take up is expressed. The semibreve, for instance, holds one rife, and one fall: and this is called the measure, or whole measure; sometimes the measure-note, or time note: the minim, one rife, or one fall: and the crotchet, half a rife, or half a fall, there being four crotchets in a full measure.

Measure Binary or Double, is that wherein the rife and fall of the hand are equal.

Measure Ternary or Triple, is that wherein the fall is double to the rife: or where two minims are played during a fall, and but one in the rife. To this purpose, the number 3 is placed at the beginning of the lines, when the measure is intended to be triple; and a C, when the measure is to be common or double. This rising and falling of the hands was called by the Greeks μήτρα and βρέχω. St Augustine calls it planfas, and the Spaniards compass. See Arsis and Titas.

Powder Measures in Artillery, are made of copper, and contain from an ounce to 12 pounds; these are very convenient in a siege, when guns or mortars are loaded with loose powder, especially in ricochet flying, &c.

MEASURING, or Mensuration, is the using a certain known measure, and determining thereby the precise extent, quantity, or capacity of any thing.

Measuring, in the general, makes the practical part of geometry. From the various subjects whereon
MEAT. See Food, Diet, Drink, &c.

Amongst the Jews, several kinds of animals were forbidden to be used as food. The flesh with the blood, and the blood without the flesh, were prohibited; the fat also of sacrificed animals was not to be eaten. Roast meat, boiled meat, and ragouts, were in use amongst the Hebrews, but we meet with no kind of feafood except salt, bitter herbs, and honey.

They never mangled milk in any ragout or hash, and never eat at the same meal both meat and milk, butter or cheese. The daily provision for Solomon's table was 30 measures of fine wheat flour, 60 of common flour, 20 loaves of oxen, 20 picture oxen, 100 sheep, besides venison and wild-fowl. See Luxury.

The principal and most necessary food among the ancient Greeks was bread, which they called τριστας, and produced in a wicker basket called μασις. Their loaves were sometimes baked under the ashes, and sometimes in an oven. The barley meal was used amongst the Greeks, which they called σπόρος. They had a frequent dish called έμμα, which was a composition of rice, cheese, eggs, and honey, wrapped in fig-leaves. The μασις was made of cheese, garlic, and eggs, beaten and mixed together. Their bread, and other substitutes for bread, were baked in the form of hollow plates, into which they poured a sauce. Garlic, onions, and figs, seem to have been a very common food amongst the poorer Athenians. The Greeks, especially in the heroic times, ate flesh roasted; boiled meat seldom was used. Fish seems not to have been used for food in the early ages of Greece.

The young people only, amongst the Lacedemonians, ate animal food; the men and the old men were supported by a black fowl called μωλος, which to people of other nations was always disagreeable meat. Grasshoppers and the extremities or tender shoots of trees were frequently eaten by the poor among the Greeks. Eels dressed with beet root was esteemed a delicate dish, and they were fond of the jowl and belly of salt-fish. Neither were they without their sweet-meats: the ancient consisted frequently of fruits, almonds, nuts, figs, peaches, &c. In every kind of food we find salt to have been used.

The diet of the first Romans consisted wholly of milk, herbs, and roots, which they cultivated and dressed with their own hands; they also had a kind of gruel, or coarse groat пап, composed of meal and boiling water; this served for bread: And when they began to use bread, they had none for a great while but of unmixed rye. barley-meal was eaten by them, which they called Φολέντα. When they began to eat animal food, it was esteemed a piece of luxury, and an indulgence not to be justified but by some particular occasion. After animal food had grown into common use, the meat which they most frequently produced upon their tables was pork.

Method of Preserving Flesh-Meat without Spices, and with very little Salt. Jones, in his Miscellanea Curiosa, gives us the following description of the Moorish Eschelle, which is made of beef, mutton, or samel's flesh, but chiefly beef, and which they cut all in long slices, and let it lie for 24 hours in a pickle. They then remove it out of those jars or tubs into others with water; and when it has lain a night, they take it out, and put it on ropes in the sun and air to dry. When it is thoroughly dried and hard, they cut it into pieces of two or three inches long, and throw it into a pan or caldron, which is ready with boiling oil and fat sufficient to hold it, where it boils till it be very clear and red when cut. After this they take it out, and let it to drain; and when all is thus done it stands to cool, and jars are prepared to put it up in, pouring upon it the liquor in which it was fried; and as soon as it is thoroughly cold, they stop it up close. It will keep two years; will be hard, and the hardest they look upon to be the best done. This they dished up cold, sometimes fried with eggs and garlic, sometimes stewed, and lemon squeezed on it. It is very good any way, either hot or cold.

MEATH, commonly so called, or otherwise East Meath: A county of Ireland, in the province of Leinster, bounded on the north, the Irish channel on the east, Kildare and Dublin on the south, and West Meath and Longford on the west. It is a fine campaign county, aboundehg with corn, and well inhabited. It returns 14 members to parliament; and gives title of earl to the family of Brabanan. It contains 326,480 Irish plantation acres, 139 parishes, 12 baronies, and six boroughs; chief town Trim. This district being the most ancient settlement of the Belgians in Ireland, the inhabitants were esteemed the eldest and most honourable tribe from which seniority their chieftains were elected monarchs of all the Belgae; a dignity that was continued in the Hy-n-Faullan without intermission until the arrival of the Caledonian colonies, under the name of Tuatha de Danann, when Conor-Mor, chief-tain of these people, obtained or rather usurped the monarchical throne, obliged Eochy Failloch, with several of his people, to cross the Shannon, and establish themselves in the present county of Roscommon, where Croitha founded the palace of Atha or Croghan, a circumstance which brought on a long and bloody war between the Belgian and Caledonian races, which was not finally terminated until the close of the 4th century, when the Belgian line was restored in the person of O'Neill the great, and continued until Brian Borom usurped the monarchical dignity, by depoyng Malachy O'Malachi, about the year 1001. Taithal Tetchomor, by a decree of the Tarah assembly, separated certain large tracts of land from each of the four provinces, where the borders joined together; whence under the notion of adopting this spot for demeane lands to support the royal household, he formed the county or kingdom of Meath, which afterwards became the peculiar inheritance of the monarchs of Ireland. In each of the portions thus separated from the four provinces, Taithal canfled palaces to be erected, which might adorn them, and commemorate the name in which they had been added to the royal domain. In the track taken out of Munster, he built the palace called Flachtras, where the sacred fire, so called, was kindled, and were all the priests and druids annually met on the last day of October; on the evening of which day it was enacted, that no other fire should
Meath.

MEATH AUDIORIUS. See ANATOMY, § 139.

The second royal palace was erected in the proportion taken out of Connaught, and was built for the assembly called the convocation of Veinreach, at which all the inhabitants were summoned to appear on the 1st day of May, to offer sacrifice to Bel or Bel, the god of fire, in whose honour two large fires being kindled, the natives used to drive their cattle between them, which was supposed to be a preservative for them against accidents and distempers, and this was called Beal-Timne, or Bel-Timne, or the festival of the god of fire. The king of Connaught at this meeting claimed a horse and arms from every lord of a manor or chieftain, as an acknowledgment for the lands taken from that province, to add to the territory of Meath. The third was that which Tailtean erected in the part taken from Ulster, where the fair of that name was held, which was remarkable for this particular circumstance, that the inhabitants brought their children thither, males and females, and contracted them in marriage, where the parents having agreed upon articles, the young people were joined accordingly; every couple contracted at this meeting, paid the king of Ulster an ounce of silver by way of acknowledgement. The royal mansion of Tarah, formerly destroyed by fire being re-built by Tuathal, on the lands originally belonging to the king of Leinster, was reckoned as the fourth of those palaces; but as a fabric of that name had stood there before, we do not find that any acknowledgment was made for it to the king of Leinster.

Meath, with Clonmacnois, is a bishop's see, valued in the king's books at L. 373: 10: 4; Sterling, by an extent returned anno 26th Elizabeth; but, by a former extent taken anno 30th Henry VIII. the valuation amounts to L. 373, 12: s, which being the largest and most profitable for the king, is the measure of the fifth fruits at this day. This see is reputed to be of ancient origin, originally belonging to the king of Leinster, was reckoned as the fourth of those palaces; but as a fabric of that name had stood there before, we do not find that any acknowledgment was made for it to the king of Leinster.

MEATH. See WESTMEATH.

MEATUS AUDITORIUS. See ANATOMY, § 139.

MEAX, an ancient town of France, in Brie, with a bishop's see, seated in a place abounding in corn and cattle, on the river Mars, which divides it into two parts, and its trade consists in corn, wool, and cheese.

w. Long. 2° 58'. Lat. 48° 58'.

MECEANAS, or MECENAS (C. Cilnius), a celebrated Roman knight, descended from the kings of Etruria. He has rendered himself immortal by his liberal patronage of learned men and of letters; and to his prudence and advice Augustus acknowledged himself indebted for the security he enjoyed. His fonnetes for pleasure removed him from the reach of ambition; and he preferred dying, as he was born, a Roman knight, to all the honours and dignities which either the friendship of Augustus or his own popularity could heap upon him. To the inference of Mecenas, Virgil owed the retribution of his lands; and Horace was proud to boast that his learned friend had obtained his forgiveness from the emperor, for joining the cause of Brutus at the battle of Philippi.

Mecenas was himself fond of literature; and, according to the most received opinion, he wrote a history of animals, a journal of the life of Augustus, a treatise on the different natures and kinds of precious stones. Besides the two tragedies Octavia and Phormeeus, and other things all now lost. He died eight years before Christ; and on his death-bed he particularly recommended his poetical friend Horace to the care and confidence of Augustus. Seneca, who has liberally commended the genius and abilities of Mecenas has not with-held his censure from his dissipation, indolence, and effeminate luxury. From the patronage and encouragement which the princes of heroic and lyric poetry among the Latins received from the favourite of Augustus, all patrons of literature have ever since been called Mecenates. Virgil dedicated to him his Georgics, and Horace his odes.

MECCA, an ancient and very famous town of Asia, in Arabia the Happy; seated on a barren spot, in a valley surrounded with little hills, about a day's journey from the Red-Sea. It is a place of no strength, having neither walls nor gates, and the buildings are very mean. That which supports it is the return of a great many thousand pilgrims annually, for the shops are fearcely open all the year besides. The inhabitants are
The hills about the town are very numerous; and consist of a blackish rock, some of them half a mile in circumference. On the top of one of them is a cave, where they pretend Mahomet usually retired to perform his devotions, and hither they affirm the greatest part of the Alcoran was brought him by the angel Gabriel. The town has plenty of water, and yet little garden-stuff; but there are several sorts of good fruits to be had, such as grapes, melons, water-melons, and cucumbers. There are also plenty of sheep brought thither to be sold to the pilgrims. It stands in a very hot climate; and the inhabitants usually sleep on the tops of their houses for the sake of coolness. In order to protect themselves from the heat through the day, they carefully shut the windows, and water the streets to refresh the air. There have been instances of persons suffocated in the middle of the town by the burning wind called Simoom.

As a great number of the people of distinction in the province of Hedsjas stray in the city, it is better built than any other in Arabia. Amongst the beautiful edifices it contains, the most remarkable is the famous Kaba, or Caaba, "The house of God," which was built in great veneration by the Arabs even before Mahomet's time.

No Christian dare go to Mecca; not that the approach to it is prohibited by any express law, or that the sensible part of the Mahometans have anything to object to it; but on account of the prejudices of those who, regarding this ground as sacred, think Christians unworthy of letting their foot on it; it would be profaned, in the opinion of the superstitious, if it was trod upon by infidels. The people even believe, that Christians are prevented from approaching by some supernatural power; and they tell the story of an infidel, who having got so far as the hills surrounding Mecca, all his goods were taken from him, and he was not permitted to continue his journey, and then he was permitted to continue his journey.

Although the Mahometans do not allow Europeans to go to Mecca, they do not refuse to give them descriptions of the Kaba, and information with regard to that building; and there are persons who gain their bread by making designs and little pictures of the Kaba, and selling them to pilgrims. See Caaba.

The Mahometans have so high an opinion of the sanctity of Mecca, that they extend it to the places in the neighbourhood. The territory of that city is held sacred to certain distances, which are indicated by particular marks. Every caravan finds in its road a similar mark, which gives notice to the pilgrims when they are to put on the modest garb in which they must appear in those sacred regions. Every Mussulman is obliged to go once in his life, at least, to Mecca, to perform his devotions there. If that law was rigourously enforced, the concourse of pilgrims would be prodigious, and the city would never be able to contain the multitudes from all the countries where the Mahometan religion prevails. We must, therefore, suppose, that devotes alone perform this duty, and that the others can easily dispense with it. Those whose circumstances do not permit a long absence, have the liberty of going to Mecca by a substitute — A hired pilgrim, however, cannot go for more than one person at a time; and he must, to prevent frauds, bring an attestation in proper form, from an Imam of Mecca, that he has performed the requisite vows. Again, if on behalf of such a person, either alive or dead; for after the decease of a person who has not obeyed the law during his life, he is still obliged to perform the journey by proxy.

The caravans, which are not numerous, when we consider the immense multitude of the faithful, are composed of many people who do not make the journey from purposes of devotion. These are merchants, who think they can transport their merchandize with more safety, and dispose of them more easily; and contractors of every kind, who furnish the pilgrims, and the soldiers who escort the caravans, with necessaries. Thus it happens, that many people who have gone often to Mecca, solely from views of interest. The most considerable of those caravans is that of Syria, commanded by the Pacha of Damascus. It joins at some distance the second from Egypt, which is conducted by a Bey, who takes the title of Emir Hadsji. One comes from Yemen, and another, less numerous, from the country of Lachfa. Some fattered pilgrims arrive by the Red Sea from the Indies, and from the Arabian establishments on the coasts of Africa. The Persians come in that which departs from Bagdad; the place of conductor to this last is befowed by the Pacha, and is very lucrative, for he receives the ransoms of the heretical Persians.

It is of consequence to a pilgrim to arrive early at the holy places. Without having been present from the beginning at all the ceremonies, and without having performed every particular act of devotion, a man cannot acquire the title of Hadsji: this is an honour very much coveted by the Turks, for it confers real advantages, and makes those who attain it to be much respected. Its infrequency, however, in the mahometan dominions, shows how much the observation of the law commanding pilgrimages is neglected. A similar custom prevails among the Oriental Christians, who are also exceedingly emulous of the title of Hadsji or Mokdai, which is given to pilgrims of their communion. In order to acquire this title, it is not sufficient that the person has made the journey to Jerusalem; he must also have kept the pasover in that city, and have assisted at all the ceremonies of the holy weeks.

After all the essential ceremonies are over, the pilgrims next morning move to a place where they lay Abraham went to offer up his son Isaac, which is about two or three miles from Mecca, where they pitch their tents, and then throw seven small stones against a little square stone building. This, as they affirm, is performed in defiance of the devil. Every one then purchases a sheep, which is brought for that purpose, eating...
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eating some of it themselves, and giving the rest to the poor people who attend upon that occasion. Indeed these are miserable objects, and such starved creatures, that they seem ready to devour each other. After all, one would imagine that this was a very

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The mechanical philosophy is the fame with what is otherwise called corporeal philosophy. See Corpuscular.

This manner of reasoning is much used in medicine; and, according to Dr. Quincy, is the result of a thorough acquaintance with the structure of animal bodies: for considering an animal body as a composition of the fame matter from which all other bodies are formed, and to have all those properties which concern a physician's regard, only by virtue of its peculiar construction; it naturally leads a person to consider the several parts, according to their figures, contexture, and use, either as wheels, pulleys, wedges, levers, screws, cords, canals, flainers, &c. For which purpose, continues he, it is frequently found helpful to design in diagrams, whatever of that kind is under consideration, as is customary in geometrical representations.

For the application of this doctrine to the human body, see the article MEDICINE.

Mechanical, in mathematics, denotes a construction of some problem, by the assistance of instruments, as the duplication of the cube and quadrature of the circle, in contradiction to that which is done in an accurate and geometrical manner.

Mechanical Curve, is a curve, according to Descartes, which cannot be defined by any algebraic equation; and stands contradistinguished from algebraic or geometrical curves.

Leibnitz and others call these mechanical curves transcendental, and different from Descartes, in excluding them out of geometry. Leibnitz found a new kind of transcendental equations, whereby these curves are defined: but they do not continue constantly the same in all points of the curve, as algebraic ones do. See the article TRANSCENDENTAL.

M E C H A N I C S.

IN the strict sense of the word, denotes the method of constructing machines to be set in motion, and to answer some useful purposes, by certain powers, either natural or artificial. According to this definition, the nature of the powers themselves is not the object of mechanical investigation, but rather the effect of them upon the passive bodies which we call machines; and the constructing of these in such a manner, that the powers may act upon them with the least possible obstruction, and produce the intended effect to the greatest advantage, is the perfection of Mechanics.

It is usual, in treatises upon this subject, to begin with an investigation of the properties of matter itself, and of central forces; but the former is not to be investigated by mechanical means, and the latter belong so much to astronomy, that very little needs to be said upon them in this place; for which reason we refer to the articles ASTRONOMY, MATTER, and MOTION, for a discussion of these subjects. In treating of mechanics, therefore, we shall begin with a description of what are commonly called the mechanical powers; and afterwards consider the various ways in which they may be modified, in order to produce the effects expected from them.

SECT. I. Of Material or Mechanical Power in general.

§ 1. Production of Motion and Rest.

In mechanics every thing is called a power which is capable of acting on a solid body; and every power which can act upon matter is supposed to be material, without regarding any abstruse speculations concerning its nature. Hence the force of gravity, of electricity, of fire, of air, of water, the power of animals, of bodies pressing or impinging with violence upon one another, are all accounted mechanical powers when applied to set machines in motion.

When any moving power is stopped by a fixed obstacle, so that it can proceed no further, we say that it is resisted by that obstacle. In this case we are apt to imagine that there is no force exerted by the resistive obstacle; but it is found by experience, that resistance is a total impediment to motion in any direction.
Mechanical power equal and contrary to that which is impelled against the resisting obstacle. This is exemplified in the case of a man standing in a boat, and pulling with a pole against the bank of a river or lake. In this case every one knows that the boat will go off in a direction contrary to that in which he pulls; but if the boat be fastened by means of a hook and a rope to that part of the pole which is between the man's body and the bank, the boat will remain immovable by reason of the equality between the force to the pull given by the pole C and the rope E, the boat on the pole forward, and of the contrary forces. Thus, in fig. 1, let us suppose that any assignable power is applied to the point E, urging it from E towards D; the whole of that force will rest upon the point of contact between the ball C and the line BD. The weight, if placed exactly perpendicular to the horizon will remain upright, without inclining either to one side or other; for the power of resistance in the line BD is exactly equal to the impulse of the weight lying upon E; so that it is in the same situation with the man and boat in the first example, when he had the boat hooked to the pole with which he pulled against the bank. If instead of opposing the end of the resisting body BD to the ball C, we place them in the position represented in fig. 3, then the whole of the power will rest upon any point of the line BD we please. For if we suppose the line EC to drive the line BD before it in the position represented in the figure, it is plain that the whole force of that line will be discharged for a moment upon the line F, or upon any obstacle we choose to put in its way in another part of the line; but if we place two supports or resistances to the moving line BD, as F and G in fig. 4, it is equally plain, that one half of the power will rest upon the one and one half upon the other. For the whole force urging forward the line BD is but a certain and determined quantity; and if divided between two obstacles, each of these must undoubtedly bear one half. In like manner, if, as in fig. 5, the power be opposed by four obstacles, each of them will bear only one fourth part, and so on if we suppose it opposed by ever so many. For reasons afterwards to be assign'd, however, it is absolutely necessary that the force on E at a line directly perpendicular upon BD; that the obstacles be all at equal distances, comparatively speaking, from C; as H and I, F and G, &c. likewise that they be of exactly the same height, &c. But if the resistance is opposed by a single obstacle, and consequently the motion, can be made uniform in all parts. On this principle depends in a great measure the perfection of printing presses, oil presses, and all other machines intended to produce a violent and uniform pressure upon any broad and flat surface.

As the pressure upon a single point may thus be diffused over a broad surface, so may that upon a broad surface be concentrated upon a single point or a surface of small dimension, as in fig. 6. Here it is plain that whatever pressure is applied to the line AB, or any part of it in a perpendicular direction, must be fulfilled by the point D; for if there was no resistance, this point would be driven along with the line AB, and the moment it was stopped the power which urged it on must likewise be stopped. It is true, that unless the power act directly perpendicular to the point D, or the line CD be supported that it cannot move either to one side or to another, the impulse will be but momentary; but of this we shall treat at large in the subsequent part of this article. On the principle just mentioned depends in a great degree the force on gimlets, augers, boring gimlets, &c.
§ 4. Of changing the Direction of a Power into one directly opposite.

This in all cases is only to be accomplished by the application of a power greater than that of which we wish to change the direction. Thus, in fig. 2. suppose we wish to change the direction of the power at E from the direction AC to that of CB, we will find it impossible to do so by any other means than the application of a greater power from D towards C. If the two powers are equal, there will be no motion whatever, and the degree of motion produced at last will only be the difference between the two powers.

If it be wanted therefore to produce a power in the direction CA, equal and opposite to that in the direction CA, one must be applied in the direction CA double to the former. This principle is different from the first mentioned, in which motion is produced by pushing against a fixed obstacle while the moving power is not retorted on the opposite side; for here the power of gravity, or whatever we suppose to act upon E, results according to its quantity, and the whole is in the situation of the boat when hooked to the pole fig. 1. To produce motion, therefore, a new force must be applied, as if a person was to pull from the bank D against the hooked pole of the boat in that figure. The principle just now laid down does not militate against the apparent action of bodies by the action of gravity, or the repulsion of elastic balls from another by what is called the power of elasticity. In both cases a greater power is applied than the simple force of gravity, and with the excess of this power the body attends, as shall be afterwards shown.

§ 5. Of the Motion produced by two or more Powers acting upon a Body in directions oblique to each other.

As the action of two powers in direct opposition to each other is attended with the destruction of both if the powers are equal; and of one of them if they are unequal; so the action of powers directed obliquely upon one another is productive of motions in various directions, according to that of the acting powers.

The motion produced by the action of two powers is always in the diagonal of the parallelogram expressed by these powers. Thus, in fig. 7, let the body A be acted upon at once by two forces, one of which would carry it from A to B in the same time that the other would carry it from A to C. The body will then describe AD, the diagonal of a square, in the time that it would have described one of the sides by a single power applied to it. This is in consequence of its obeying both forces; as it is evident that it has moved as far as from A to B, and likewise from A to C, which is precisely the effect that the two powers would have had upon it separately. In this case the body has acquired a greater power than it would have had from a single power, but less than it would have acquired from the union of the two powers if they had acted directly in concert with each other: because the diagonal of a square is less than the sum of the sides, and the power with which any body moves is exactly proportioned to its velocity. If, instead of supposing the forces equal, we suppose one of them considerably greater than the other, then the greater force will carry the body farther in its own direction than the other, and the whole will be represented by a parallelogram, as in fig. 8. In this case it is evident that the body has moved exactly in conformity to the direction of both powers, viz. the whole length of AB, and the whole length of AC. In this case the loss of motion is less than in the former; because the length of the oblong parallelogram approaches much nearer to the sum of the sides than the diagonal of a square; and the greater inequality there is between the sides, the less power is lost.

If instead of acting at right angles to each other, the direction of the powers forms an acute angle, as in figs. 9. 10. 11. the power produced will be considerably greater than either of the original ones; and the more acute the angle is, the greater will be the augmentation, as is evident from an inspection of the figures. The reason of this, though not quite so obvious, is the same with the former. Thus the body A in fig. 9. had it been acted upon by only one power, viz. that denoted by AB, would have been at B, or carried as far forward as E, the half of the diagonal; its oblique direction upward not being taken into the account. Had it been acted upon by the force AC alone, it would have been at C with an obliquity as far down as the other is up. As these obliquities, however, are in contrary directions, they must of necessity destroy one another; and therefore the body moves neither to one side nor another, but proceeds with the same of the direct forces of the powers, or thafe by which they move in the straight diagonal. But either of the two powers would have brought it forward as far as E; of consequence both conjoined must carry it on to D, the whole length of the diagonal. Thus it appears, that when a body is acted upon by two powers which partly conspire together, the power produced will be the exact sum of them as far as they do conspire, and the loss arises entirely from the opposition between them; for all powers which do not directly conspire, oppose one another in a certain degree. Hence when the acting forces make an obtuse angle with each other, as in figs. 12. 13. there is then a very great loss of power, because there is such an opposition between them; and it is only that small part of their motion which acts in concert that can produce any in the body acted upon: but this, as in the former case, is exactly double to what it would be if only one of them acted upon the body. Thus, in fig. 12. the whole direction of the powers from E to B, and from B to C, is in absolute opposition to each other; and therefore, supposing them equal, must be totally lost. In the direction AD they conspire; and therefore the body will move twice as far in that direction as is expressed by that of the lines in the figure; that is, from A to D, instead of only from A to E, which is the limit of each of the forces. In cases of this kind, the more obtuse the angle is at which the forces act, the greater is the loss of power, as is evident from an inspection of figs. 12. 13.

Some who are but beginning to the study of mechanics may be embarrassed in their ideas how two forces acting at right angles to each other can in any manner of way oppose each other, as in fig. 7. And we find that a body descending by the force of gravity pointed may rest.
may be pushed to a side seemingly by the least force imaginable. But this will really be understood from fig. 14, which is only a square turned into another form. Now it is plain that any powers AB and AC oppose each other as much as they confpire; that is in the proportion of half the diagonal of the square; this quantity therefore is totally lost, and the body proceeds with the other half; which being doubled on account of each of the powers proceeding with one half of the diagonal, gives the whole diagonal for the total motion produced.

But however plain this may appear from an inspection of the figure, it is by no means so apparent when we come to try it by numbers. Thus, supposing each of the sides AB and AC to be \(5\), the diagonal of the square will be nearly \(7.071\); but if from the sum of the sides \(10\) we take this number, or half of it from each number, we will have only \(2.071\) for the whole motion, instead of the diagonal \(7.071\), which is the reality. From an inspection of the figure also we plainly see, that if one diagonal is gained by the powers confiring together or acting in concert, another is lost by their opposition. It is natural therefore to inquire, How can any two powers gain or lose more than their own quantity; for the two powers taken together amount to \(10\), but the two diagonals, one of which is gained and the other lost, amount between them to upwards of \(14\) ! To solve this seeming paradox, we must consider, that as the diagonal of the square \(ABCD\), fig. 14, is generated from the two sides \(AB\) and \(CD\), to these sides may be accounted the diagonals of two other smaller squares \(ABE\) and \(AEC\), fig. 15, each of the sides of which is half the diagonal of the large one. From the sum of the sides of these squares, which to the large square are the source of power, it is evident that a diagonal may be taken and another remain, because each of the sides of the half is a diagonal.

All powers are compounded of others.

Hence we not only see that every mechanical power we are acquainted with may be derived from two others, but have a demonstration that it actually is so; not only because this supposition explains the phenomena, but because we are involved in an inexplicable confusion; for if we suppose, with Hooke, that one power can lose more than its own quantity; and if it loses more than one half, it can never produce effects equivalent to another half; which we cannot but be the case, if we suppose any two unoriginated powers acting upon one another at right angles, or indeed any other way, though the supposition of their acting at right angles makes the matter more plain than any other. This leads to a very curious speculation concerning the origin of mechanical motion, of which an account is given under the article Motion.

Hitherto we have considered both the powers not only as equal at the beginning, but as continuing so throughout their whole course; but this is a supposition which we are not likely to be convinced of by such a method. Thus, in fig. 16, supposing the body \(A\) pulled in the direction \(AB\) by the weight \(D\) of five pounds put over the fixed pin \(B\), and pulled in the direction \(AC\) by \(C\), another weight of five pounds fastened to it by a string; the whole will be kept in the position represented in the figure by a weight of \(7.071\) pounds fastened to it by a string, and put over the pin \(F\), situated anywhere in the diagonal line \(FG\); and let us add ever so much weight, provided it be done to \(D\) and \(C\) in the proportion of five, and to \(E\) in that of \(7.071\), the body \(A\) will remain suspended in the air without altering its position in the least.

If, instead of making the weights equal, we make one exceed the other in any proportion, the weight of the parallelogram of which the weights represent the sides. Thus, in fig. 17, if we suppose the body \(A\) pulled in the direction \(AB\) by the weight \(G\) of four pounds, and in the direction \(AC\) by the weight \(H\) of three pounds, it will be kept suspended by the weight \(F\) of five pounds put over the pin \(E\), placed anywhere in the diagonal line \(ED\). For the diagonal \(AD\) is equal (by Prop. 47. Book I. of Euclid) to the square-root of the sum of the squares of the sides \(AB\) and \(AC\), or \(CD\) and \(BD\). But the square of \(AB\) is \(4 \times 4 = 16\) pounds, and of \(AC\) is \(3 \times 3 = 9\) pounds by the supposition; and \(16+9 = 25\), the square-root of which is \(5\); and these proportions will be found to hold invariably in whatever way we apply mechanical powers; though, when they act at oblique angles, the diagonals must be calculated by other methods.

If, however, we set any of the powers at liberty, we shall find that none of them will continue the same for a moment. If we suppose the power of gravity, which is the most constant and equal to any other remaining power, at the end of that moment it will be at the extremity of the diagonal of the small square \(Abcd\); but if now the force \(Ac\) is increased to double what it was in the preceding moment, the body will at the end of the second moment be at \(g\), the extremity of the parallelogram \(defg\); and by another increment of the same power, the body will be at the end of the third moment at \(k\), and so on. This is similar to the motion of falling bodies, of which we shall treat hereafter; but if one of the other powers diminishes instead of increasing, the phenomena will be different. Thus in fig. 19, supposing the body at \(A\) to be actuated at the first moment by the two forces \(Ab\) and \(Ac\); at the end of that moment it will be at the extremity of the diagonal \(Ad\); but next moment, supposing the power \(Ac\) to be diminished one half, the other remaining the same, it will then be at \(g\), and the third moment at \(k\), thus describing another kind of curve. If, while one of the other powers decreases the other increases, a third kind of curve will be generated; and by proper management of these powers, the body may be made to describe the segment of a circle, as in fig. 20:
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A Machine for showing the action of oblique powers. Fig. 21.

where it is manifest that one power continually decreases while the other increases.

The following machine has been contrived to illustrate the operation of oblique powers upon each other. ABCD is a wooden square, so contrived that the part BEFC may draw out from it or be pushed back at pleasure. To this is joined a pull H, freely moving upon its axis, which will be at H when the piece is pushed in, and at $ when it is drawn out. To this part let the ends of a straight wire & be fixed, so as to move along with it under the pulley; and let the ball G be made to slide easily upon the wire. A thread $ is fixed to this ball, and goes over the pulley to $; by which means the ball may be drawn up on the wire parallel to the side AD, when the part BEFC, is pulled as far as it will go into the square: but when this part is drawn out, the ball must be carried along with it parallel to the bottom of the square DC. Thus the ball may be drawn either perpendicularly upward by pulling the thread $, or moved horizontally by pulling out the part BEFC, in equal times and through equal spaces, each power acting equally and separately upon it. But, if the ball is at G, the upper end of the thread be tied to the pin I, in the corner A of the fixed square, and the moveable part BEFG be drawn out, the ball will then be acted upon by both the powers together: for it will be drawn up by the thread towards the top of the square, and at the same time carried with its wire & towards the right hand BC, moving all the while in the diagonal line L, and will be found at $ when the sliding part is drawn out as far as it was before: which then will have caused the thread to draw up the ball to the top of the inside of the square just as high as it was before when drawn up singly by the thread without moving the sliding part.

If a body is acted upon by three forces, the investigation becomes somewhat more complex, though it is still easily explained on the foregoing principles. Thus, in fig. 22, let the body A be pulled sidewise in opposite directions by the two equal weights G G put over the pins B and C, and moving horizontally by the weight H, the same with G. In this case it is plain that each of the weights G and G sustains one half of the weight H; and as both taken together are double in quantity to H, it might be supposed that they would be abundantly able to keep the body A in its position. The case, however, is very different. As each of the weights G sustains only one half of H, it follows that A acts only with one half of its weight upon them. The body A, therefore, is pulled in the direction AC and AB by two powers, each of which is as 2, and in the direction AF by two, which are only as one. With the force AB, therefore, were it to act upon it singly, it would describe the diagonal AD, and with that AC it would describe the diagonal AE. These two diagonals are in truth the forces by which it is now resisted, and the effect is precisely according to the principles already laid down. By each of them taken separately, the body would be brought down to F; their lateral action being in opposite directions destroys itself: and by their conjunct action, the body would be brought down to double the space AF, that is to H, and consequently would describe the diagonal of the small square ADHE; which diagonal is equal to the side of the large one, and the very same that the body would have described though the two lateral weights had not been present. Hence it appears, that though we pull a body ever so strongly by strings in a direction opposite to each other, it will still require an equal weight to retain it in equilibrio; that is, supposing the strings to be perfectly flexible. There may indeed be a deception in making an experiment of this kind; for the body will never descend as far as H, nor near that distance; but then it must be observed, that when the strings begin to bend in the middle, the weights GG act in a direction different from what they did originally, and pull the body upwards instead of laterally: in which case, it must either remain at rest, as in fig. 23, or move upwards, as in fig. 24.

When the powers act in the direction AB and AC, fig. 23, one half of the weight H is sustained by each of them. The body is therefore pulled in the directions AB and AC by two powers, each of which is as 2; and in the direction AF by other two, each of which is as 1. By the power AB it would be made to move in the diagonal AD of the parallelogram ABDF; and by the power AC, in the diagonal AE of the parallelogram ACFE; but these diagonals are equal and contrary to each other, and therefore destroy each other; of consequence the body remains at rest.

In fig. 24, the body A with the weight H appended to it is placed nearer to the point B than to C by one third. Of consequence, as will afterwards be explained, it bears two-thirds of the weight H, while C sustains only one-third. The acting powers, therefore, are now the diagonals of two unequal parallelograms. One power draws the body in the direction AB with a force as 3, while the weight H draws it in the direction AH with a force as 2. By it, therefore, the body would be drawn in the direction of the diagonal AD of the parallelogram BDEA. On the other hand, it is acted upon by the power AC, which is likewise as 3, while the weight H draws it down with a force only as 1. By this, therefore, it would be drawn in the direction of the line AG, the diagonal of the parallelogram ACGF. We must now make these two diagonals the sides of a third parallelogram ADIG; and in the diagonal AI of this parallelogram it will go, for the reasons already given.

If four or more forces act upon a body in different directions, the case becomes very complicated; and if acted upon by many powers or employed, it will by no means be easy by four or more methods to determine a precise way which the body will tend. Cases of this kind, however, seldom occur in practical mechanics; and when they do, it will be better to determine them by actual experiment than by a tedious investigation, which, after all, may be liable to a mistake. We forbear, therefore, to give more examples; though if the reader inclines to exercise his ingenuity, he must proceed upon the plan already laid down, viz. by combining the different powers together, for any diagonal from these parallelograms; combining these diagonals into a third set of parallelograms; and the diagonals thence resulting into a fourth set, &c. until that last single one is met with prevailing over all the rest or two destroying each other. If one prevails, the body
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§ 6. Of the Relation Between Velocity and Power.

Hitherto we have supposed the bodies to be moved not only to make any resistance to motion in any direction, unless opposed a fixed obstacle; in which case, velocity and power would be the same thing; and thus it always appears to be when we represent bodies by lines upon paper. But when we come to practice, matters turn out very different. A ball of cork moving with any degree of velocity will not have an equal power with one of wood moving with the same velocity; neither will a wooden ball have the same power with a metallic one. Among the metals themselves, too, there is a difference; for the lighter metals are inferior in power to the heavier ones. Gravity, therefore, must be accounted the power which gives to moving bodies what we call their force or momentum; for according to the weight of a body, so will its impulse always be, and that whether it moves upwards, downwards, sidewise, or in a circle. The absolute power of a body, therefore, must be measured by comparing the gravity of different bodies together, and denoting one of them by unity: making the other 2, 3, 4, &c. according as it is twice, thrice or four times, the specific gravity of the former. Thus let an hollow ball of metal be filled with water; if the ball be very thin, we may let its weight pass unnoticed, or we may make allowance for it in the calculation. Supposing the weight of this ball then to be 1, if it moves with a velocity of 10 feet in a second, its absolute force or momentum will be 10 × 110 = 1000; a ball of stone of equal size which weighs three times as much as the former, if moved with an equal velocity, will have a force of 1000 inches; a ball of tin which weighs 7 times as much, will have a momentum of 700; and a ball of gold or platinum would have a momentum of 1700 or 2000.

This will also hold exactly by increasing the quantity of matter, where it is deficient in specific gravity. Thus, if the hollow metallic ball, be increased in diameter, so that it shall equal in weight the ball of iron or of metal, it will have the same force with that ball; and in like manner, it might be made to have a momentum equal to the metallic balls, though not without a very considerable increase of size. Great minds of matter will therefore supply the place of great velocity: and hence Mr. Atwood observes, that the balling ram used by the ancients were no less powerful in beating down the walls of cities than the modern artillery. "The battering-rams of the ancients (says he) consisted of very large beams of wood terminated by solid bodies of brass or iron; such a mass being suspended as a pendulum, and driven partly by its gravity and partly by the force of men against the walls of a fortification, exerted a force which, in some respects, exceeded the utmost effects of our battering-ram, though in others it was probably inferior to the modern ordnance. To compare the effects of the battering-ram, the metal extremity of which supposes equal 10 a cannon-ball of 24 pounds weight; in order that the two bodies may have the same effect in cutting a wall or making a breach in it, the weight of the ares must exceed that of the cannon ball in proportion of the square of 1700, the velocity of the ball*, to the square of the velocity with which the battering-ram could be made to impinge against the wall expressed in feet. If this may be estimated at 10 feet in a second, the proportion of the weights will be that of about 2860,000 to 100, or of 28,900 to 1; the weight of the battering-ram therefore must 346 ton. In this case the cannon-ram and the cannon-ball, moving with the velocities of 10 and 1700 feet respectively in a second, would have the same effect in penetrating the substance of an opposed obstacle; but it is probable that the weight of the ares never amounted to so much as is above described; and consequently the effects of the cannon ball to cut down walls by making a breach in them, must exceed those of the ancient battering-rams: but the magnitude of these, or the impetus whereby they communicated a shock to the whole building, was far greater than the utmost force of cannon-balls; for if the weight of the battering-ram were no more than 1700 times greater than that of a cannon-ball, each moving with its respective velocity, the momenta of both would be equal; but as it is certain that the weight of these ancient machines was far more than 1700 times our heaviest cannon-balls, it follows, that their moment or impetus to shake or overturn walls, &c. was far superior to that which is exerted by the modern artillery. And since the strength of fortifications will in general be proportioned to the means which are used for their demolition, the military walls of the moderns have been constructed with less attention to their solidity and massy weight than the ancients thought a necessary defence against the aries; that fort of cohesive firmness of texture which resists the penetration of bodies being now more necessary than in ancient times; but it is manifest, that even now solidity, or weight in fortifications also is of material consequence to the effective destruction of a wall or battery."
any frail instruments, where a sudden blow will cause a much deeper penetration than a weight vastly greater than could be stirred from the earth by the force of the blow.

§ 7. Of the Multiplication and Increase of Power.

We have now seen that power, absolutely so called, acts in a kind of double capacity, viz. either when it imparts a great velocity upon a small quantity of matter, or when it imparts a small velocity upon a great quantity of matter. It must, however, be remarked, that the matter or effect of all supposes subject to the laws of gravity; for what would be the consequence of putting a body in motion which had no gravity we cannot possibly conceive, because we never saw any such body. Philosophers indeed mention the *vis inerita* of matter as property distinct from gravity; but the arguments in favour of this property are now generally looked upon to be inconclusive, and gravity and the *vis inerita* looked upon to be the same.

The two modes in which absolute power acts, come precisely to the same thing whether the velocity be greater or small: for it is evident, that when two pounds move with the velocity of 4, it is the same thing with one pound moving with the velocity of 2; the velocities as well as powers being exactly the same. But there is a third way in which power may be directed, in which it has not the relation to velocity already mentioned; and that is, by simple pressure, where no motion is admitted. Thus may the smallest power be made to augment itself to an inconceivable degree, as in fig. 26. Here, suppose the body A to press directly downwards upon the line AB fastened to the small wheel B, moveable upon an axis. If we suppose the extremity of the line A to be supported so that it shall not fall to a side, the wheel B will press downward with the whole of the weight A upon the line EF, and consequently the line g must sustain the whole of this weight. But if the line EF be supported so that it cannot move perpendicularly downwards to g, it will then roll along the line EF from B towards F; and this tendency to roll in the direction just mentioned will be exactly equivalent to the weight A. Any body therefore laid on the top of a stick set up at an angle of 45 degrees, will require a power double to its own weight to keep it steady at the foot, abstracting from that which will be necessary to prevent it from falling to a side.

If now we suppose the wheel B to press laterally upon another C, and that other, by means of the line CD and wheel D, to press upon the two obstacles i and k, both of which it touches at an angle of 45 degrees; it is plain that not only each of these obstacles must bear the whole weight of the body A, but the reaction of the wheel D will press down the wheel C in the direction Ch with the very same force that D is pressed upwards. This is entirely similar to the case of the man in the boat represented in fig. 1. Thus the weight A produces a pressure equal to five times its own weight; and by multiplying the wheels and rods, we might increase the pressure as much as we please. The case is similar to that in hydraulics, where a little quantity of liquid may be made to burst the strongest vessel.

Plate (cxxxiv.)
MECHANICS.

Sect. II.

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15 Of the first kind of lever, the weight is to be raised and likewise that which raises it; so that the weight upon the fulcrum C must support both the weight to be raised and likewise that which raises it; so that the weight upon the fulcrum C must be the greater in proportion as the arm CB of the lever is shorter. Thus, if the arms are both equal, the fulcrum C must bear double the weight at A: if one arm is double the length of the other, then it has only to bear the weight to be raised, and one half more; because any weight at 2 will balance one double to itself at 1; but if removed to 10, the fulcrum will only have 1 1/2 to bear.

16 In levers of this kind, the fulcrum C must support both the weight to be raised and likewise that which raises it; so that the weight upon the fulcrum C must be the greater in proportion as the arm CB of the lever is shorter. Thus, if the arms are both equal, the fulcrum C must bear double the weight at A: if one arm is double the length of the other, then it has only to bear the weight to be raised, and one half more; because any weight at 2 will balance one double to itself at 1; but if removed to 10, the fulcrum will only have 1 1/2 to bear.

17 In some cases, the weight to be raised is placed between the acting power and the fulcrum, as in fig. 28. This lever is more powerful than the other, and is likewise more easily supported, because only part of the weight to be raised, and none of that which raises it, lies upon the fulcrum. Thus in fig. 28, let the extremity A of the lever AB rest upon a fulcrum at 0, and let the small weight 1, by means of a string put over the wheel or pin C, pull up the other extremity; this weight 1 will then counterpoise the large one 10, and very little additional force will be required to raise it up. It is also plain, that the whole weight to be raised being 10, the fulcrum supports only 9 of it, for the other 1 is sustained by the string BC. It is plain also, that a lever of this kind only ten feet long will raise as great a weight as another of the former kind eleven feet in length; nevertheless there is not any absolute gain of power, because the small weight 1 must move through ten times as much space as the large one; and thus the quantity of motion is exactly equal in both. To this kind of lever we may reduce oars, doors turning upon hinges, cutting knives fixed at the point of the blade, &c. From it also we see the reason why two men carrying a burden upon a pole may bear unequal shares of the weight; for the nearer any one of them is to the burden, the greater share he bears; and if he goes directly under it, he must bear the whole. Hence, if two persons of unequal strength are to carry a burden in this manner, the weaker should always be placed at the greatest distance from it.

18 If in this lever the moving power be put in the place of the weight, it acts at a great disadvantage; and a very great power will be requisite to overcome a small weight. The reason of this is plain from an inspection of fig. 28; for it is the same thing whether we suppute the body 10 to be the moving power, or the weight to be raised; in either case, nine-tenths of it are spent upon the fulcrum at 0; and the other ninth part at 10 will be able to do no more than balance the weight 10. Levers of this kind are only made use of when we wish to give a considerable degree of velocity to bodies; and hence the flys of clocks, millstones, &c. may be accounted levers of this kind; for in these the moving power is applied to a pinion near the centre of motion, and acts at a great disadvantage; the musles of the arms or legs of a man, by their insertion near the joints, likewise act as levers of this kind; and hence the power exerted by a muscle is always much greater than the force it has to overcome.

19 In all cases in which the lever is applied, it is necessary, in order to give it the greatest advantage, that the moving power act in a direction exactly perpendicular to the lever itself. If this be not the case, it will be necessary to lengthen the lever in proportion to the obliquity. Thus in fig. 29, suppose the straight lever AB to rest upon the fulcrum C, so that a weight of one pound may counteract it; if the lever be bent in the direction AD, it will then be necessary to lengthen it somewhat in order to produce the same effect. If bent in the direction CE, it must be farther lengthened, and still farther if bent in the direction CF. The reason of this, is that when the weight acts on the hindered lever AC, ACE, and ACD, a part of its force is spent in giving, or attempting to give, a lateral motion to the fulcrum C; and the part thus lost is exactly equal to the advantage gained by the greater length of the lever. To make a lever of a determinate length always with the same power, it will be necessary to have some contrivance by which the moving power may act always perpendicularly to it; as by having two circular pieces of wood or other solid matter fastened to the ends of it round which the ropes may wrap themselves when it is put in motion, such as are represented by ab and BG in the figure.

20 Fig. 30, shows a kind of lever bent so that one fourth part of it may form a right angle with the other; kind of Here the prop or centre of motion is at the angular lever.

21 If, as in fig. 31, and 32, the lever be bent so as to form two sides of a square, the weight to be raised will of lever, always be equal to that upon the fulcrum, in whatever place the fulcrum may be put; but both will vary according to the distance from the angular point. Thus if, in fig. 31, the fulcrum be placed at the angular point A, the weight F applied to the extremity B of the lever is often raised without any resistance; while in fig. 32, the prop must act at a distance of five times the length of the lever to raise it; and even then with great difficulty. It is plain, therefore, that the greater the angle of the lever, the less is the advantage gained by the moving power; and hence the contrivance of forming a right angle in this way, is of great importance in the practice of the mechanical arts.
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of the arm AB will just counterpoise an equal weight E by means of the string CDE put over the pin D, and drawn laterally by the arm AC. But if, as in fig. 32, the fulcrum be placed nearer to the extremity of the arm AC, as at 3, the cafe will then be very much altered, and one pound suspended at the extremity B of the arm AB will counterpoise two at the extremity C of the other arm: the pressure on the fulcrum will likewise be equal to the weight to be raised. Was the fulcrum placed at 2, then a weight of one pound at B would only counterpoise two pounds acting at C; and if it was placed at 1, then a weight of three pounds at B would be requisite to counterpoise 4 at C.

It is worth notice, that levers of this kind cannot be exactly counterpoised by the power of straight levers. Thus in fig. 33 let any weight, as C, be appended to B, the extremity of the arm of the bent lever BA4. Let DE be a straight lever, the force of which we design to oppose to that of the crooked lever.

For this purpose let another weight F act upon the extremity D of this straight lever by means of a string put over the pin G. Let the two levers be connected together by means of the string h2, and let a piece of wood or iron EQ be put between their two extremities; the two weights being now allowed to act, it is evident that the levers will be pulled in different directions, the string h2 will be tightened, and the extremity E of the straight lever DE will be pressed towards 4, while the extremity 4 of the crooked lever will be pressed towards E; by which means the two levers will oppose one another in every point of their action. There is not, however, any weight whatever applied to the straight lever which can be made to counterbalance that at C, in such a manner as to keep the bent lever steady. Let us first suppose the weights to be each one pound, and the string to be placed as in the figure at h2. In this case the weight C pulls the crooked lever from h towards 2, with a force equal to 4, and the extremity 4 will be pressed towards E with an equal degree of force. But in the straight lever, though the point h be pulled in the direction h2 by a force of four pounds, the extremity E is pressed contrary way by a force equivalent only to three. Thus the weight C must preponderate, and that at F will ascend. Let us next add to the weight F one third of a pound; by which means the pressure from E towards 4 will be augmented to 4, and the two extremities of the levers will counteract each other; but now the preface in the direction h2 will be greater by one third of a pound than it is in the direction h2: and on consequence the weight F will prevail, the arm AB of the crooked lever and the weight appended to it being raised. If we attempt to mend matters by augmenting the weight F by not quite a third part, the extremities of the two levers will not balance each other, the preface from E to 4 will be greater than from E to 4; and in like manner the preface from 2 to h will be greater than from h to 2. Hence both levers will be pulled in a direction from D towards G, and the weight F will descend if the weights be properly adjusted without any aecent of the other. In short, let us alter the weights as we will, or let us alter the position of the fulcrum as we will, it is easy to find that there is an absolute impossibility that the two levers can counteract each other; because the pressure upon the fulcrum of the crooked lever will always be equal to that by its extremity 4; but in the straight lever the pressure upon the fulcrum must necessarily be greater than that of the extremity.

There are all the varieties of the lever which can be suppos'd; it remains now only to show the reason of its action, or why a small weight when at rest should counterpoise a great one; motion or velocity being here to appearance out of the question, as we cannot attribute any degree of motion to two bodies absolutely at rest. To do this in a clear and distinct manner has puzzled some of the greatest mathematicians: that of Dr. Hamilton, professor of philosophy in Dublin, founded upon the resolution of forces, seems to be the most readily understood, and least liable to objection.

The most noted theorem in mechanics (says he) is this, "when two heavy bodies counterpoise each of the other by means of any machine, and are then made to move together, the quantities of motion with which one descends and the other ascends perpendicularly will be equal." An equilibrium always accompanying this equality of motions bears such a resemblance to the cafe wherein two moving bodies drop each other when they meet together with equal quantities of motion, that many writers have thought that the cause of an equilibrium in the several machines might be immediately ascribed, by saying, that since one body always looses as much motion as it communicates to another, two heavy bodies counteracting each other must continue at rest when they are so circumstanced that one cannot descend without causing the other to ascend at the same time, and with the same quantity of motion. For then, should one of them begin to descend, it must instantly lose its whole motion by communicating it to the other. This argument however plausible it may seem, I think is by no means satisfactory; for when we say that one body communicates its motion to another, we must necessarily suppose the motion to exist first in the one, and then in the other; but in the present case, where the two bodies are so connected that one cannot possibly begin to move before the other, the descending body cannot be said to communicate its motion to the other, and thereby make it ascend: But whatever we should suppose causes one body to descend, must be also the immediate cause of the other's ascending; since from the connection of the bodies, it must act upon them both together as if they were really but one. And therefore, without contradicting the laws of motion, I might suppose the inferior weight of the heavier body, which is in itself more than able to inflame the lighter, would overcome the lighter, and cause it to ascend with the same quantity of motion with which the heavier descends; especially as both their motions, taken together, may be less than what the difference of the weights, which is here supposed to b. the moving force, would be able to produce in a body falling freely.

However, as the theorem above-mentioned is a very elegant one, it ought certainly to be taken notice of in every treatise of mechanics, and may serve as a very good index of an equilibrium in all machines; but I do not think that we can from thence, or from any one general principle, explain the nature and effects of all the mechanic powers in a satisfactory manner.
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Mr. Maclaurin, in his View of Newton's Philosophy, after giving us the methods by which Archimedes and Newton prove the property of the lever, states that it appears to be the most natural one for this purpose. From equal bodies, sustaining each other at equal distances from the fulcrum, he shows us how to infer that a body of one pound (for instance) will sustain another of two pounds at half its distance from the fulcrum; and going on thus, he deduces, by a kind of induction, what the proportion is in general between two bodies that sustain each other on the arms of a lever. But this argument, were it otherwise satisfactory, yet as it cannot be applied when the arms of the lever are incommensurable, it cannot conclude generally, and therefore is imperfect.

There are some writers on mechanics, who, from the composition of forces, demonstrate that cafe of the general proposition relating to the lever in which the directions of the forces are oblique to each other, and meet in a point; but I do not find that they have had any other way of proving the second case, in which the directions of the forces are parallel, but by considering these directions as making an angle with each other, though an infinitely small one, or as meeting at an infinite distance; which way of reasoning is not to be admitted in subjects of this kind, where the proof should always show us, directly from the laws of motion, why the conclusion must be true, in such manner that we might see clearly the force of every step from the first principles down to the conclusion, which we are prevented from doing when any such arbitrary and inconsistent supposition is introduced.

From these considerations, and by examining the various proofs that have been given of this fundamental proposition in mechanics, we may see the reason why many subequent writers have been dissatisfied with the former demonstrations, and have looked for new ones; I shall now propose two methods of demonstrating it, merely from the composition and resolution of forces. The proposition may be expressed as follows,

When three forces act upon an inextensible line, whether straight or crooked, and keep it in equilibrium, any two of them will be to each other inversely as the perpendicular distances of their lines of direction from that point to which the third force is applied.

Let the three forces E, G, F, (fig. 34.) act upon three points A, B, D, in an inextensible line; and first let the directions of the forces E and F (which act on the same side of the line) meet in the point C. Then it is evident that the force, which is compounded of these two, must act upon the line ABD in the direction of a right line that passes through the point C; consequently the force G, which sustains this compounded force, must be equal thereto, and must act in a contrary direction; therefore the force G must act in the direction of the line C B. From the point B draw B H and B K, perpendicular to the directions of the forces E and F, and draw B M and B N parallel to those directions, forming the parallelogram B M C N; then, since these three forces are

Sir Isaac Newton's demonstration of this proposition is indeed very concise; but it depends on this supposition, that when from the fulcrum of a lever several arms or radii slixe out in different directions, all lying in the same vertical plane, a given weight will have the same power to turn the lever from which ever arm it hangs, provided the distance of its line of direction from the fulcrum remains the same. Now it must appear difficult to admit this supposition, when we consider that the weight can exert its whole force to turn the lever only on that arm which is the shortest, and is parallel to the horizon, and on which it acts perpendicularly; and that the force which it exerts, or with which it acts perpendicularly, on any one of the oblique arms, must be inversely as the length of that arm, which is evident from the resolution of forces.
Section II.

Mechanics are in equilibrio, they must be to each other respectively as the sides and diagonal of this parallelogram to which their directions are parallel; therefore it is to \( F \) as \( CM \) to \( CN \) or \( MB \), that is, (because the sides of a triangle are as the lines of the opposite angles) as the line of the angle \( MBC \), or its alternate one \( BCN \), to the line of the angle \( BCM \); but making \( CB \) the radius, \( BK \) is the line of the former angle, and \( BH \) of the latter; therefore \( E \) is to \( F \) as \( BK \) to \( BH \); so that the forces \( E \) and \( F \) are to each other inversely as the perpendicular distances of their lines of direction from the point \( B \), on which the third force \( G \) acts. Now to compare the forces \( R \) and \( G \) together; since the forces \( R \) and \( L \) may be denoted by \( BH \) and \( BK \), and are both together equal to \( G \), that force will be denoted by the whole line \( KB \); and therefore \( R \) will be to \( G \) as \( BH \) to \( KH \); so that these forces are also to each other inversely as the perpendicular distances of their lines of direction from the line of direction of the third force \( L \); and thus the second case of the proposition is proved, in which the forces act against each other in parallel directions. If the point in the inflexible line, to which one of the forces is applied, should become a fixed point, or \( f\)ulcrum, round which the line may turn, it is evident that the other two forces will continue in equilibrio, as they were before; and therefore the property of the lever, in all cases, is manifestly proved by this proposition.

The centre of gravity of a body is said to be that point which, when being sustained, or prevented from descending, the body will continue at rest. Hence it follows, that when a body hangs freely from a single point and continues at rest, its centre of gravity will lie perpendicularly under the point of suspension; for in that situation only it will be sustained, and can descend no lower.

From this property, which agrees likewise to the common centre of gravity of two bodies joined together by an inflexible right line, and which may then be considered as one, I shall show that their centre of gravity is a point in the line that joins them together, as situated that the distances of the two bodies from it are to each other inversely as their weights. This theorem concerning the position of the common centre of gravity of two bodies, which is a very noted one in mechanics, I have never seen demonstrated otherwise than by inferring it from the general property of the lever: but I think the method I shall now propose of deducing it directly from the definition of the centre of gravity, is the most concise as well as the most natural, and besides it will afford us a very easy way of demonstrating the property of the lever.

Let the two bodies \( A \) and \( B \) (fig. 36.) be joined by an inflexible right line passing through their centres of gravity, and let them be suspended from the fixed point or pin at \( P \), by the threads \( AP \) and \( BP \), so that they may hang freely in such a position as their joint gravity will give them. When these bodies continue at rest, their common centre of gravity must lie directly under the point of suspension, or in the perpendicular line \( PL \); consequently it must be at the point \( C \), the intersection of the lines \( PL \) and \( AB \); the position of the point, in the line \( AB \), will be determined by finding out the proportion between the segments \( CA \) and \( CB \). If the inflexible line was not interposed between these bodies, they would move till their threads coincided with the perpendicular line \( PL \); since therefore they are kept together by this line, they must urge it with certain forces in opposite directions; and these forces
M E C H A N I C S.

Mechanical urging forces must be equal, since the line on which they act continues at rest; and therefore the force with which each body urges the other in the direction of this line, may be denoted by the same letter U, and we may denote the weights of the two bodies respectively by the letters A and B. Now the body A is acted upon by three forces, viz. by its weight A in the direction PC, by the force U with which the other body urges it in the direction CA, and by the reaction of the pin in the direction AP; and since these three forces are in equilibrium, and keep the body at rest, they are to each other respectively as the sides of the triangle PCA: therefore A is to U, as PC to CA. In like manner, the body B is urged by three forces, viz. its weight B in the direction PB, the urging force U in the direction CB, and the reaction of the pin in the direction BP, which forces are to each other as the sides of the triangle PCB; therefore U is to B, as CB to PC; and therefore (ex aequo perturbata) A is to B, as CB to CA; consequently the weights of the bodies A and B are to each other directly as their distances from the point C, which lies directly under the point of suspension, and is therefore their common centre of gravity.

When two bodies are connected by an inflexible line, and this line is supported by a prop so that their centre of gravity cannot descend, the bodies must continue to rest, and will be in equilibrium. Therefore it is easy to see how, from the theorem now demonstrated, we may prove the property of the lever in that case, where the directions of the forces are parallel; and from thence the other case, in which the directions are oblique to each other, may be deduced by the resolution of forces, as is usually done. And this is the second method by which I said the general property of the lever might be strictly demonstrated.

The lever is the most simple of all the mechanic powers; and to it may be reduced the balance and the axis in peritrochio, or axle and wheel: Though I do not consider the balance as a distinct mechanic power, because it evidently no other than a half of the parallelogram of which is the particular purpose of comparing the weights of bodies, and does not serve for raising great weights or overcoming resistances as the other machines do.

Though this demonstration will no doubt be abundantly clear to mathematical readers, yet to others less versed in that science its appearance will no doubt be somewhat obscure and perplexed. The following we subjoin as less intricate.

Let AB, fig. 37, represent a straight rod of wood or iron, fastened at the extremity A, at right angles to another piece of the same, and kept steady by two pins C and D. If a weight be put upon the extremity H of the upright rod AB, it will press down that, and along with it the horizontal rod AB, so that every point in the rod will move with the whole force of the weight. Thus, whether we suppose an obstacle to be placed at the extremity B, at the point 2, or at 1, in the horizontal rod AB, it will have exactly the force of the weight placed at H to overcome.

Supposing then that the weight would make the whole descend from A to E in one second; then it is plain that the whole power exerted by the rod in its descent would be expressed by the parallelogram ABEF. But if, instead of supposing the line AB to be the full length represented in the figure, we suppose it to be mechanical only half that length, and cut off at 1, then the power of the weight would be expressed by the parallelogram A 1 E 1. Were it still farther shortened by being cut off at 2, then the power would be expressed by the parallelogram A 2 E 2; and each of these parallelograms, however unequal they may be as represented upon paper, would in reality be equal when the experiment was made, because in no case could the weight descend with a greater force than its own. Suppose next the weight to be taken off from H, and put upon B, and the rod AB to be moveable upon the centre A; the whole power of the weight then would be expressed by the triangle ABG, equal to the parallelogram ABEF; but as every point of the lever must bear the whole influence of the weight as before, it is plain, that as we approach towards the centre, that power is compressed into less and less space. Thus, when the weight has descend from B to C, though the large triangle ABG be equal to the parallelogram ABEF, yet the smaller triangle A 11 is equal only to one half of the parallelogram A 1 E 1, which represents the power. The whole power being therefore compressed into half the space, must of necessity be double to what it was in the former case. In like manner, the triangle A 2 B, is only one fourth part of the space which it would have occupied, and this parallelogram itself is only half the space representing the whole power of the weight. In this case, therefore, the power is confined within one fourth part of the space which it naturally has, and for that reason must be four times as great.

§ 2. Of the Wheel and Axle, or Axis in Peritrochio.

This power acts entirely on the principles of the lever, and has therefore sometimes been called a perpetual lever. In it the power is applied to the circumference of a wheel by means of a rope or otherwise, the weight to be raised being fastened to a rope which winds round the axis. It is represented fig. 39, where AB is the lever here by which the particular purpose of comparing the weights of bodies, and does not serve for raising great weights or overcoming resistances as the other machines do.

Though this demonstration will no doubt be abundantly clear to mathematical readers, yet to others less versed in that science its appearance will no doubt be somewhat obscure and perplexed. The following we subjoin as less intricate.

Let AB, fig. 37, represent a straight rod of wood or iron, fastened at the extremity A, at right angles to another piece of the same, and kept steady by two pins C and D. If a weight be put upon the extremity H of the upright rod AB, it will press down that, and along with it the horizontal rod AB, so that every point in the rod will move with the whole force of the weight. Thus, whether we suppose an obstacle to be placed at the extremity B, at the point 2, or at 1, in the horizontal rod AB, it will have exactly the force of the weight placed at H to overcome. Supposing then that the weight would make the whole descend from A to E in one second; then it is plain that the whole power exerted by the rod in its descent would be expressed by the parallelogram ABEF. But if, instead of supposing the line AB to be the full length represented in the figure, we suppose it to be mechanical only half that length, and cut off at 1, then the power of the weight would be expressed by the parallelogram A 1 E 1. Were it still farther shortened by being cut off at 2, then the power would be expressed by the parallelogram A 2 E 2; and each of these parallelograms, however unequal they may be as represented upon paper, would in reality be equal when the experiment was made, because in no case could the weight descend with a greater force than its own. Suppose next the weight to be taken off from H, and put upon B, and the rod AB to be moveable upon the centre A; the whole power of the weight then would be expressed by the triangle ABG, equal to the parallelogram ABEF; but as every point of the lever must bear the whole influence of the weight as before, it is plain, that as we approach towards the centre, that power is compressed into less and less space. Thus, when the weight has descend from B to C, though the large triangle ABG be equal to the parallelogram ABEF, yet the smaller triangle A 11 is equal only to one half of the parallelogram A 1 E 1, which represents the power. The whole power being therefore compressed into half the space, must of necessity be double to what it was in the former case. In like manner, the triangle A 2 B, is only one fourth part of the space which it would have occupied, and this parallelogram itself is only half the space representing the whole power of the weight. In this case, therefore, the power is confined within one fourth part of the space which it naturally has, and for that reason must be four times as great.

§ 2. Of the Wheel and Axle, or Axis in Peritrochio.
In all cranes, it is necessary to have a raised block, represented by \( G \), on one end of the axle, with a catch \( H \) to fall into its teeth; which will at any time support the weight, and keep it from descending, if the workman should happen to let slip his hold. For want of this precaution, terrible accidents have sometimes happened to people inclosed in cranes, by their inadvertently missing a step.

§ 3. Of the Pulley.

The pulley is a single wheel of wood, brass, or iron, moveable upon an axis, and inclosed in a kind of case called its block, which admits of a rope to pass freely over the circumference of the pulley, in which also there is usually a groove to keep the rope from sliding, the axis being generally fixed in the block.

In some pulleys the block is fixed; in others moveable, and rides with the weight. Both these kinds are represented, fig. 39. AA shows a fixed pulley, with its block \( B \). Over the wheel a string of pulleys, to the extremities of which are fixed the two weights \( W \) and \( P \). This pulley, however, though it changes the direction of a power, yet does not gain any advantage, for one of the weights must always descend as much as the other ascends, of consequence their velocities must always be equal; and when this is the case, there can be neither increase nor decrease of power. A single fixed pulley, therefore, though it may compare the weight of two bodies together, cannot be accounted in any respect a mechanical power. But if with a fixed pulley we combine a moveable one, or one in which the block rises along with the wheel, we gain an increase of one half. Thus if a weight \( W \) hangs at the lower end of the moveable block \( P \) of the pulley \( D \), and the cord \( GF \) goes under the wheel, it is plain that the half \( G \) of the cord bears one half of the weight \( W \), and the half \( F \) the other. The hook \( H \), therefore, which fulfills the half \( G \) of the cord, must therefore bear one half of the weight; and if the cord at \( F \) be drawn up, so that the pulley may be raised from \( D \) to \( C \), the string will be extended to its whole length, all but that which goes under the wheel of the pulley \( D \); but the weight or power \( P \) by which the string is thus drawn up, will have moved twice as far as the weight \( W \) which is drawn up; whence we see that only one pound and a half will be required to counterpoise two pounds at \( W \). If the upper and fixed block contain two pulleys, and the lower one \( U \) contain also two, the advantage gained by this combination will be as 4 to 1. Thus, if one end of the string \( KMOQ \) be fixed to a hook at \( J \), and the string passes over the pulleys \( N \) and \( R \), and under those \( L \) and \( P \), the weight \( T \) of one pound will balance a weight \( W \) of four pounds, suspended by a hook from the moveable block, making allowance for the weight of the block itself. In like manner will the pulleys give an advantage of 4 to 1, when disposed as at \( X \) and \( Y \); but in all cases the same relation between velocity and power is preserved as in the lever and axis in peritrochial vix, if the power balances twice its own weight, it must move or have a tendency to move through twice the space; if it balances four times its weight, then it must have a tendency to move through four times the space that the other does.

Pulleys are of great use in practical mechanics, as advantages by their means great weights may be raised to any genes and dimensions much more expeditiously than by any other method, and the smallness of their weight makes them very convenient for carriage. At sea they are used for hoisting the sails and yards, straining ropes, &c. Archimedes, by means of a machine composed of pulleys, is said to have drawn a ship along the strand, in the presence of Hiero king of Syracuse; but this is scarcely to be credited, on account of the great friction which attends this kind of machines.

The friction arises from three causes: 1. The diameter of the axis bearing a considerable proportion to that of the wheels. 2. Their rubbing against their blocks, or against one another. 3. The frictions of the rope that goes over and under them. All these causes
causes must necessarily be augmented, in proportion to the weight we have to overcome; and when we consider the immense resistance which a slip must make, with the strength and firmness of the rope necessary to overcome it, we can scarce suppose the strength of any individual equal to the task. Pulleys have often been used by inhuman tyrants, in constructing machines for torturing the objects of their cruelty.

The pulley has by some writers been reduced to the lever as well as the wheel and axis; in which method they consider the fixed pulleys as a lever of the first, and the moveable pulley as one of the second kind: but it is justly observed by Professor Hamilton, that the pulley cannot be with any propriety reduced to a lever, because, though both the moveable and moveable pulleys should be taken away, the ropes would have to sustain the same weight that they do with the pulleys; nay, the very same advantages would be gained by the mere use of pins, without any wheels, were not the friction very great even upon the smoothest pins that could be made use of. It is, indeed, merely to avoid this resistance on the pins that wheels are made use of at all. The best method of computing the power, and explaining the reason of the effects of pulleys, is by considering that every moveable pulley hangs by two ropes equally stretched, each of which bears one half of the weight; and therefore, when the same rope goes round a number of fixed and moveable pulleys, since all its parts on each side of the pulleys are equally stretched, the whole weight must be equally divided amongst all the ropes by which the moveable pulleys hang; consequently, if the power which acts on one rope be equal to the weight divided by the number of ropes, that power will sustain the weight.

A very considerable improvement in the construction of pulleys has been made by Mr James White, who has obtained a patent for his invention, and of which the following description is given by the inventor. Fig. 65 shews the machine, consisting of two pulleys A and B, one fixed and the other moveable. Each of these has six concentric grooves, capable of having a line put round them, and thus acting like as many different pulleys, having diameters equal to those of the grooves. Supposing then each of the grooves to be a distint pulley, and that all their diameters were equal, it is evident that if the weight 144 were to be raised by pulling at S till the pulleys touched each other, the first pulley must receive that length of line as many times as there are parts of the line hanging between it and the lower pulley. In the present case, there are 12 lines, b, d, f, &c. hinging between the two pulleys, formed by its revolution about the fixed upper and fixed lower grooves. Hence as much of the pulley passes over the uppermost pulley as is equal to twelve times the distance of the two. But, from an inspection of the figure, it is plain, that the second pulley cannot receive the full quantity of line by as much as is equal to the distance between it and the first. In like manner, the third pulley receives less than the first by as much as is the distance between the first and third; and so on to the last, which receives only one twelfth of the whole. For this receive its

share of line n from a fixed point in the upper frame, which gives it nothing: while all the others in the same frame receive the line partly by turning to meet it, and partly by the line coming to meet them.

Supposing now the fixed pulley to be equal in size, and to move freely as the line determines them, it appears evident, from the nature of the system, that the number of their revolutions, and consequently their velocities, must be in proportion to the number of suspending parts that are between the fixed point above-mentioned and each pulley respectively. Thus the outermost pulley would go twelve times round the time that the pulley under which the part n of the line, if equal to it, would revolve only once; and the intermediate times and velocities would be a series of arithmetical proportions, of which, if the first number were 1, the last would always be equal to the whole number of terms. Since then the revolutions of equal and distinct pulleys are measured by their velocities, and that it is possible to find any proportion of velocity on a single body running on a centre, viz. by finding proportionate distances from that centre, it follows, that if the diameters of certain grooves in the same substance be exactly adapted to the above series (the line itself being supposed inflexible, and of no magnitude), the necessity of using several pulleys in each frame will be obviated, and with that some of the inconveniences to which the use of the pulley is liable.

In the figure referred to, the coils of rope by which the weight is supported are represented by the lines a, b, c, &c.; a is the line of friction, commonly called the fall, which passes over and under the proper grooves, until it is fastened to the upper frame just above n. In practice, however, the grooves are not arithmetical proportions, nor can they be so; for the diameter of the rope employed must in all cases be deduced from each term; without which the smaller grooves, to which the said diameter bears a larger proportion than to the larger ones, will tend to rise and fall faster than they, and thus introduce worse defects than those which they were intended to obviate.

The principal advantage of this kind of pulley is, that it destroys lateral friction, and that kind of shaking motion which are so inconvenient in the common pulley. And left (says Mr White) this circumstance should give the idea of weakness, I would observe, that to have pins for the pulleys to run on, is not the only nor perhaps the best method; but that I sometimes use centres fixed to the pulleys, and revolving on a very short bearing in the side of the frame, by which strength is increased, and friction very much diminished; for to the last moment the motion of the pulley is perfectly circular: and this very circumstance is the cause of its not wearing out in the centre as soon as it would, afflicted by the ever increasing irregularities of a galliard bearing. These pulleys, when well executed, apply to jacks and other machines of that nature with peculiar advantage; both as to the time of going and their own durability; and it is possible to produce a system of pulleys of this kind of six or eight parts only, and adapted to the pockets, which, by means of a skin of sewing silk, or a clew of common thread, will raise upwards of an hundred weight.

§ 4. Of
Sect. II. \[ \text{Mechanical Powers.} \]

\section*{Mechanical Powers. Plate GCLXXIV.}

\section*{§ 4. Of the Inclined Plane.}

This power is represented fig. 40; and the advantage gained by it is exactly in the proportion of the length of the plane to the perpendicular height of it. Thus, let \( AB \) be a plane parallel to the horizon, and \( CD \) one inclined to it: suppose also the whole length \( CD \) to be three times as great as the perpendicular height \( CF \); in this case, the cylinder \( E \) will be supported upon the plane \( CD \), and kept from rolling down upon it, by one-third part of its weight. Were the length of the plane four times its height, it would be prevented from rolling down by one-fourth part of its weight. The force with which a rolling body descends upon an inclined plane will be to that with which it would descend by the power of gravity, as the height of the plane is to the length of it.—For, suppose the plane \( AB \) (fig. 41.) to be parallel to the horizon, the cylinder \( C \) will keep at rest upon any part of the plane on which it is laid. If the plane be so elevated as in fig. 42, that its perpendicular height \( D \) be equal to half of its length \( AB \), then the cylinder \( C \) will roll down with half its weight; for it would require a power (acting in the direction \( AB \)) equal to half its weight to keep it from rolling. If the plane be elevated so as to be perpendicular to the horizon, as in fig. 43, the cylinder \( C \) will descend with its whole force of gravity, because the plane contributes nothing to the support or hinderance of it; for which reason, it must require a power equal to the whole force of its gravity to keep it from descending.

If, as in fig. 44, the cylinder \( C \) is made to turn upon slender pivots in the frame \( D \), which is furnished with a hook, with a line \( G \) fastened to it; if this line go over the fixed pulley \( H \), and have its other end tied to the hook in the weight \( I \); if the weight of the body \( I \) be to the weight of the cylinder \( C \), added to that of its frame \( D \), as the perpendicular height of the plane \( LM \) is to its length \( AB \); the weight will just support the cylinder, and a small force will make it either ascend or descend. In the time that the cylinder moves from \( A \) to \( B \), it must rise through the whole height of the plane \( LM \), and the weight will descend from \( H \) to \( K \), through a space equal to the whole length of the plane \( AB \). If the plane be now made to move upon rollers or wheels as in fig. 45, and the cylinder be supported upon it, the same power will draw the cylinder up the plane, provided the pivots of the wheels be small, and the wheels themselves pretty large. For let the machine \( ABC \) equal in height and length to \( ABM \), fig. 44. be furnished with four wheels, of which two are seen at \( D \) and \( E \), the third being under \( C \), while the fourth is concealed by the board \( a \). Let the cylinder \( F \) be laid upon the lower end of the inclined plane \( CB \), and the line \( G \) be extended from the frame of the cylinder about six feet parallel to the plane \( CB \) and fixed in that direction to a hook in the wall, which will keep the cylinder from rolling off the plane. Let one end of the line \( H \) be tied to a hook at \( C \) in the machine, and the other to a weight \( K \), the same which drew the cylinder up the plane before. If this line be put over the fixed pulley \( I \), the weight \( K \) will draw the machine along the horizontal plane \( L \), and under the cylinder \( F \); and when the machine has been drawn the whole length \( CB \), the cylinder will be raised to \( d \), equal to \( \text{Mechanical power} \) the perpendicular height \( AB \) above the horizontal part at \( A \).

The inclined plane, considered as a mechanical reason of power, may easily be reduced to the lever; for the effect of power acquired by it is always in the proportion of the inclined plane to the height, in the same manner as the clined lever to the short one. To compute, or show the reason of the power of an inclined plane, therefore, we have only to construct a lever, the long arm of which is equal to the length of the plane, and the short arm to the height of it; then, whatever weight put upon the long arm counterpoises another put upon the short one, will also keep the same weight from rolling down the inclined plane.

The inclined plane belong also to the wedge, and all cutting instruments which as wedges, as knives, hatchets, &c. From the theory of the inclined plane also combined with that of falling bodies, we deduce some of the most remarkable properties of the pendulum. See \textit{Pendulum}.

§ 5. Of the Wedge.

This may be considered as two equally inclined plate planes \( DEF \) and \( CEF \), fig. 46. joined together at \( CCLXXV. \) their bases \( e \) \( EFO \); \( DC \) is the whole thickness of the wedge at its back \( ABCD \), where the power is applied; \( EF \) is the depth or height of the wedge; \( DF \) the length of one of its sides, equal to \( CF \) the length of the other side; and \( OF \) is its sharp edge, which is entered into the wood or other matter to be split, by the force of a hammer or mallet striking perpendicularly upon its back. Thus \( AB \), fig. 47. is a wedge driven into the cleft \( CED \) of the wood \( FG \).

When the wood does not cleave at any distance before the wedge, there will be an equilibrium between the power impelling the wedge downward, and the resistance of the wood acting against the two sides of the wedge; if the power be to the resistance as \( h \), the whole thickness of the wedge at its back \( ABCD \), where the power is applied; \( EF \) is the height of one of its sides, equal to \( CF \) the length of the other side; and \( OF \) is its sharp edge, which is entered into the wood or other matter to be split, by the force of a hammer or mallet striking perpendicularly upon its back. Thus \( AB \), fig. 47. is a wedge driven into the cleft \( CED \) of the wood \( FG \).

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Mechanical be at \( ad \), and the moulding will be separated to \( fe \) from the winch. But, from what has been already shown concerning the inclined plane, it appears, that, to have an equilibrium between the half wedge and the resistance of the moulding, the former must be to the latter as \( ab \) to \( ac \), that is, as the thicknes of the back which receives the stroke is to the length of the side against which the moulding acts. Since, therefore, the power upon the half wedge is to the resistance against its side as the half back \( ab \) is to the whole side \( ac \), it is plain that the power upon the whole wedge, where the whole thichness is double the half-back, must be to the resistance of both its sides as the thicknes of the whole back is to the length of both sides of the eleft, when the wood splits at any distance before the wedge.

For when the wedge, is driven quite into the wood, and the latter splits at ever so small a distance before it, the top of the wedge then becomes the acting part, because the wood does not touch it any where else. And since the bottom of the eleft must be considered as the place where the whole resistance, is accumulated, it is plain from the nature of the lever, that the farther the power is from the resistance, the greater advantage it acts with.

Some have supposèd, that the power of the wedge was in the proportion of the thicknes of it to the length of one of its sides; but from what has already been advanced, it is plain that this cannot be the case. The wedge, as has already been shown, is composed of two inclined planes, each of which has a perpendicular height of only one half the thicknes of the wedge. As the power of the inclined plane therefore is always as the length to its perpendicular height, it is evident that the power of each of these inclined planes of which the wedge is composed must be as the length of one side to half the thicknes; and consequently the power of both must be as the length of both sides is to the whole thicknes.

The power of the wedge is exceedingly great, infor­mation that not only wood but rocks may be split by it, which could scarce be done by any of the other powers: but in this it is as it is allowed by the hammer which drives it, and shatters the stone in a manner that could scarcely be done by any simple pre­fure.—Wedges as well as pulleys have also been used as instruments of torture.

§ 6. Of the Screw.

This is the strongest of all the mechanical powers, though it cannot be accounted a simple one, as no screw can be made afe of without a lever or winch to assist in turning it. We may suppose it made by cutting a piece of paper into the form of an inclined plane or half wedge, and then wrapping it round a cylinder, as in fig. 49. From this figure it is evident, that the winch which turns the cylinder must move once round in the time that the paper describes one spiral; and consequently if any weight or greater power of resistance were applied, the winch must turn once round in the time that the weight would move from one spiral thread to another, from \( d \) to \( c \) for in­stance. Hence the force of the screw will be as the circumference of the circle described, by the lever or winch, by which it is turned, to the distance between the threads of the screw itself. Thus, supposing the Mechanical distance of the thread, to be half an inch, and the length of the winch twelve inches, the circle described by the extremity of it where the power acts will be nearly 76 inches, or about 152 times the distance between the threads; whence a single pound acting at the end of such a winch would balance 152 at the extremity of the screw; and as much more as can overcome the friction would turn the winch and raise up the weight.

Fig. 50 represents a machine for exhibiting the Machine force of the screw. Let the wheel \( C \) have upon its axis a ferew \( ab \), working in the teeth of the wheel \( D \), which supposes to be 48 in number. It is plain that every time the Screw \( ab \) and wheel \( C \) are turned round by the winch \( A \), the wheel \( D \) will be moved one tooth by the screw; and therefore in 48 revolutions of the winch, the wheel \( D \) will be turned once round. If then the circumference of a circle described by the handle of the winch \( A \) be equal to the circumference of a groove \( e \) round the wheel \( D \), the velocity of the handle will be 48 times as great as the velocity of any given point in the groove. Consequently if the line \( G \) goes round the groove \( e \), and has a weight of 48 pounds hung to it below the pedestal \( EF \), a power of one pound at the handle will balance that weight. If the line \( G \) goes round the axle \( I \) instead of the groove of the wheel \( D \), the force of the machine will be as much increased as the circumference of the groove \( e \) is greater than that of the axle \( I \); which, supposing to be six times, then one pound at \( H \) will balance 288 pounds suspended by the line at the axle.

The screw is of very extensive use in mechanics, its great power rendering it more eligible for compresing bodies together than any of the rest, and the great disparity between the velocity of the handle and that of the threads of the screw, rendering it proper for dividing space into an almost infinite number of parts. Hence, in the construction of many mathematical instruments, such as telescopes, where it is necessary to adjust the focus to the eyes of different people, the screw is always made use of in order to move the eyeglass a little nearer or farther away from the objective glass. In the 7th volume of the Philosophical Transactions, a new method of applying the screw, so as to make it act with the greatest accuracy, is descried by Mr. Hunter surgeon. The following are the gen­eral principles upon which this method depends.

1. That the strength of the several parts of the en­gine be adjusted in such a manner to the force they are intended to exert, that they shall not break under the weight they ought to counteract, nor yet encum­ber the motion by a greater quantity of matter than is necessary to give them a proper degree of strength.

2. That the increase of power by means of the ma­chine be so regulated, that while the force we can exert is thereby rendered adequate to the effect, it may not be retarded in procuring it more than is absolutely ne­cessary.

3. That the machine be as simple as is consistent with other conditions.

4. It ought to be as portable, and as little trouble­some as possible in the application.

5. The moving power must be applied in such a manner as to act to the greatest advantage; and that, 152
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Mechanical the motion ultimately produced may have that direction and velocity which is most adapted to the execution of the ultimate design of the machine.

6. Of two machines, equal in other respects, that deserves the preference in which the friction least diminishes the effect proposed by the whole.

To attain all these advantages in any machine is perhaps impossible; but in the application of the screw, the following method promises to be attended with several of them.

Let A B (fig. 51.) be a plate of metal, in which the screw C D plays, having a certain number of threads in an inch, suppose 10. Within the screw C D there is a female screw, which receives the smaller screw D E of 11 threads in an inch. This screw is kept from moving about with the former by means of the apparatus at A F G B. But if the handle C K L be turned ten times round the screw, C D will advance an inch upwards; and if we suppose the screw D E to move round along with C D, the point E will advance an inch. If we now turn the screw D E ten times backward, the point E will move downwards 11/10 of an inch, and the result of both motions will be to lift the point E 1/10 of an inch upwards. But if, while the screw C D is turned ten times round, D E be kept from moving, the effect will be the same as if it had moved ten times round with C D, and been ten times turned back; that is, it will advance 1/10 of an inch. At one turn, therefore it will advance upwards 11/100 × 11/10 = 1/10 of an inch.

If now the handle be fixed inches long, the power to produce an equilibrium must be to the weight as 1 to 110 × 6.2832 × 12 = 4146.912. Thus the force of Mr Hunter's screw is greatly superior to that of the common one, for in order to have as great a power on the plan of the latter, it must have 110 threads in an inch, which would render it too weak to resist any considerable violence.

With regard to the second general maxim above laid down, Mr Hunter considers both kinds of screws as equally applicable, only that the more complicated structure, and consequently greater expense of his screw, renders it convenient to use the common screw where only a small increase of power is necessary, and his improved one where a great power is wanted. By shortening the handle also, the whole machine is rendered more portable and less troublesome in the using.

To answer the fifth intention, both seem to be equally proper; but for the sixth, the preference must be given to such as best answer the particular purpose proposed. Thus if the screw D E be designed to carry an index which must turn round at the same time that it rises upward, the common screw is preferable; though our author also proposes a method by which his screw may answer the same purpose: With this view a still smaller screw ought to play within the screw D E, and be connected with the screw C D, so as to move round along with it. It must have, according to the foregoing proportions, 111 threads in an inch; and they must lie in a contrary direction to those of C D; so that when they are both turned together, and C D moves upwards, this other may move downwards. At one turn this will move upwards 111/110 part of an inch, and at the same time will move in a circular direction; but the accuracy required in constructing such screws, even the mechanical power, would probably be too great for practice. In many cases, however, screws upon Mr Hunter's principles may be of considerable use.

The theory of the screw is easily deduced from that Theory of the inclined plane and lever; for the screws of the theory, in fact form a continued inclined plane, the height of which is the distance between the two threads, and the length is the circumference of the cylinder. Hence, without any lever the screw would have a considerable power, were it not for the great friction of the parts upon one another; and this friction would be much more increased by the perpendicular action of a weight on the top of the cylinder than by the horizontal action of a lever.

§ 7. Other methods of accumulating power, which do not properly come under the denomination of any of the mechanical powers already described.

From the account already given of the six mechanical powers, it is evident, that they can do no more than accumulate, or, if we may use the expression, compound any degree of velocity into a small space. The velocity thus compounded, becomes what we call power, and is capable of again impressing the original degree of velocity upon a body of an equal or nearly equal size to the first which originally impressed it; but in every case the absolute quantity of motion, or of power, remains the same without the possibility of augmentation or diminution by levers, screws, pulleys, or wedges. It follows, therefore, that if by any method we can preserve for a certain time a small quantity of motion, that will at the end of the time specified amount to an astonishing power, which we could scarce at first have imagined to proceed from so small a cause. Thus, though a man cannot raise a ton weight from the ground at once, he is easily capable of raising 100 pounds at once from the ground, and this for a considerable number of times in succession. It is plain, therefore, that in a very short time a man could in this manner raise the ton weight, if it were divided into 20 parts, as effectually as by a lever or other machine; though the fatigue consequent upon flopping down and raising up his body often would doubt make the toll much greater. Even by means of a lever, however, before a man could raise a ton weight one foot from the ground, with the trouble of exerting a force equal to 100 pounds, he must have a lever 20 or 21 feet in length, and exert a constant force of 100 pounds, while he goes up through a space of 20 feet, or pulls down a rope through that space. The lever, therefore, only accumulates the power exerted in pulling or carrying the weight of 100 pounds through 20 feet, and discharges it all upon the space of one foot; whence it is plain, that any other thing which could do this would raise the ton weight as effectually as the lever.

One method of accumulating a great power is by suspending a very heavy body by a chain or strong rope of considerable length. This body may be put in motion by a very small degree of power more than is requisite for bending the rope, and will acquire a vibratory motion like a pendulum; by continuing the impulse as the body returns, it will continually acquire greater and greater force, the arches through which it
Mechanical it moves becoming continually larger, until at last it might be made to overcome almost any obstacle; and, upon this principle the battering rams of old were constructed, the power of which has been already mentioned: nevertheless the power of one stroke of this engine never could exceed the accumulated power of the impulses given to it in order to produce that stroke, or even quite equal it, because the stiffness of the rope, and the resistence of the air, must always take off something from it.

Another method of accumulating force is by means of a very heavy wheel or cylinder, moveable about an axis. A small force will be sufficient to put this wheel in motion; and, if long continued, will accumulate in such a manner as to produce such effects as raising weights and overcoming resistances, as could not by any means be accomplished by the application of the original moving force. On this subject Mr Atwood has demonstrated, that a force of 20 pounds applied for 37 seconds to the circumference of a cylinder of 10 feet radius, and weighing 4713 pounds, would, at the distance of one foot from the centre, give an impulse to a musket-ball equivalent to what it receives from a full charge of gun-powder. The same effect would be produced in six minutes and ten seconds by a man turning the cylinder with a winch one foot long, in which he constantly exerted a force of 20 pounds. In this case, however, as well as the former, there is not any absolute accumulation of power; for the cylinder has no principle of motion in itself, and cannot have more than it receives.

This accumulation of motion, however, in heavy wheels, is of great service in the construction of machines for various purposes, rendering them greatly more powerful and easy to be worked by animals, as well as more regular and steady, when set in motion by water, or any inanimate power. Hence the use of flies, ballast-wheels, &c, which are commonly supposed to increase the power of a machine, though in reality they take something from it, and act upon a quite different principle.—In all machines in which flies are used, a considerably greater force must at first be applied than what is necessary to move the machine without it, or the fly must have been set in motion some time before it is applied to the machine. It is this superfluous power which is collected by the fly, and serves as a kind of reservoir from which the machine may be supplied when the animal slackens his efforts. This, we must observe, will always be the case with animals, for none are able to exert a great power with absolute constancy; some intervals of rest, even though almost imperceptible, are requisite, otherwise the creature's strength would in a short time be entirely exhausted. When he begins to move the machine he is vigorous, and exerts a great power; in consequence of which he overcomes not only the resistence of the machine itself, but communicates a considerable degree of power to the fly. The machine, when moving, yields for a time to a smaller impulse; during which time the fly itself acts as moving power, and the animal recovers the strength he had lost. By degrees, however, the motion of the machine decreases, and the animal is obliged to renew his efforts. The velocity of the machine would now be considerably increased, were it not that the fly now acts as a resisting power, and the greatest part of the superfluous motion is lodged in it, so that the increase of velocity in the machine is scarcely perceptible. Thus the animal has time to rest himself until the machine again requires an increased impulse, and so on alternately.—The case is the same with a machine moved by water, or by a weight; for the strength of these does not exhaust itself like that of an animal, yet the yielding of the parts of the machine renders the impulse much less after it begins to move; hence its velocity is accelerated for some time, until the impulse becomes so small that the machine requires an increase of power to keep up the necessary motion. Hence the machine slackens its pace, the water meets with more resistence, and of consequence exerts its power more fully, and the machine recovers its velocity. But when a fly is added to the other parts, this acts first as a power of resistance, so that the machine cannot acquire the velocity it would otherwise do. When it next begins to yield to the preflure of the water, and the impulse of course to slacken, the fly communicates part of its motion to the other parts, so that if the machine be well made, there is very little difference in the velocity perceptible.—The truth of what is here advanced will easily be seen, from considering the inequality of motion in a clock when the pendulum is off, and how very regularly it goes when regulated by the pendulum, which here acts as a fly.

Flies are particularly useful in any kind of work of which is done by alternate strokes, as the lifting of weight of large peffiles, pumping of water, &c. In this case the weight of the wheel employed is a principal object; and the method of calculating this is to compare it with the weight to be raised at each stroke of the machine. Thus, supposse it required to raise a peffile 30 pounds weight to the height of one foot 60 times in a minute: Let the diameter of the fly be seven feet, and supposse the peffile to be lifted once at every revolution of the fly; we must then consider what weight pulling through 22 feet in a second will be equivalent to 30 pounds moving through one foot in a second. This will be 30×22 or 660 pounds. Were a fly of this kind to be applied, therefore, and the machine set a going, the fly would just be able to lift the peffile once after the moving power was withdrawn; but by increasing the weight of the fly to 10, 12, or 20 pounds, the machine when left to itself would make a considerable number of strokes, and be worked with much less labour than if no fly had been used, though no doubt at the first it would be found a considerable incumbrance to the motion. This is equally applicable to the action of pumps; but the weight which can be most adventagiously given to a fly has never yet been determined by mechanics. It is certain, however, that the fly does not communicate any absolute increase of power to the machine; for if a man or other animal is not able to set any mechanical engine in motion without a fly, he will not be able to do it, though a fly is applied, nor will he be able to keep it in motion though set a-going with a fly by means of a greater power. This may seem to be contradicted by the example of a common clock; for if the pendulum be once flopped, the weight is not able to let it in motion again, though it will keep going when once put in motion by an external power. This, however,
Mechanical depends not upon any insufficiency of the weight, but on the particular mechanism of the crown wheel; which is such, that when once the pendulum is stopped, it would require a much greater weight than that commonly applied to set it in motion; and if the usual weight was to act fairly, it would be more than sufficient to move all the machinery, and make the pendulum vibrate also with much greater force than it does.

§ 8. Of Friction.

The doctrine of friction, according to Mr. Ferguson, may be summed up in the following manner: 1. When one body aslides upon another upon a horizontal plane, it resists it with its whole weight; which, being equally reacted 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 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 detaching 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 wood, it will require the same weight to draw it along, whether it be laid on its broad or narrow side. 4. For though there be four times the number of touching particles on the broad side (castri pari), yet each particle is pressed with 4. of the weight that those are on the narrow side; and since four times the number, multiplied by 4 of the weight, is equal to 4 of the whole weight 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 1/4 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 ragged, it will require a much greater weight. Thus also the cylinder of wood AB, if very smooth, and laid on two well polished supports CD (having been first oiled or greased), and then charged with the weight of two pounds in the mechanical two equal balls GH, 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, if 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 to ad infinitum. Hence, supposing the friction to be precisely a third of the weight, the first weight with all the additional ones, viz. 2, 3, 4, 5, &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 inconvenient, the readiest way to overcome the friction would be to double the power G, or H, at once. 8. But though we may, at a medium, allow a third part of the weight with which any simple machine is charged for the friction arising from hence, yet this is very precarious, and seldom is the case: for if ABCD 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 fifth part of the weight will be sufficient to draw it along the plane. On the other hand, if the plane be covered with a linen or woollen cloth, then a third or half part, and sometimes more, will be requisite to draw it along the plane. 9. For, notwithstanding the difficulty and uncertainty attending the estimation of the quantity of friction, it is still a most useful and necessary inquiry, 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 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.

Fig. 54.

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
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Of the Combinations of the Mechanical Powers.

From what has been already laid down concerning the mechanical powers in particular, we have seen that none of them is capable of augmenting the absolute force of any acting substance; and from hence we may justly conclude, that no combination of them can do so. In fact, these combinations are very often detrimental, and occasion a great loss of power by friction. This is the great obstacle in mechanics, and must always be greater in complex than in simple machines; and whereas the latter are always to be preferred, excepting where convenience requires some degree of complication. The lever being the simplest machine, and that attended with least friction, is always to be used where it is requisite to raise weights for a small way. It may likewise be used with propriety where bodies are to undergo a long continued degree of preface, and where they yield but little. For this purpose the lever ought to be of the second kind, represented fig. 29, where one end being fixed at A, a weight may be put upon the other extremity B, and the body to be preffed put at 1, 2, or any of the intermediate divisions, according to the degree of preface it is designed to undergo. This has the advantage of giving a long and very adequate preface, and is a very advantageous method of preffing cheese or other things which do not require a very great exertion of force. Where this is requisite we must employ wedges or screws; but both these have the disadvantage of slackening their preface on the least yielding of the materials to be preffed. Wedges therefore require to be almost constantly driven, and screws to be turned by a lever, in order to produce a confant preface. In oil mills the preface is produced by wedges, which are constantly driven by great mallets lifted up by the force of the mill. Oil of sweet almonds is made by hypotheearies in a press driven by a screw, and turned by a long lever alihifted by a capstan.

Where it is necessary to have a considerable weight raised to some height, the pulley is the most useful power, but the friction is extremely great; the axis in peritrochio combined with a single pulley will answer the purpose extremely well, and with less friction than any machine composed of pulleys alone. The Delt machines called cranes are generally combinations of souls of these two; and are very much used, especially by the commercial people, for raising goods out of ships, drawing them up into warehous, and for lowering them down. In these operations we must observe, that lowering goods is much more dangerous than raising them, on account of the vast increase of velocity which bodies acquire every moment by the power of gravity. In the construction of cranes, therefore, it is absolutely necessary to attend to this circumstance, and to guard against accidents. The following are recommended by Mr Ferguson: Fig. 52. shows one crane well calculated for the purposes just mentioned. When the rope H is hooked to the weight K, a man turns the winch A, on the axis whereof is the trundle B, which turns the wheel C, on whose axis D is the trundle E, which turns the wheel F with its upright axis G, on which the great rope HH winds as the wheel turns; and going over a pulley I, at the end of the arm d of the gib cde, it draws up the heavy burden K; which being raised to a proper height, as from a ship to the quay, is then brought over the quay by pulling the wheel Z round by the handles z, z, which turns the gib by means of the half wheel b fixed on the gib-post c, and the strong pinion fixed on the axis of the wheel Z. This wheel gives the man that turns it an absolute command over the gib, to as to prevent it from taking any unlucky swing, such as often happens when it is only guided by a rope tied to its arm d; and people are frequently hurt, sometimes killed, by such accidents.

The great rope goes between two upright rollers i and j, which turn upon gudgeons in the fixed beams f and g; and as the gib is turned towards either side, the rope bends upon the roller next that side. Were it
it not for these rollers, the gib would be quite unmanageable; for the moment it were turned over so as to fall towards any one of the weights, F, the whole would begin to descend, because the rope would be shortened between the pulley I and axis G; and so the gib would be pulled violently to one side, and either be broken to pieces or break every thing that came in its way. These rollers must be placed so that the fides of them round which the rope bends are cogs or break every thing that came in its way. The truer these rollers are placed, the easier the gib is managed, and the less apt to swing either way by the force of the weight K.

A ratchet-wheel Q is fixed upon the axis D, near the trundle E: and into this wheel falls the catch or click R. This hinders the machine from running back by the weight of the burden K, if the man who raises it should happen to be careless, and to leave off working at the winch A sooner than he ought to do.

When the burden K is raised to its proper height from the ship, and brought over the quay by the weight of the burden K, if the man who works the engine.

The crank A, which, by the crank handle, turns the winch A, the gripe never louches the specimen in the trundle B, and then this wheel will prevent its running-back, if another, their product will be 182: and by multiplying the cogs of the wheels, 78 and 36, into another, their product will be $4368$: and dividing $4368$ by 182 the quotient will be 24: which shows that the winch A makes 24 turns for one turn of the wheel F and its axle G, on which the great rope or chain H I H winds. So that if the length or radius of the winch A were only equal to half the diameter of the great axe G, added to half the thickness of the rope H, the power of the crane would be as 24 to 1: but the radius of the winch being double the above length, it doubles the said power, and so makes it as 48 to 1: in which case, a man may raise 48 times as much weight by this engine as he could do by his natural strength without it, making proper allowance for the friction of the working parts. Two men may work at once, by having another winch on the opposite end of the axis of the trundle under B, and so make the power still double.

If this power be thought greater than what may be generally wanted, the wheels may be made with fewer cogs in proportion to the cogs in the trundles; and so the power may be of whatever degree is judged to be requisite. But if the weight be so great as will require yet more power to raise it (hoppo se a double quantity), then the rope H may be put under a moveable pulley, as $\theta$, and the end of it tied to a hook in the gib at $\lambda$, which will give a double power to the machine, and so raise a double weight hooked to the block of the moveable pulley.

When only small burdens are so raised, this may be quickly done by men pushing the axle G round by the handspokes $y, y, y, y$: having first engaged the trundle B from the wheel C: and then this wheel will only act as a fly upon the wheel F: and the catch R will prevent its running back, if the men should inadvertently leave off pushing before the burden be unhooked from $\beta$.

Lastly, when very heavy burdens are to be raised, which might endanger the breaking of the cogs in the wheel F; their force against these cogs may be much abated by men pushing round the handspokes $y, y, y, y$, whilst the man at A turns the winch.

We have only shown the working parts of this crane, without the whole of the beams which support them; knowing that these are easily furnished, and that if they had been drawn, they would have hid a great deal of the working parts from sight, and also confused the figure.

Another very good crane is made in the following manner...
Another crane.

Mr. Padmore of Bristol, England, (whose contrivance the fore-mentioned crane is), observing this dangerous contrivance, contrived a method for remedying it, by putting cogs all round the outside of the wheel, and applying a trundle E to turn it; which increases the power as much as the number of cogs in the wheel is greater than the number of staves in the trundie: and by putting a ratchet-wheel F on the axis of the trundie (as in the abovementioned crane), with a catch to fall into it, the great wheel is stopp'd from running back by the force of the weight, even if all the men in should leave off walking. And by one man working at the winch I, or two men at the two opposite winches when needful, the men in the wheel are much affiicted, and much greater weights are raised, than could be by men only within the wheel. Mr. Padmore put also a grip wheel G upon the axis of the trundie, which being pinched in the same manner as described in the former crane, heavy burdens may be let down without the least danger. And before this contrivance, the lowering of goods was always attend- ed with the utmost danger to the men in the wheel; as every one must be sensible of who has seen ship engines at work. And it is surprising that the masters of wharfs and cranes should be so regardless of the limbs, or even lives of their workmen, that, excepting the late Sir James Creed of Greenwich, and some gentlemen at Bristol, there is scarce an instance of any who has used this safe contrivance.

We shall describe here four new cranes invented by Mr. Gottlieb of London, who communicates them to the public as quite new in their principles, and more simple and useful than any hitherto contrived. Fig. 49. is a representation of a crane adapted for a large warehouse, where heavy goods are wanted to be drawn up from a cart or quay. One of this construction has lately been erected in Mr. Camden's sugar-house, Old Gravel Lane, London. Its operation is as follows: The horse yoked below at A turns the upright axis and the wheel B, which is about 6 feet in diameter; this turns a 3 feet wheel C, having an upright axis D through the floor turning with it, and carrying a 3 feet wheel E with perpendicular cogs. The wheel E turns two pinions F and G, the former being pinched in the same manner as described in the former crane, heavy burdens may be let down without the least danger. And before this contrivance, the lowering of goods was always attended with the utmost danger to the men in the wheel; as every one must be sensible of who has seen ship engines at work. And it is surprising that the masters of wharfs and cranes should be so regardless of the limbs, or even lives of their workmen, that, excepting the late Sir James Creed of Greenwich, and some gentlemen at Bristol, there is scarce an instance of any who has used this safe contrivance.

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A new portable cellar crane is represented in fig. 60. New cellar crane, which is very useful to wine-merchants, brewers, &c. cran-e, in drawing up and letting down casks full of wine, beer, &c. It saves the trouble and inconvenience of horses, and in many places can be used where horses could not. AA are two wooden props about 6 feet in height, and

M E C H A N I C S.

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Combination of Mechanical Powers.

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Another crane.

Mr. Gottlieb's new crane.

Plate 38.

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Combination of Mechanical powers.

and jointed together like a ruler at E. They are connected to each other by an iron round bar C and wooden bar at the bottom D. The iron prods EE fasten the uprights steadily to the edge of the cellar. F is the axis round which two ropes are coiled, the ends of which are fastened to the two clamps GG. On the axis F is fixed the iron wheel H of 3 feet in diameter; in the teeth of this works the pinion I of about 6 or 7 inches in diameter, and is turned by the handle at K.

It is evident, by a bare inspection of the figure, that when the two ropes are shifted over the ends upon the barrel, either at the top or bottom of the cellar, that by turning of the winch K towards or from you, the barrel can be safely or expeditiously taken out or lowered down.

When the crane is done with, it stands up by unferrying the nut at B, taking the wheels and axle away out of the loops at L, and folding the sides at A together like a jointed role; it may then be taken away in the cart or dray, or taken in the men's hands.

Fig. 61. represents a portable stone-crane mounted in a wooden frame and stage, which is judged to be very useful for loading and unloading carts with large heavy stones. It is moveable to any part of a stone-yard or ground; the frame is sufficiently wide for a cart to draw under the crane, and at any time it may be taken to pieces.

The frame AAAA is made of wood, is about 9 or 10 feet high, and about 9 feet square. The wheels BB are of iron, and are about 3 feet in diameter, and the pinion D, that is fixed to the axis of the first wheel B, 8 inches in diameter, on the axis of the second wheel B, the axis round which the rope-coils are fixed.

Now the stones being corded and hooked at the end of the rope, it is very evident that the man at C will either raise or lower them as may be necessary, according as he turns the winch towards or from him, and in a safe and very easy manner.

Fig. 62. is a representation of a crane-carriage which Mr Gottleib conceives it to be very useful in moving large stones in quarries, where carts and hores cannot be conveniently or at all managed. Its principle is evidently clear from a bare view of the figure. It consists only of two sets of crane-wheels applied to the two sets of wheels belonging to the carriage; so that two men, one at each winch AA, turning the pinions and wheels round, shall act upon the carriage-wheels and move it along. By their both turning forwards or backwards, the carriage goes accordingly; but if they turn contrary-ways, the carriage will be turned round, or partly so, as may be wanted.

The pinion B is 6 inches in diameter, which turns the wheel C of 3 feet diameter, on the axis of which is fixed the pinion D of 1 foot diameter, which works into 2 wheels E, E, of 3 feet 6 inches diameter, that are fixed upon the carriage-wheels, and give motion to the whole machine.

The friction of the axle-trees of these machines may be considerably diminished, by applying an improved axle-tree invented by Mr Gottleib, which he calls the anti-friction axle-tree, and for which he has a patent. It is formed from a steel-roller, from 4 to 6 inches, long, turning within a groove cut in the iron part of the axle; and the advantages discovered by experiments made by Mr Gottleib will be seen by the small table subjoined. A section of this axle-tree is represented in fig. 65, where a is the axle-tree, b the groove, c the roller, d the cavity between the lower part of the tree and the box e. In figs. 66, 67, f represents the oil-velvet supplying it with oil, g the tube to convey the oil by, h the strips of slate, i the fastening, screws. Figs. 63, 64, give a side view of the axle.

Advantage of the anti-friction axle-tree.

Old axle-tree. Anti-friction.

Coaches - 60 o 19 o
Chariots, post-chaises, &c. 49 1 17 6
Single horse chariots and chairs - 31 7 6 8
 Wagons - 78 o 33 o
Drays for beer 158 0 48 0

One general maxim to be kept in mind by all mechanics is, that whatever a machine gains in power it loses in time, even supposing friction were entirely out of the question. It must likewise be remembered, that in almost all cases where a machine gains by complication, it will lose one third by mere friction, unless its parts are made with an accuracy not to be expected. In some cases, however, a great power must be had; and in these we must have recourse to the most simple machines, which will lose only time, but little power by friction; for the complicated ones waste both time and power to a great degree. There is not perhaps a better method of procuring a very great power than by combining a screw with a toothed wheel which acts as an axis in peritrochio, as is represented fig. 50; for by making the threads of the screw pretty close, and the diameter of the wheel large, we may increase the power almost to any degree we please, without any considerable increase of friction.

In this case, where it can conveniently be done, it is better to increase the diameter of the wheel than to add another, for this augments the power without any sensible augmentation of the friction; and it is absolutely necessary to have the axle as small as can be made of sufficient strength to bear the weight. Archimedes is said to have boasted, that he could move the earth provided he could find a place to stand on; and Bichop Wilkins, that he could pull the strongest oaks up by the roots by means of a single horse-hair. But abstracting from the impossibility in the case of Archimedes, it does not appear that the bishop could, more easily have fulfilled his task, on account of the immense friction of the machine he must have employed, and the stiffness of the great ropes which must have been bent in order to accomplish his purpose.

To perform feats of this kind, a lever seems more likely than anything; but the vast room it takes up, and the excessive length requisite to make it act with sufficient force, together with the vast weight it must necessarily have if made of the requisite strength, must easily convince us that all such extravagant boats are vain, and that wherever great effects are to be accomplished, a great power must originally be applied.

Sect.
Wheel-carriages.

Sect. IV. Of Wheel-carriages.

Wheel-carriages in general signify all kinds of machines furnished with wheels, for drawing great weights by means of the strength of an ills or otherwise.

It is very probable, that in the infancy of the arts, sledges were used before wheels were invented, or at least before the application of them became very general. Homer mentions them as employed in bringing wood for the funeral of Patroclus; though it is not to be doubted that the Greeks at that time were acquainted with the use of wheels, as the same poet mentions them on all occasions when speaking of the war chariots of his heroes. It is possible, therefore, that by the country people, for inferior purposes, the sledge might be employed, while wheel-carriages were confined to those of superior rank, or used only for war chariots. It is not long ago indeed since sledges were used for certain purposes in Britain, notwithstanding the number of wheel-carriages used in it from time immemorial. In some of the cold countries, where ice is met with in great quantity, and the ground is covered with frozen snow for a great part of the year, sledges are still used, and run upon the smooth surfaces of these bodies with as great ease as wheels run upon the ordinary ground. Upon very smooth ice, indeed, or upon any body perfectly smooth, wheels would not turn at all; for the only reason why they turn in the ordinary way, is the continual inequality they meet with. If we suppose the wheels to be carried in the air, it is plain that they would not turn, there being nothing to put any part in motion more than another; and the same would be the case if we could suppose ice, or any other body, to be so smooth that it would give as little resistance as air. On common roads, however, the wheels meet with obstructions at the bottom, which retard that part; and in consequence of this the upper part moves forward, and a circulating motion immediately begins to take place. By means of this circulatory motion the friction becomes very much less than what it would be if the weight were drawn along the ground upon a sledge, inasmuch that, according to the computation of Dr. Hellman, a four-wheeled carriage may be drawn with five times as much ease as one that slides upon the same surface as a sledge.

The structure of wheel-carriages is so generally known, that it is needless to describe them. In the construction of them, however, there are several particulars to be observed, which may render one method of construction preferable to another, though there may be a general similarity between one carriage and another. In order to ascertain the most proper method for constructing them, it will first be necessary to consider the obstructions which occur to their motion. These are,

1. The vis inversae of matter. — This, though for a considerable time supposed to be a principle of mere inactivity, or resistence to any change of state from repose to rest in material bodies, is now almost exploded. Mr. Anville, in a late treatise on wheel-carriages, supposes the philosophers who maintain the existence of such a principle, to have mistaken Sir Isaac Newton and other great men. According to him, they are really no more by the vis inversae of matter than a mere sattiveness in it, by which it was disposed to abide in that state, either of repose or motion, in which it originally was: "whereby it alters not its state but in proportion to the quantity of power exerted against it. Thus, should a body of any given weight or quantity of matter, moving with a certain degree of velocity, strike another body at rest of the same weight, it would communicate half its motion to that body, and they would move together with the same velocity as the first; but this proceeds from no principle of the body at rest to rest motion, it does not destroy in the other more than it receives from it; therefore no motion is lost, it is only divided; and the two after division have a power equal to that of the one before it, with the whole velocity of motion. Indeed when we consider that the least degree of motion in any body, however small, will communicate some degree of it to the largest in the universe; and that, on the contrary, none but an equal degree of impetus can deprive a body of actual motion, and that immediately opposed to it: add to this, that since all matter within the reach of our observation, and by analogy we have reason to think it is in actual and rapid motion, impressed on it by its great Creator, and co-existent with it; we may conclude, that if matter do not affect, it is more liable to motion than to rest."

2. Friction. By this is meant the quantity of motion destroyed by bodies sliding over one another, and which is in proportion to the weights laid upon them. See Sect. II. § 8.

Friction depends not only upon the pressure made on the moving bodies, but on the inequalities on the surfaces upon which they move. For as the surfaces of even the most highly polished bodies have some inequalities, whenever two of them are pressed together, the inequalities of the one must enter, and in some degree accommodate themselves, to those of the other; and as the forms of these inequalities are of infinite variety, it is impossible to give any general description which can exactly answer to every one of them.

Mr. Anville supposes the varieties only to be of two kinds, which he thinks may not be very dissimilar to any that occur. 1. Let us imagine two sliding surfaces, when viewed through a microscope, to present such an appearance as is represented in fig. 69, in which A is the sliding body to be moved in the direction CD over the fixed body B. To effect this, it is evident, that either the teeth must be violently broken off, or a power applied to them sufficient to make them slide upon each other on the principles of the inclined plane; in which case the friction must always be in proportion to the weight of the slider, and that with which it is loaded, without regard to the length or breadth of the bearing surface; for if only one pound rested upon one tooth, there would be no more but that pound to be lifted. If the pound rested upon two teeth, there would only be half a pound to be lifted over each, and so on to any number; but if we suppose the teeth to be of such a shape, that they cannot act as inclined planes, let them be ever so strong, we must calculate the friction in a different manner.

Let surfaces of this kind be represented by fig. 70. In which case it is evident, that instead of depending on the weight or pressure only, it will be in proportion to the number and strength of the teeth to lock-
principles of these powers. Thus, let the circle $O$ represent a wheel of four feet diameter, placed on the axle $PQ$, and opposed in that line by the obstacle $O$, which is supposed to be 7.03 inches in height; the line in which the carriage is drawn being $CT$, parallel to the plane $PQ$. In this case the effort applied to the carriage is communicated to the nave of the wheel where it touches the axle. This part, therefore, represents the lever to which the power is applied, and is the point $C$ in the figure. As the turning point is that where the wheel touches the obstacle, that must represent the fulcrum of the lever; whence that arm of the lever will be represented by $CO$, which may be supposed a spoke of the wheel; and as the upright spoke $CL$ is in the line which bears the whole weight from the axle, and in which it is to be lifted; hence that part of the circumference of the wheel which is between the fulcrum and the upright spoke bearing on it, must represent the arm of the lever which is to raise the weight. In this case neither the weight nor the power act at right angles to their respective arms of the lever; so that we must represent their powers by the imaginary lines $MO$ and $ON$. As the length of $OM$, therefore, is to that of $ON$; so is the proportion required to the weight to balance it on the obstacle, when rising over it; and in this case the arms are equal, it is plain that the powers must be to likewise. Every obstacle, therefore, exceeding this height, which is as 7.03 to 48, will require a power acting parallel to the plane greater than the weight drawn; and every obstacle whose height bears a smaller proportion to that of the nave, must be overcome by a smaller power.

Again, let a wheel of four feet diameter be represented by the circle in fig. 72, and supposed to be moved along the plane $PQ$, and an obstacle of twelve inches height be placed before it, the real lever will then be represented by the lines $LO$; which being reduced to the imaginary ones $MO$ and $ON$, shows that the power is greater than the weight. By the same rule, if an obstacle of three inches be placed in the way of a wheel, as in fig. 73, the power required to move the wheel will be considerably less than the weight, though it is plain that the proportion of power must always be according to the size of the wheel, the height of the obstacle, and the direction in which the carriage is drawn. For instance, if the line of traction in fig. 73, be raised into the direction $CS$, the power required to move the carriage over it will be to the real weight as the line $CO$ is to the line $ON$; and in consequence of thus altering the direction, we gain as much as the length of the line $CO$ exceeds that of $CN$.

This view of the manner in which the wheels of carriages act, will serve to elucidate the question, whether large or small wheels are preferable for carriages? Let the circle fig. 74, represent a wheel of two feet diameter, and the obstacle in its way 7.03 inches in height; then will the true lever be represented by the lines $COL$, to be reduced to the imaginary ones $MON$. In this case, the power required to draw the carriage must be to its weight as NO is to $OM$, which is more than double; and thus the advantage of large wheels over small ones is evident. In this, however, as in all other cases where wheels act as mechanical: A plane, the wheels will make but one sliding only.
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dical powers, we must remember, that the same doctrine applies to them as to the powers themselves when used in any other manner, viz. that as much as we gain in power we lose in time; and therefore, though a wheel of twice the diameter may be raised over an obstacle of any given height with twice the ease that would be required for one of once the diameter, yet the large wheel would require twice the time to move over it that the small one does.

Hitherto we have considered the carriage as being drawn in a direction parallel, or nearly so, to the plane on which the wheels move, which line is supposed to be horizontal: but the case will be different when we suppose them to move upon an inclined plane; for then, even though the line of traction be parallel to the ascending plane, and though the wheels act as levers, we shall find that the action of the weight will increase with the power gained by the increase of size in the wheels; and consequently, that the increased size of the latter will be of no farther use than that of diminishing the friction, in the same manner as is done upon horizontal planes.

To illustrate this, suppose the larger circle in fig. 75. to represent a wheel of four feet diameter, and the smaller circle a wheel of only two, both of which are made to ascend the inclined plane LM, by powers applied in the directions GI and ES parallel to the elevation of the plane, which is 45 degrees; it will then be found, that by describing the lever as in the former case, though the arm of the lever to which the power is applied be double the length in the large wheel that it is in the small, the other is augmented in the same proportion. Neither will the powers be augmented by varying the direction of the line of traction; for while these are kept parallel to one another, their relative powers must always keep the same proportion to one another. The reason is obvious, viz. that when wheels of any dimension ascend or descend inclined planes of any regular elevation, the fulcrum of the lever contained in the wheels must be determined by that part of the wheel which touches the plane, and which must always be of a proportionate height both in large and small wheels. It is otherwise, however, with the fulcrum marked out by perpendicular or irregular obstacles upon the plane itself; for large wheels will always have the advantage over small wheels when these are presented, for the reasons already given. Indeed, when the wheel impinges perpendicularly upon an obstacle as high as the line of traction, it is plain that it cannot be drawn over it by any power whatever, unless the direction of the latter be altered.

From these considerations, our author draws the following conclusions: 1. That in a carriage placed upon an horizontal plane, nothing more is required to produce motion than to overcome the friction which takes place between it and the plane. 2. By the application of wheels to a carriage, the friction is diminished in the proportion of the diameters of the axles and hollow parts of the naves to those of the wheels. 3. In the draught of a carriage without wheels upon a regular plain ascent, the friction must not only be overcome, but there is a power likewise to be applied sufficient to lift such a proportion of the weight of the carriage as the perpendicular part of the ascending plane bears to that portion of the plane. 4. If wheels of any size be applied to the carriage in such circumstances, they have only the advantage of lessening the friction; for though they really act as levers, yet as each arm of the lever is lengthened in proportion to the increase of size in the wheels, the power can be no farther augmented than as the ascent may act as a mechanical power for raising the wheels, carriage, &c. to the top. 5. Large wheels have the advantage over small ones in overcoming obstacles, because they act as levers in proportion to their various sizes. 6. The line of traction, or that in the direction of which the carriage is drawn, should always, if possible, be parallel to that in which the plane lies; for when this is the case, the arm of the lever to which the power is applied will bear the longest proportion possible to the other. This always takes place when the line of traction is perpendicular to that spoke of the wheel which points to the obstacle. As it may not always be possible, however, to alter the direction of the line of traction to this position, it will be most proper to fix upon some medium between that which commonly occurs and that which requires the greatest exertion to overcome the obstacle; that is, between a level line and one rising perpendicular to the spoke of the wheel which points to the obstacle it is likely to meet with. The greater attention ought to be paid to this last, that all wheels, but especially small ones, are liable to link into the ground over which they pass, and thus produce a constant obstacle to their own progress. The line of traction, it must also be observed, is not an imaginary one drawn from that part of the animal to which the traces or chains are attached to the axle of the wheel, but the real direction of the traces to whatever part of the carriage they are attached; for the effort will be instantly communicated in the same direction from one part of the carriage to all the rest, by reason of the whole being fastened together and in one piece.

Hitherto we have considered the whole weight of the carriages as bearing perpendicularly against the axles of the wheels: but as this cannot be done in chairs, carts, and other carriages having only two wheels, it will be necessary to have their centres, or transverse lines of gravity, as near to the ground as possible. To understand this, it must be premised, that the centre of gravity is that point of any body which if suspended will keep all the parts of the body at rest, let the body be placed in any situation we please. Thus the centre of gravity in a wheel or circle is the centre of the circumference, provided the substance of it be equally ponderous throughout. In like manner, the real centre of a globe coincides with the centre of gravity; provided the matter of which it is composed be equally ponderous. In a square, whether superficial or solid, the centre of gravity will be a point equally distant from all its sides; so that if the substance be equally heavy, it will be impossible to turn it into any position in which there will not be as much matter upon one side of the centre as upon the other: and in like manner, every figure, however irregular, has some point round which, if it be turned, as much matter will always be upon one side as on the other.

If now any body be supported by a transverse line pulling not through the centre of gravity itself, but either
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either above or below it, the body can only be kept in equipoise while that line remains directly above or below the point; for if the body is moved forwards, as in two-wheeled carriages moving downhill, a greater part of the weight will be thrown forwards over the line of suspension than what remains behind it; and consequently this superficial part must be borne by the animal which draws it. In ascending any height, the reverse takes place; for thus a portion of the weight is thrown backwards, and will tend to lift up the animal altogether. The consequence of this is, not only that the creature must proceed with great pain, but that the friction on the nave and axle will be augmented by laying upon them a part of the animal's weight also. If the body be suspended above the centre of gravity, the effect, though the same in both cases, will be reversed in the ascent and descent of a hill, as long as the body is firmly attached to the shafts; but should the whole weight be suspended under the axle, independent of the shafts altogether, then it will always, whether ascending, descending, or moving horizontally, have the same effect as if hung directly by it.

Our author next proceeds to treat of a generally received opinion, that the disadvantages attending carriages suspended either above or below the centre of gravity are augmented by the height of the wheels. The reason given for this opinion is, that the hinder part of the load in ascending an hill, being thrown back, will overhang that part of a large wheel which touches the plane, much more than when a smaller wheel is used. Mr Anilce, however, observes, that all the disadvantage, in either case, is expressed by the weight which, from its action upon the axle tends to lift the animal, which must always be the same whether the wheels are high or low. Thus, in fig. 76. let a carriage be represented with two wheels of four feet diameter, ascending a plane of 35° elevation from the level LE. Let fig. 77. represent a carriage exactly in the same circumstances with the former, only that the wheels are six feet in diameter. Let C be the centre of gravity, and SP the line of gravity parallel to the central line AR, the line of support or suspension; in each of these the body is thrown so far back by its position, that the space GS and AR is taken from before the line of gravity, and added to the part behind it. Hence a certain part of the animal's weight must be exerted upon the shafts, in order to balance that of the carriage, which is thus thrown back, and which, as is evident from the figures, must be the same in both carriages, though the wheels of the one so much exceed those of the other in size, and the point T, where the wheel touches the plane, is much farther from the line of suspension in the large wheel than in the small one.

To remedy the inconvenience which must arise from placing the centre of gravity in the carriage low enough with respect to the wheels, it will be best to apply three or four wheels, placing them in such a manner that the line of gravity may always fall between the wheels, in whatever situation the carriage may probably be placed. Thus if the body A, fig. 76, be below the point of which the line of gravity is never above, B and C, it will be entirely supported between them, though more by C than B, even though the carriage should be ascending an hill as steep as HH, viz. 50 degrees, which cannot ever happen in practice. Even in this case the animal would have no occasion to make exertions for preserving the balance of the carriage, though, had it been supported only by the axles of two wheels at S, the greater part of the weight of the carriage would have been thrown behind, and the equilibrium could not have been preserved without the greatest difficulty. Hence it is plain, that the greater the distance between the axles of three or four wheels applied to a carriage, the less liable will it be to have the line of gravity thrown out of its proper direction; but as this distance greatly augments the difficulty in turning a carriage, some medium is to be observed in this as well as other things.

What has been just now observed with regard to the preserving the balance of a carriage longitudinally, applies equally to the preventing it from being overturned laterally upon uneven roads, or such as have one side much higher than the other. In order to this, we must take care to keep the line of gravity so far within the body of the carriage that it cannot be thrown out of it by any ordinary declivity of the road upon one side more than another. In the present case, however, as the wheels are not moveable on an axle in a lateral direction, we must consider the points of suspension to be those where the wheels touch the ground. Thus, let fig. 79. represent the cross section of a carriage moving upon two wheels; let C be its centre of gravity; it is plain, that in the position there represented, each of the points A and B sustains an equal share of the weight, and must do so as long as the carriage moves upon level ground; but if it be drawn along a road one side of which is higher than the other, such as represented fig. 80. then the centre of gravity, and consequently the whole weight of the carriage, will bear upon the point of the wheel B, with this additional inconvenience, that the prehure does not lie perpendicularly but somewhat obliquely, by which the wheel is in great danger of being broken. To avoid inconveniences of this kind, the points of bearing upon the wheels are removed to a greater distance than the exact perpendicular, and this is called dishing the wheels; the good effects of which are evident from the figure. The wheels are dished by inverting the spokes into the naves in such a manner that they may decline every way from the carriage. Some disadvantage, however, attends this contrivance, for the carriage thus takes up more room upon the road, which makes it more inconvenient; and when it moves upon plain ground, the spokes not only do not bear perpendicularly, by which means their strength is lessened, but the friction upon the nave and axle is made unequal, and the more so the more that the wheels are dished. To obviate these inconveniences, some have bent downwards the ends of the axles; but thus the good effects of the dishing is entirely lost, for the wheels are thereby thrown erect, and the breadth of the dish doubled increased on the upper part of the carriage.

The practice of bending forward the ends of the axle is still worse; for thus the wheels are thrown out of that parallel direction which they should always prefer on the ground, and likewise increases the friction both on the shoulders of the axles, and like-
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47. How the power of wheels may be augmented.

The power of wheels can only be augmented in two ways. 1. By increasing the length of that arm of the lever to which the power is applied; and, 2. By diminishing the friction between the nave and axle.

The former is only a temporary expedient in case of any obstacle which cannot be surmounted in the ordinary way. It is accomplished, by transferring the action of the animal's power from the centre to the upper part of the circumference of the wheel: thus the power of the lever will be nearly doubled, as is shown from fig. 71. For if the power be applied to the wheel at A, then the arm of the lever would be represented by the dotted line AO instead of CO; and the former being nearly twice as long as the latter, their powers must be in the same proportion. It is evident, however, that this mode of applying the animal's power can only be useful in any sudden emergency; for were we to attempt to reduce it into practice by winding a rope or chain about the circumference of the wheel, the animal must move twice as fast as the carriage. See this also exemplified in Plate cccxxxvi. fig. 58, where the moving power is represented by the weight P; the wheel EF turning between two toothed planes AB and CD.

Here it is evident, that while one of the small divisions ca. ae. &c moves forward its own length, the plane A must move the same, while the centre, by the motion of which only that of the wheel can be measured, moves but through half the space.

48. Of friction-wheels.

With respect to friction-wheels or rollers, the case is different; and we may apply these in as great numbers, and in as great a variety of ways as we please, without fear of inconvenience. The best method of applying them, according to Mr. Amftice, is to have the wheels and axle fixed to one another, so that both may turn together. Two friction wheels a little overlapping each other, must then be fixed on each side of the body of the carriage, so that it may bear on the axle in the interweaving of the wheels, as is represented in fig. 81. Here ABCD represents the body of the carriage, the large circle one of the wheels fixed to the axle E. The circumference of each of the friction-wheels F and G is supposed to be three feet, and that of their axles three inches. As the large wheel then revolves by the motion of the carriage, and thus transfers the friction from its circumference to its axle; so the friction of the axle itself is now transferred from the circumference of the friction-wheels to their axles. Every revolution of the great wheel, therefore, during which it passes over 18 feet of ground by means of the motion of the axle, puts the latter wheels round one fifth part of their circle; and consequently their axles are moved through the same part of their circumference, the friction being thus reduced to that upon this small part; which being no more than half an inch, becomes 552 times less than it would have been on the large wheel without any motion on an axle, and 14 times less by means of the friction-wheels than without them. The axles on both sides indeed are in motion, but the calculation must be made as if only one moved; for the greater number of wheels there are, the more will the friction be divided among them.

An objection of considerable weight ariseth to this method of fixing the wheels and axles together, that thus the wheels are prevented from moving with different velocities as they ought to do, when the carriage moves out of a right line; but this may be obviated by leaving the friction-wheels loose upon their axles, by which means they will be at liberty to move with different velocities, at the same time that they will have the advantages of friction-wheels always as to one wheel of the carriage, and generally as to both. The whole contrivance, however, seems likely to be entirely frustrated by the following one of Mr. Gamett of Brid- tell, who has obtained a patent for it. The general principle on which he proceeds is this. Between the axle and nave a hollow space is left to be filled up by solid equal rollers nearly touching each other. These are furnished with axles inserted into a circular ring at each end, by which their relative distances are preserved; and they are kept parallel by means of wires fastened to the rings between the rollers, and which are riveted to them.

To understand the effect of this machinery we must consider, that if, when plane surfaces move with a roller between them, if the under one be fixed, the upper plane will put the rollers forward but with half the quantity of its own motion. This is owing to the reaction of the stationary plane, which causes the roller to move backward upon itself as much as the other causes it to move forward upon itself. Thus, let CD, fig. 82, be a fixed surface, and AB a moveable one, with a roller B between them; if B be moved forward to G, it will cause the roller to move to F, which is but half the distance that AB has moved; because it has rolled in a retrograde direction as far against the surface BA as it has gone forward upon the other. This is entirely owing to the resistance it meets with from CD; for if it did not touch that surface, but was attached by any other means to AB, it would be carried along with it through the whole space without any rolling motion. Hence it is clear, that if a roller be placed between the axle and nave of a wheel, and the latter be turned round, the roller will move with a retrograde motion upon the axle; and in order to carry it quite round, the nave must be turned as much beyond a whole revolution as is equal on its inner circumference to the whole circumference of the axle. To exemplify this, let ABCD, fig. 83, represent the nave of the wheel E, the inner circumference of which is 18 inches, and the axle so small that it may be considered as a point. Let F and G be two rollers closely fixed between them; if then the wheel be turned round, the rollers will also be carried along with it round the point which we consider as an axle; for there can neither be rolling nor friction against a mere point. But if the axle be of any sensible size, for instance one inch circumference, then must each roller move round by the motion of the nave against it, and the resistance of the angle on the opposite side. But in order to do this, it must roll in a retrograde direction upon the nave, and consequently the latter must go as far beyond a revolution as is equal to the circumference of the axle upon it, before the roller can go once round the axle, which in this case is by one
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One 18th part of the circumference. Should the circumference of the axle be nine inches, and that of the inner part of a nave turning upon it with rollers between them, it never can amount to two revolutions of the wheel round the axle, however nearly it may approach to it; for no segment of a circle can ever be a straight line.

It will now be apparent, that if several rollers be placed all round between the nave and axle, whenever the wheel be turned there cannot be any real friction, but merely a rolling of the rollers. If likewise the rollers be all of one size, and very nicely fitted to the cavity, they will keep their places without shifting, and very effectually answer the purpose of destroying friction. As such rollers, however, were very liable to be displaced by accident, the use of them was neglected, till Mr. Galileo suggested the improvement already mentioned, and which is represented in fig. 84. Here ABCD represents a piece of metal to be inferred into the nave of a wheel, of which E is the axle, and 1, 2, &c. rollers of metal having axes inferred into the brazen circle which passes thro' their centres, and both circles being riveted together by means of bolts pulling between the rollers from one side of the nave to the other; and thus they are always kept separate and parallel. By this method, indeed, some friction unavoidably takes place between the axes of the rollers and their sockets in the brass rings; but as the quantity of friction depends principally on the force by which the rubbing surfaces are pressed upon each other, and as in this case there is but the slight pressure occasioned by those accidental circumstances which would bring the rollers together, the friction must be too trifling to be noticed.

Thus far with regard to wheel-carriages in general. We must now make some remarks on the methods of drawing them, and the contrivance of particular carriage.-Men, by reason of their upright form, are not means fitted for horizontal draughts; but animals who go upon all four are remarkably so. In Britain horses are commonly made use of; but mules, oxen, sheep, and dogs, in other parts of the world. In all animals, however, the capacity for drawing a load depends upon their weight as well as their absolute strength. Thus it may happen that a very heavy horse will draw a load, which a lighter though stronger one could not move; and this will always happen, when the weaker horse exceeds the other in weight more than he is exceeded by him in strength. It is well known that the weight, as far as it goes, reacts upon the horse, and pulls him back as much as he pulls it forward, until the exertions of the muscles of the animal retold, by the solid ground, overcome the restfulness of the load upon the moveable wheels, and it goes forward in proportion to the excess of the one power over the other. If the horse were put upon a moveable plane, and attempted to draw a load upon the solid ground, instead of pulling it forward he would pull himself back.—The horse has two sources of power in drawing a load, viz. his strength and weight. The former is the source of velocity; and as we find the actual power of any inanimate body in motion by multiplying the velocity into its quantity of matter, so do we find the power of a horse to draw a load, by considering his weight as well as absolute strength. There are even many instances in common practice, where it is useful to increase the weight of an horse or other animal; and therefore when horses are employed to draw mills, it is usual to put a small load upon their backs in order to increase their absolute momentum. Where the animals are equal in strength and momentum, however, the only difference that can take place in the weights they draw must arise from the convenience or inconvenience of the carriages to which they are yoked, or of the roads upon which they walk. A load breath-high is much more easily drawn than one which is dragged along the ground, because the power of the animal is then exerted directly against it; and this holds good whether the horses go up or down hill. If in descending, indeed, as the load is then higher with regard to the horse than when it is on a plane, he will consequently pull it with the greater force; but in this case, its own gravity conspires with the draught, and will likewise help the load to descend; so that in this case the animal has an opportunity of exerting his greatest power when there is the least necessity, nay, when it is often inconvenient.

In all carriages with four wheels the two fore ones are made of a much smaller size than the hind ones, both for the sake of turning more easily, and likewise that there may be no danger of cutting the braces; but were both the fore and hind wheels to be of the same height, the carriage would be drawn with much greater ease. It is imagined indeed by the drivers of carriages, that the hind wheels pull on the fore-wheels; but this is evidently absurd; for the fore-wheels must turn as many times round offter than the large ones as the latter exceed them in size. Thus, if we suppose the circumference of the large wheels to be 18 feet, and that of the small ones only 6, it is evident that the latter must turn round three times for one that the large ones, and the carriage therefore to be loaded equally on both axles, it is plain that by the greater friction upon the fore-axle than the other, it must wear out much sooner, and that as much as the fore-wheels are smaller than the hind ones. But it is the universal practice of those conversant in loading and driving carriages, to put a much greater load upon the fore than the back axle. Thus the friction not only becomes greatest where it ought to be least, but the small wheels must necessarily sink deeper into the ground than the large ones, which they are at any rate inclined to do from their size. The only danger in laying the greatest load upon the hind axle is, when the carriage goes up a very steep ascent; but in the few cases in which this may happen, a small temporary weight laid upon the pole betwixt the horses would prevent all danger of overreaching.

To confirm these reasonings by experiment, let a small model of a waggon be made, with its fore-wheels 4 inches in diameter, and its hind-wheels 4; the whole model weighing about 20 ounces. Let this little carriage be loaded any how with weights, and have a
small cord tied to each of its ends, equally high from the ground it rests upon; and let it be drawn along a horizontal board, first by a weight in a scale hung to the cord at the fore-part; the cord going over a pulley at the end of the board to facilitate the draught, and the weight just sufficient to draw it along. Then turn the carriage, and hang the scale and weight to the hind-cord, and it will be found to move along with the same velocity as at first: which shows that the power required to draw the carriage is all the same, whether the great or small wheels are foremost; and therefore the great wheels do not help in the least to pull on the small wheels in the road.

Hang the scale to the fore-cord, and place the fore-wheels (which are the small ones) in two holes, cut three eighths of an inch deep in the board; then put a weight of 32 ounces into the carriage over the fore-axle, and an equal weight over the hind-one: this done, put 44 ounces into the scale, which will be just sufficient to draw out the fore-wheels: but if this weight be taken out of the scale, and one of 16 ounces put into its place, if the hind-wheels are placed in the holes, the 16 ounce weight will draw them out; which is little more than a third part of what was necessary to draw out the fore-wheels. This shows, that the larger the wheels are, the less power will draw the carriage, especially on rough ground.

Put 64 ounces over the axe of the hind-wheels, and 32 over the axle of the fore-wheels, in the carriage; and place the fore-wheels in the holes: then put 38 ounces into the scale, which will just draw out the fore-wheels; and when the hind-ones come to the hole, they will find but very little resistance, because they sink but a little way into it.

But shift the weights in the carriage, by putting the 32 ounces upon the hind-axle, and the 64 ounces upon the fore-one; and place the fore-wheels in the holes: then, if 76 ounces be put into the scale, it will be found no more than sufficient to draw out these wheels; which is double the power required to draw them out when the lighter part of the load was put upon them; which is a plain demonstration of the absurdity of putting the heaviest part of the load in the fore-part of the waggons.

Every one knows what an outcry was made by the generality, if not the whole body, of the carriagers, against the broad-wheel act in Britain; and how hard it was to persuade them to comply with it, even though the government allowed them to draw with more horses, and carry greater loads than usual. Their principal objection was, that as a broad wheel must touch the ground in a great many more points than a narrow wheel, the friction must of course be just so much the greater; and consequently there must be so many more horses than usual to draw the waggons. It is believed that the majority of people were of the same opinion; not considering, that if the whole weight of the waggons and load in it bears upon a great many points, each sustains a proportionensibly less degree of weight and friction, than when it bears only upon a few points: so that what is wanting in one is made up in the other; and therefore will be just equal under equal degrees of weight, as may be shown by the following plain and easy experiment.

Let one end of a piece of pack-thread be fastened to a brick, and the other end to a common scale for holding weights: then, having laid the brick edgewise on a table, and let the scale hang under the edge of the table, put as much weight into the scale as will just draw the brick along the table. Then taking back the brick to its former place, lay it flat on the table, and leave it to be acted upon by the same weight in the scale as before, which will draw it along with the same cafe as when it lay upon its edge. In the former cafe, the brick may be considered as a narrow wheel on the ground; and in the latter, as a broad wheel. And since the brick is drawn along with equal cafe, whether its broad side or narrow edge touches the table, it shows that a broad wheel might be drawn along the ground with the same ease as a narrow one (supposing them equally heavy), even though they should drag, and not roll, as they go along.

As narrow wheels are constantly sinking into the soft road, they not only prove very destructive to the high- and narrow ways over which the carriages move, but by reason of wheels, this very sinking, they must be accounted as going continually up hill in some degree, even when drawn upon plain ground. These inconveniences are obviated by the use of broad wheels; and indeed the utility of these is so obvious, that it seems surprizing how the use of narrow wheels is on any occasion permitted by the legislature. The wheels ordinarily used for waggons in Britain are nine inches broad; but of late a practice has been introduced of using rollers 16 inches broad; by which the inconveniences of the narrow wheels are removed, and the greatest weights may be drawn over the very worst roads, not only without making them worse, but greatly to their improvement. It has been objected, that broad wheels soon accumulate in clayey roads so much matter that it would soon equal an ordinary load; but, not to mention that such roads ought to have no existence in a country where such sums are annually paid for their repairation, it is evident, that passing heavy rollers over them is the only method to give that firmness to clay which is necessary for its supporting the animals who walk over it; and indeed many of the roads in Britain, by reason of the continual poaching by wheels and feet of horses, &c. become throughout a great part of the year almost impassable by people on foot. The British legislature appear to be very sensible of the advantage derived from these rollers, and accordingly allow such carriages as are furnished with them to go toll-free.

In the transactions of the Royal Irish Academy for 1782, we meet with some curious observations on the worth of carriages, and the experiments on carriage wheels, by Mr Lovell Edgeworth. This gentleman informs us, that he was present in London in 1773, at a set of experiments tried in order to determine the comparative advantages of low and high wheels. The apparatus for these experiments were constructed with the greatest accuracy. The carriages themselves were made by the best workmen in London, and they were drawn along a smooth table by silk strings of small diameters put over a pulley nicely contriv'd, and fitted up in such a manner as to have scarce any friction. On applying a weight to the end of the string which pulled over the pulley, the difference appeared in the velocities with which the carriages passed along the table, whether the wheels were high or low; but what appeared surprizing was, that when obstacles were put
in their way, sometimes the high and sometimes the
low wheels had the advantage, according to the difterent
shapes and sizes of the obstacles. "It appears
at first view (says Mr Lovell), that the force which
drew these carriages was employed only in overcoming
the friction of the axle-tree, or in lifting the weight
over the obstacle. But I suspected at the time,
and have since been convinced, that an obftcction of
another fort existed more confiderable than either of
these which I have mentioned, and which has not to
my knowledge been taken notice of by any writer upon
mechanics."

This obftcction is no other than the vis inertiæ
of matter, which has so much engaged the attention of
philosophers, and the non-existce of which, in differen-
tion from the power of gravity, seems now to be pretty
generally admitted. The argument used for its exis-
tence by Mr Edgeworth is as follows: "After a car-
riage has been once set in motion upon a smooth road
with any given velocity, its motion, fo long as that
velocity is continued, is neither retarded nor promoted
by the vis inertiæ; but whenever it paßes over any
height, not only the weight of the carriage must be
lifted up, but the vis inertiæ of that weight must be
overcome in a new direction; and as much velocity
must be communicated to it in that new direction as
will enable it to rìse to the height of the obstacle while
it paßes over its base. When an obstacle is of such a
size and shape that a wheel of fix feet diameter must
strike the top of it at once, and not roll from the bot-
tom upwards, and when its shape will permit a smaller
wheel to touch it during its whole ascent, as there is
more time allowed for overcoming the vis inertiæ of
its weight in the latter case than in the former, the
smaller wheel may be drawn forward by a less
power than the larger, notwithstanding the advan-
tage of the lever, which is in favour of the larger
wheel."

To determine this, our author made use of an in-
clined plane five or six feet long and one foot high,
placed on a smooth horizontal floor. He then assu-
med the distance to which the carriage was driven on
the floor by the velocity acquired in descending the
plane, as a measure of the force with which it could
overcome any obstacle placed in its way; and conse-
quently the diminution of the distance was the mea-
sure of the resistance itself. Not satisfied with this ap-
pArius, however, he screwed a circle of iron three
feet three inches in diameter upon a solid floor. In
the center of this circle he erected an upright axle or
roller upon two pivotS, one resting in a pocket of brahs
upon the floor, the other in a bridge raised across the
machine. Around the axis was wound a small silk cord,
with a scale and weights fastened to it, which passed
over a pulley into an adjoining flour-cake, and turned the axis
with a determined velocity. An horizontal arm of
wood extended from the axis to the circumference of
the inner circle, and to the extremity of the arm was
fastened a piece of steal in form of the axle-tree of a
 carrier, having a wheel upon it, which by the motion
of the axis was carried round upon its edge like the
flone of a tanner's mill. The inner arm was furnished
with a hinge, by means of which the wheel could rìse up
and pass over any obstacle which stood in its way.
Above this was another arm, having on its extremity
a tin vane, which by its resisted to the air regulat-
ed the motion of the machine. On putting weights
into the scale, it was found that eight or ten turns
were necessary to give the wheel an uniform velocity,
which was preferred in all the experiments, any resist-
ance thrown in the way being overcome by an addition
of weight, and consequently this addition being al-
ways an accurate measure of the resistance.

On loading the wheel so as to weigh about four
pounds, it acquired a velocity of ten feet in a second by
nearly five pounds and an half; but on placing in its
way an obstacle only a quarter of an inch high, six
pounds and an half were required to cause the wheel
pass over it. Two such obstacles required fourteen
and an half pounds; but on substituting two obstacles
of the same height, but making an inclined plane three
quarters of an inch long, it required only two pounds
to overcome their resistance. "The difference there-
fore (says he) between two and fourteen must be at-
tributed to the vis inertiæ; for the velocities of the
carriage and the heights of the obstacles remaining
the fame, the only difference that exists is, that in the
one case the wheel has much more time to surmount
the obstacle than in the other, and consequently had
much less vis inertiæ."

On this piece of reasoning, however, it is impossible
to avoid making the following remark, viz. that no-	hing happens but what ought to do so upon the com-
mon principles of mechanics. One obstacle, when up-
right, required six pounds and an half to overcome it;
but when an inclined plane three times the length
was added to it, it ought then to have been overcome
by a third part of the power, that is, by something
more than two pounds; and the reason why something
less than the third part was required, seems to have been
the advantage the wheel had by acting as a lever; as
has been already observed on the principles of Mr An-
ftice. There is not therefore the least occasion to ap-
ply to a vis inertiæ, or any obscure principle, for a solu-
tion of what may so easily be solved upon the common
principles of mechanics and gravity.

Mr Edgeworth concludes his observations with some
Ufe of
remarks on the ufe of springs, which are found greatly ufed in
to facilitate the draught of carriages. "Whatever
(fays he) permits the load to rise gradually over an
obstacle without obstructing the velocity of the car-
riage, will tend to facilitate its draught; and the ap-
plication of springs has this effect to a very confider-
able degree: the fame weight of four pounds being
drawn over the fame obstacles, when sprins were put
between the load and the carriage, by four pounds in-
stead of 14. This remarkable difference points out
the great advantages of springs in rough roads; an ad-
vantage which might be obtained for heavy wagons,
as well as for other carriages, by a judicious ap-
plication of the fame means.

It appears from the Memoirs of the French aca-
demy, that the idea of applying springs to carriages
had occurred to M. Thomas in the year 1703; who
has given a drawing of a carriage constructed upon
this principle many years before it was attempted to
be put in execution. So little expectation had he of
success, that he expressly mentions it as a theory
which could not be reduced to practice; he had, howevcr, no
motion of applying springs to facilitate the draught,
but...
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Sect. IV.

Wheel-carriages.

54. On high and low carriages.

but merely for the convenience of the rider; and I apprehend that it is not at present commonly imagined that springs are advantageous for this purpose; nor would it at first sight appear credible, that, upon a rough paved road, such as are common in Cheshire and other parts of England, a pair of horses could draw a carriage mounted upon springs with greater ease and expedition than four could draw the same carriage if the springs and braces were removed, and the carriage bolted fast down to the perch.

Mr Lovell made also some experiments with high and low, long and short carriages, in order to determine which was the most advantageous, but could not recollect the particular results of each experiment. He was, however, satisfied, that the preference lately given in England to high carriages is ill-founded; and that, though in smooth roads, the height of the carriage is a matter of indifference, yet in rough roads it is very disadvantageous. The length of carriages also, if their weight be not increased, is a matter of indifference, except in very uneven roads, and where there are deep ruts; long carriages being preferable in the former case, and short ones in the latter.

The reason why springs so much facilitate the draught of carriages seems to be, not only that they allow the wheels to pass more gradually over the obstacles, as Mr Edgeworth says, but that by their efficacy they make the carriage bound upwards every moment for a small way. Thus its gravity is for that moment in a great measure counteracted, and the progressive motion which it has already acquired is at liberty to act more freely in pushing it forward; for were it possible very suddenly to take away the horses from a carriage mounted on springs, and moving with considerable velocity, it would continue for some time to move of itself; the weight in this case acting as a fly upon any mechanical engine, by means of which the machine accumulates a certain quantity of power, and will keep itself in motion for a considerable time after the hand is taken away from it. The weight of all carriages indeed has some effect of this kind, otherwise the draught would require an intolerable exertion of strength; and it is to be observed, that this tendency to proceed in the direction in which it is once set a-going, is remarkable in all great quantities of matter, and very perceptible even when weights are pulled directly upward; for in raising great weights by a crane, the burden is lifted with considerably more ease when near the top than at bottom, even after making every necessary allowance for the weight of the rope, &c.

By means of wheels, some people have contrived carriages to go without horses, or any other moving power than what was given by the passengers, by the wind, &c. One of these is represented by ABCD. It is moved by the footman behind it; and the forewheels, which act as a rudder, are guided by the person who sits in the carriage (a). Between the hind-wheels is placed a box, in which is concealed the machinery that moves the carriage. AA (fig. 86) is a small axis fixed into the box. B is a pulley, over which runs a rope, whose two ends are fastened to the ends of the two levers or treddles CD, which other ends are fixed in such manner in the piece E, which is joined to the box, that they can easily move up and down. F, F, are two flat pieces of iron that are joined to the treddles, and take the teeth of the two wheels H, H, which are fixed on the same axis with the hind-wheels of the carriage, I, J.

It is evident, that when the footman behind presses down one of the treddles, suppose C, with his foot, he must bring down one of the pieces of iron F, and consequently turn the wheel H that is next to it; and at the same time, by means of the rope that goes over the pulley, he must raise the other treddle D, together with its piece F, which being thrust down will turn the other wheel H; and to alternately; and as the great wheels are fixed on the same axis, they must necessarily move at the same time.

It is easy to conceive, that if the ends of the treddles next E, instead of being placed behind the carriage, were turned the opposite way, so as to come under the feet of the person who sits in it, he might move it with equal, or even greater facility, than the footman, as it would then be charged with the weight of one person only.

A machine of this kind will afford a salutary recreation in a garden or park, or on any plain ground; but in a rough or deep road must be attended with more pain than pleasure.

Another contrivance for being carried without draught, is by means of a sailing chariot or boat fixed on four wheels, as AB; which is driven before the fair wind, by the sails CD, and guided by the rudder E, by land. In a chariot of this kind, the wheels should be farther asunder, and the axle-trees longer, than in other carriages, to prevent overturning.

A machine of this sort was contrived in the last century by Stephimus, at Schevelling in Holland, and is celebrated by many writers. Its velocity with a strong wind is said to be so great, that it would carry eight or ten persons from Schevelling to Putten, which is 42 English miles distant, in two hours.

Carriages of this kind are said to be frequent in China; and in any wide, level country must be sometimes both pleasant and profitable. The great inconvenience attending the machine is, that it can only go in the direction the wind blows, and even not unless it blow strong; so that, after you have got some way on your journey, if the wind should fail, or change, you must either proceed on foot or go back. Some remedy for this inconvenience will be found in the next contrivance. The Hollanders have, or had, small vessels, something of this kind, that carry one or two persons on the ice, having a fledge at bottom instead of wheels; and being made in the form of a boat, if the ice break the passengers are secured from drowning.

To fall against the wind: Let ABCD be the body of a sailing chariot, M the mast, to which are fixed the wings or sails EFGH; the two first of which, EF, are here supposed to be expanded by the wind; R is the rudder by which it is guided. Therefore the wind driving

(a) This machine was invented by M. Richard, a physician of Rochelle, and was exhibited at Paris in the last century. It is described by M. Ozanam in his Recreations Mathematiques.
driving the falls round, with the main M, and the cog-wheel k, take the teeth placed perpendicular to the face of the two fore-wheels of the carriage, and consequently keep it in continual motion.

The body of this machine should not be large, nor placed very high, not only to prevent overturning, but that its motion may not be thereby impeded; for the velocity will be in proportion to the force of the wind on the falls to that on the body of the machine. Therefore, if they be both equal, it will stand still; or if the force on the body be greatest, it will go backwards; unless there be a contrivance to lock the wheels. The upper part of the machine next a, may be made to take off when the wind is contrary; and there may be another set of falls placed between the two hind-wheels, which will considerably increase its velocity. But after all, for general use, a common carriage must be preferable: for this cannot be expected to go up a moderate ascent without great difficulty; nor down a declivity, when there is a strong wind, without danger; and even on level ground, if the road be in any degree rough, its progress must be very slow, attended both with difficulty and danger.

In an open country, however, where there is a large track of level and smooth ground, and frequent strong winds, a machine of this sort will certainly be very convenient; and in mild countries, when made of a small size, may be useful to young people, by affording them a pleasant and healthful exercise.

A carriage, the body of which is incapable of being overturned, may be made as follows. The body must consist of a regular hollow globe, as AB, at the bottom of which is to be an inmoveable weight, and which must be proportioned to the number of persons or the load the machine is intended to carry. Round the globe must go two horizontal iron circles D, E, and two others F, G, that are perpendicular to the former. All these circles must be made exactly to fit the globe, that it may move freely in every direction. The two horizontal circles are to be joined on each side by a perpendicular bar, one of which is expressed in the figure by H. All these iron should be lined with leather, to prevent unnecessary friction. The body of the carriage may be either of leather or hard wood; but the latter will be most eligible, as least liable to wear. The wheel on each side is to be fastened to the perpendicular by means of a handle K that keeps it ready.

Now the body of this machine moving freely in the iron circles every way, the centre of gravity will always lie at C; therefore, in whatever position the wheels are, or even if they overturn, the body of the carriage will constantly remain in the same perpendicular direction.

At L is placed a pin, round which is a hollow moveable cylinder: this pin moves up and down in the groove MN, that it may not impede the perpendicular motion of the circles, at the same time that it prevents the body of the machine from turning round in a horizontal direction. O is one of the windows, P, the door, and QR the shafts to the machine.

When a carriage of this sort is intended for a single person, or a light weight, it may be hung on wheels, in the same manner as the rolling lamp or the sea-com-
The upper stone is five inches thick, and 21 inches broad; the lower one somewhat broader. C is a cog-wheel, having 16 or 18 cogs, which go into the trundle F, having nine spokes fixed to the axis G, the latter being firmly inserted into the upper stone A, by means of a piece of iron. H is the hopper into which the corn is put; I the stone to carry it by little and little through a hole at K, in between the stones, where being ground into meal, it comes out at the eye L. Both stones are inclosed in a circular wooden cafe, of such a size as will admit the upper one to run freely within it.—The under surface of the upper stone is cut into grooves, as represented at Q, which enable it to throw the meal out at the eye L more perfectly than could be done if it was quite plain. Neither of them are entirely flat, the upper one being somewhat conave, and the under one convex. They nearly touch at the edges, but are at some distance in the middle, in order to let the corn go in between them. The under stone is supported by strong beams, not represented in the figure; the spindle G stands on the beam MN, which lies upon the bearer O. One end of this bearer rests upon a fixed beam, and the other has a string fixed to it, and going round the pin P, by the turning of which the timbers O and MN may be raised or lowered, and thus the stones put nearer, or removed farther from each other, in order to grind finer or coarser. When the corn is to be ground, it must be put into the hopper by little at a time. A man turns the handle D, and thus the cog-wheel and trundle are carried round also together with the stone A. The axis G is angular at K; and, as it goes round, shakes the stone I, and makes the corn fall gradually through the hole K. The upper stone going round grinds it, throwing out the meal, as already said, at the eye L. Another handle, if thought proper, may be put at the other end of the handle E. The spindle must go through both stones, in order to reach the beam MN, and the hole through which it passes is fastened with leather or wood, so that no meal can pass through. Mr Emerson, from whom this account is taken, observes, that "it is a pity these mill-stones are not made at a cheaper rate, for the sake of the poor, who are much distressed by the exorbitancy of the millers."

The construction of a horse-mill differs not from that of the hand-mill just described, excepting that instead of the handle D, the spindle is furnished with a long horizontal lever and cogged wheel, which turns the trundle and stones, as already mentioned.—The stones are much heavier than in the hand-mill.

The mills most commonly in use for grinding corn are water-mills, the construction of which is not essentially different from that of the hand- or horse-mills.—The lower mill-stone, as already mentioned, is fixed, but the upper one movable upon a spindle. The opposite surfaces of the two stones are not flat, but the one convex and the other concave, though in a very small degree. The upper stone, which is six feet in diameter, is hollowed only about an inch in the middle, and the other rises three quarters of an inch. They approach much nearer each other at the circumference, and the corn begins to be ground about two thirds of the radius distant from the circumference, and there it makes the greatest resistance, the space between the two stones being in that place only about two thirds or three fourths of the thickness of a grain of corn; but as these stones, as well as those of the hand-mill or horse-mill, can be separated a little from each other, the meal may be made fine or coarse in them, as well as in the two former mills.

In order to cut and grind the corn, both the upper and under stones have furrows cut in them, as is observed in the hand-mill. These are cut perpendicularly on one side, and obliquely upon the other, by which means each furrow has a sharp edge, and by the turning of the stones, the furrows meet like a pair of scissors, and by cutting the corn, make it grind the more easily. They are cut in the same way in both stones, when they lie upon each other, whereby means they run crosswise to each other when the upper one is revolved and turned round; and this greatly promotes the grinding of the corn, great part of which would be driven onward in the lower furrows, without being ground at all, if both lay the same way.—When the furrow becomes blunt and shallow by wearing, the running stone must be taken off, and the furrows cut deeper in both by means of a chisel and hammer. Thus, however, by having the furrows cut down a great number of times, the thicknesses of both stones are greatly diminished; and it is observed, that in proportion to the diminution of the thickness of the upper stone, the quantity of flour also diminishes.

By means of the circular motion of the upper stone, the corn is brought out of the hopper by jerks, and recedes from the centre towards the circumference by the centrifugal force; and being entirely reduced to flour at the edges where the stones nearly touch one another, it is thrown at last out at the hole called the eye, as already mentioned. In Scotland, it is frequent to have the stones without any furrows, and only irregularly incised with small holes, by means of an iron instrument. Stones of this kind last a much shorter time than those with furrows, the latter being fit for use for 20 or 40 years, while the former seldom or never last more than seven. The under mill-stone is considerably thicker than the upper; and therefore, when both have been considerably worn by use, the lower one is frequently taken up, and the upper one put in its place, the former being converted into a running-stone.

Fig. 9t. shows the construction of a common water-mill, where AA is the large water-wheel, commonly about 17 or 18 feet diameter from a, the extremity of any float-board, to b the extremity of the opposite one. This wheel is turned round by the falling of the water upon the boards from a certain height, and the greater the height, provided the water runs in an uninterrupted stream, the smaller quantity will be sufficient to turn the mill. This wheel is without the mill-house, but the wheel has an axle BB of considerable length, which passes through a circular hole in the wall, and has upon it a wheel D, of eight or nine feet diameter, having 6t cogs, which turn a trundle E of ten flaves or spokes; by which means the trundle, and consequently the mill-stone, will make six revolutions, and one ten for every revolution of the wheel. The odd cog, commonly called the running cog, is added, that as every one comes to the trundle it may take the stuff behind that one which it took at the last revolution;
Some degree of nicety is requisite in feeding the mill; for it too great a quantity be poured into it, the flours are separated from each other more than they ought to be, and their motion is also impeded; while, on the other hand, if it be fed too slowly, the flours moves with too great velocity, and the attrition of the two is apt to make them strike fire. This matter is regulated by turning the pin L backwards or forwards as the miller thinks proper.

Sometimes, where plenty of water can be had, there are two trundles applied to the cog-wheel by means of a single large one turned immediately by the perpendicular cog-wheel, and carrying round with it an horizontal coggled wheel, on each side of which are placed the smaller trundles abovementioned, carrying the flours. In like manner, the water-wheel may be made to drive fanners, bolting mills, &c.; but it must always be remembered, that by complicating machinery to a great degree, it becomes more ready to give way; and the frequent repairation of which it stands in need, will, by the delay of business, be found at last more expensive than if separate machines had been used.

The wind-mill is furnished with apparatus similar to the water-mill, but necessarily differs in the external apparatus for applying the power. This is done by means of the two arms AB and CD, fig. 93, interfering each other at right angles in E, and falling through the axis EF, and about 32 feet in length.

On these yards are placed two fells or vanes, in the shape sometimes of parallelograms, and sometimes of trapeziums, with parallel bafe s; the greater where of HI is about six feet, and the length of the smaller FG is determined by radii drawn from the centre EO and H.

As the direction of the wind is very uncertain, it becomes necessary to have some contrivance for turning the falls towards it, in order to receive its force, in whatever way it may turn: and for this purpose two general methods are in use. In the one, the whole machine is furnished upon a moveable car or axis, perpendicularly to the horizon, and which is supported by a strong stand or foot very firmly fixed in the earth, and thus by means of a lever the whole machine may be turned round as occasion requires. In the other method, only the roof, which is circular, can be turned round by means of a lever and rollers, upon which the circular roof moves. This last kind of wind-mill is always built of stone, in the form of a round tower, having a large wooden ring on the top of it, above which the roof, which must likewise be of wood, moves upon rollers, as has been already mentioned. To effect this motion the more easily, the wooden ring which lies on the top of the building is furnished with a groove, at the bottom of which are placed a number of brastraillkes at certain distances, and within the groove is placed another ring, by which the whole roof is supported. The beams ab and ac are connected with the moveable ring, and a rope is fastened to the beam ab in b, which at the other extremity is fitted to a windlass or axis in petricchio; and this rope being drawn through the iron hook G, and the windlass turned round, the falls and roof will be turned round also, in order to catch the wind in any direction. Both these methods of conduction have their advantages and disadvantages. The former is the least expensive, as the whole may be made of

Vol. L. 5 D wood
the other requires a costly building of stone; and the roof being round, the building must also be so, while the other can be made of any form, but has the inconvenience of being liable to be carried off altogether by a very high wind, of which an instance occurred not long ago in Essex.

Fig. 94. shows the internal mechanism of a windmill. AHO is the upper room; HZ, the lower one; AB the axle-tree passing through the mill; STVW the flaps covered with canvas let obliquely to the wind, and turning round in the order of the letters. CD is the cog-wheel, having about 45 cogs a a a, &c. which carry round the lantern EF, having eight or nine trunnels e e e, &c. along with the axis GN. 1K is the upper mill-stone, LM the Lower one; QR is the bridge supporting the axis or spindle GN, which rests upon the beams ed, XY, wedged up at e, d, and X; ZY is the lifting tree, which stands upright; ab and ef are levers having Z and e as centers of motion; gf is a cord, with a flote i bound about the pins g and b, and which thus serves as a balance or counterpoise. The spindle r N is fixed to the upper mill-stone IK by means of a piece of iron called the ymd, and fixed in the lower side of the flone, the whole weight which rests upon a hard flone fixed in the bridge QR at N. The trundle EF and axis G is an apparatus for it rests its lower part by r in a square focket, and the top runs in the edge of the beam w. By bearing down the end of the lever fe we raise b, which raises also ZY, and this raises XY, which lifts up the bridge QR, with the axis NG, and the upper flone IK; so that by this contrivance the flones may, as in a water-mill, be let at any distance. The lower flone is fixed upon strong beams, and is broader than the upper one; the flour being conveyed through the tunnel n into a chest. P is the hopper into which the corn, is put and which runs along the front r, into the pool t, and so falls between the flones, where it is ground. The square axis G i makes the front r as it, turns round, and makes the corn run out, r is a firing going round the pin r, which serves to bring the front nearer or let it go farther from the axis, and thus makes the corn to run faster or slower according to the velocity of the wind. If the wind be very strong, only part of the flones S, T, V, W, is covered, or perhaps only one half of the two opposite flones. Another cog-wheel B is placed towards the end B of the axle-tree, with a trundle and mill-flones like those already described: so that when the wind is strong, the mill may do twice the business as ordinarily does. When only one pair is to grind, the trundle EF and axis G t are taken out from the other: xy is a girt of pliable wood, fixed at the end x; and the other end t is tied to the lever k, moveable about k, and the end m being put down, draws the girt xy close to the cog-wheel; and thus the motion of the mill may be stopped at pleasure: pq is a ladder for ascending to the higher part of the mill; and the corn is drawn up by means of a rope milled about the axis AB.

Besides these mills for grinding corn, one has lately been invented by Mr. Winlaw for threshing it out, and for which he has obtained a patent. It is represented fig. 95. AAAAA represents the frame of the

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Before the corn is put into this mill, it must undergo the operations of combing the bottoms of the sheaves, and stripping the ears from the straw. The former is performed by means of an hand-comb. The use is obvious, viz. to take out all the loose ears, and straw laid irregularly, which would otherwise be lost, or impede the stripping of the ears. The comb for stripping the ears is made in the form of a cross. The teeth are of an angular form, and let at convenient distances, to strip the ears clean. If set too wide, they will pass through without effect; and if too near together, they will not admit the straw to go between them.

The grain is separated from the chaff and straw of the ear by the motion of the inner nut within the outward cone. The distance between the former is adjusted by the regulating screw D at the bottom; for if this be screwed up too far, the grain will be bruised, if too far lowered down, the grain will not be separated. The dart marked upon the fly shows the direction in which the handle is to be turned, it being pointed as the handle is to be turned.

This mill was tried in the month of June 1785, in the presence of a number of gentlemen, with great satisfaction to the spectators; and since that time has been used by a number of others, though it has not as yet come into general use. At the first trial there passed through the mill one bushel of heads per minute, with very moderate labour to the man who turned it; and by experiment it was found, that four bushels of ears yielded one bushel of clean grain. Hence it appears, that the difference between the expedition of the mill and the labour of the thrasher is immensely great; for allowing that a man will thresh six bushels per day at eight hours work, the mill will clear that quantity in 24 minutes, and that to much greater perfection than can be done by the flail, as it separates every grain from the ear, which cannot but be accounted a very great saving, while much corn flies off by the flail, and a great deal is lost by foul threshing, either when performed by tafk or day-work. But by the use of the mill, all fraudulent practices must be prevented, the straw preferred in its original reed, and thus answer the purposes of thatching, &c. much better than when bruised under the flail; and every other purpose equally well. The ears may also be combed out with great expedition, as a lad without having prafidged was found to comb out a bushel of ears in 20 minutes, which is at the rate of six bushels of clean corn per day.—The saving by the use of this mill is calculated at 24 d. per bushel. On a smaller scale the mill answers equally well for clover-feed, the flowers being first combed off from the stems, after which it will do as much work in three hours, as a man in the ordinary way can perform in a week; for a man cannot clean much above a bushel in that time, which is the great reason of the high price of clover-feed. The mill will likewise answer for flax, carry, or any other feeds, or for separating the husks from rice, which in the present mode cannot be done without great labour and expense.

In all mills it is necessary that a considerable power
Mills be employed in order to accomplish the intended purpose. Water is the most common power, and indeed the best, as being the most constant and equable; while wind comes at sometimes with great violence, and at others is totally gone. Mills may also be moved by the force of flames, as were the Albion-mills at London; but the expense of fuel must undoubtedly prevent this mode of constructing mills from ever becoming general. In all cases it is absolutely necessary to make the most of the power that we can, by making it act to the greatest advantage. Hence the best methods of constructing water and wind-mills have been investigated by those who were most conversant in the principles of mechanics; and so difficult has been the investigation, that the principles are not yet settled absolutely without dispute.

The water-mills are of three kinds; Breast-mills, Under-shot-mills, and Over-shot-mills. In the former, the water falls down upon the wheel at right angles, to the float-boards or buckets placed all round the wheel to receive it: if float-boards are used, it acts only by its impulse; but if buckets, it acts also by the weight of water in the buckets in the under quarter of the wheel, which is considerable. In the undershot wheel float-boards only are used, and the wheel is turned merely by the force of the current running under it, and striking upon the boards. In the overshot wheel the water is poured over the top, and thus acts principally by its weight; as the fall upon the upper part of the wheel cannot be very considerable, lest it should dash the water out of the buckets. Hence it is evident, that an undershot-mill must require a much larger supply of water than any other; the breast-mill the next, unless the fall is very great; and an overshot mill the least. Dr. Delfagulier found, that a well-made overshot mill would perform as much work as an undershot one with one tenth part of the quantity of water required by the other.

In the 5th volume of the Philosophical Transactions, Mr. Smeaton has considered at great length the best methods of constructing all these mills from machines and models made on purpose: but conscious of the inferiority of models to actual practice, did not venture to give his opinion without having seen them actually tried, and the truth of his doctrines established by practice.

Having described the machines and models used for making his experiments, he observes, that, with regard to power, it is most properly measured by the raising of a weight; or, in other words, if the weight raised be multiplied by the height to which it can be raised in a given time, the product is the measure of the power raising it; and, of consequence, all those powers are equal whose products made by such multiplication are equal: for if a power can raise twice the weight to the same height, or the same weight to twice the height in the same time that another can, the former power will be double the latter; but if a power can only raise half the weight to double the height, or double the weight to half the height, in the same time that another can, the two powers are equal.

This, however, must be understood only of a slow and equable motion, without acceleration or retardation; for if the velocity be either very quickly accelerated or retarded, the vis inertiae, in our authors opinion, will produce an irregularity.

To compute the effects of water-wheels exactly, it is necessary to know in the first place what is the real velocity of the water which impinges on the wheel. 2. The quantity of water expended in a given time; and 3. How much of the power is lost by the friction of the machinery.

1. With regard to the velocity of the water, Mr. Smeaton determined by experiments with the machinery described in the volume referred to, that with a head of water 15 inches in height, the velocity of the wheel is 8.06 feet in a minute. The area of the head being 105.8 inches, this multiplied by the weight of a cubic inch of water equal to .579 of an ounce avoirdupois, gives 61.26 ounces for the weight of as much water as is contained in the head upon one inch in depth: and by further calculations derived from the machinery made use of, he computes that 264.7 pounds of water descend in a minute through the space of 15 inches. The power of the water, therefore, to produce mechanical effects in this case will be 264.7 x 15, or 3970. From the result of the experiment, however, it appeared that a vast quantity of the power was lost; the effect being only to raise 9.375 pounds to the height of 135 inches; so that the power was to the effect as 3970 to 9.375 x 135 = 1266, or as 10 to 3.18.

This, according to our author, must be considered as the greatest single effect of water upon an undershot-wheel, where the water descends from an height of 15 inches; but as the force of the current is not by any means exhausted, we must consider the true proportion between the power and the effect to be that between the quantity of water already mentioned and the sum of all the effects producible from it. This remainder of power, it is plain, must be equal to that of the velocity of the wheel itself multiplied into the weight of the water. In the present experiment, the circumference of the wheel moved with the velocity of 3.12 feet in a second, which answers to a head of 1.82 inches (A); and this height being multiplied by 264.7, the quantity of water expended in a minute gives 481 for the power of the water after it has passed the wheel; and hence the true proportion between the power and the effect will be as 3849 to 1266; or as 10 to 4.

As the wheel revolved 86 times in a minute, the velocity of the water must be equal to 86 circumferences of the wheel; which, according to the dimenions of the apparatus used by Mr. Smeaton, was as 86 to 30, or as 29 to 7.—The greatest load with which the wheel would move was 9 lb. 6 oz.; and by 12 lb. it was entirely stopped. Whence our author concludes:

(4) These calculations are founded upon the known maxim in hydrostatics, that the velocity of spouting water is nearly the same with that which an heavy body would acquire by falling from an height equal to that of the reservoir, and is proved by the rising of jets nearly to the height of their reservoirs.
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cludes, that the impulfe of the water is more than double of what it ought to be according to theory; but this he accounts for by observing, that in his experiment the wheel was placed not in an open river, where the natural current, after it has communicated its impulfe to the float, has room on all sides to escape, as the theory supposes, but in a conduit, to which the float being adapted, the water cannot otherwise escape than by moving along with the wheel. It is observable, that a wheel working in this manner, will have an impulfe to the float, has room on all sides to escape, as the theory supposes, but in a conduit, to which the float being adapted, the water cannot otherwise escape than by moving along with the wheel. It is observable, that a wheel working in this manner, as soon as the water meets the float, receiving a sudden check, it rises up against the float like a wave against a fixed object, inasmuch that when the wheel of water is not a quarter of an inch thick, before the float, yet this sheet will act upon the whole surface of a float whose height is three inches: and consequently, was the float no higher than the thickness of the sheet of water, as the theory also supposes, a great part of the force would have been lost by the water dashing over the float.

Mr Smeaton next proceeds to give tables of the velocities of wheels with different heights of water; and from the whole deduces the following conclusions.

1. The virtual, or effective head, being the same, the effect will be nearly as the quantity of water expended.

2. The expence of water being the same, the effect will be nearly as the height of the virtual or effective head.

3. The quantity of water expended being the same, the effect is nearly as the square of the velocity.

4. The aperture being the same, the effect will be nearly as the cube of the velocity of the water. Hence, if water passes out of an aperture in the same section, but with different velocities, the expence will be proportional to the velocity; and therefore, if the expence be not proportional to the velocity, the section of the water is not the same.

5. The virtual head, or that from which we are to calculate the power, bears no proportion to the head water; but when the aperture is larger, or the velocity of the water less, they approach nearer to a coincidence; and consequently, in the large openings of mills and forges, where great quantities of water are discharged from moderate heads, the head of water, and virtual head determined from the velocity, will nearly agree, which is also confirmed by experience.

6. The most general proportion between the power and effect is that of 20 to 3; the extremes 10 to 3.2, and 10 to 2.8. But as it is observable, that where the power is greatest, the second term of the ratio is greatest also; whence we may allow the proportion subsisting in great works to be as three to one.

7. The proportion of velocity between the water and wheel is in general about 5 to 2.

8. There is no certain ratio between the load that the wheel will carry at its maximum, and what will totally stop it; though the proportions are contained within the limits of 20 to 19, and 20 to 15; but as the effect approaches nearest to the ratio of 20 to 15, or of 4 to 3. When the power is greatest either by increase of velocity or quantity of water, this seems to be the most applicable to large works: but as the load that a wheel ought to have, in order to work to the best advantage, can be assigned by knowing the effect that it ought to produce, and the velocity it ought to have in producing it, the exact knowledge of the greatest load it will bear is of the least consequence in practice.

Mr Smeaton, after having finished his experiments on the under-shot mills, reduced the number of floats, which were originally 24, to 12; which caused a diminution in the effect, by reason that a greater quantity of water escaped between the floats and the floor than before; but on adapting it to a circular sweep of such a length, that one float entered into the curve before the other left it, the effect came so near that of the former, as not to give any hopes of advancing it by increasing the number of floats beyond 24 in this particular wheel.

Our author next proceeds to examine the power of water when acting by its own gravity in turning an over-shot wheel: "In reasoning without experiment (says he), one might be led to imagine, that however different the mode of application is, yet that, whenever the same quantity of water defends through the same perpendicular space, the natural effective power would be equal, supposing the machinery free from friction, equally calculated to receive the full effect of the power, and to make the most of it: for if we suppose the height of a column of water to be 30 inches, and resting on a base or aperture of one inch square, every cubic inch of water that departs therefrom will acquire the same velocity or momentum from the uniform pressure of 30 cubic inches above it, that one cubic inch let fall from the top will acquire in falling down to the level of the aperture; one would therefore suppose that a cubic inch of water let fall through a space of 30 inches, and thereimpinging upon another body, would be capable of producing an equal effect by collision, as if the same cubic inch had descended through the same space with a given motion, and produced its effects gradually. But however conclusive this reasoning may seem, it will appear in the course of the following deductions, that the effect of the gravity of defending bodies is very different from the effect of the stroke of such as are non-elastic, though generated by an equal mechanical power."

Having made such alterations in his machinery as were necessary for over-shot wheels, our author next gives a table of experiments with the apparatus so altered. In these the head was six inches, and the height of the wheel 24 inches; so that the whole descent was 30 inches: the quantity of water expended in a minute was 96 pounds; which multiplied by 30 inches, gives the power 2,900; and after making the proper calculations, the effect was computed at 1914; whence the ratio of the power to it comes to be nearly as 3 to 2. If, however, we compute the power from the weight of the wheel only, the power will be to the effect nearly as 5 to 4.

From another set of experiments the following conclusions were deduced.

1. The effective power of the water must be reckoned upon the whole descent, because it must be raised to that height in order to be able to produce the same effect a second time. The ratios between the powers,
powers so estimated and the effects at a maximum, differ nearly from 4 to 3, and from 4 to 2. Where the heads of water and quantities of it expended are the least, the proportion is nearly from 4 to 3; but where the heads and quantities are greatest, it comes nearer to that of 4 to 2; so that by a medium of the whole the ratio is nearly as 3 to 2. Hence it appears, that the effect of over-shot wheels is nearly double to that of under-shot ones; the consequence of which is, that non elastic bodies, when acting by their impulse or collision, communicate only a part of their original impulse, the remainder being spent in changing their figure in consequence of the stroke. The ultimate conclusion is, that the effects as well as the powers are as the quantities of water and perpendicular heights multiplied together respectively.

2. By increasing the head, it does not appear that the effects are at all augmented in proportion; for by raising it from 3 to 11 inches, the effect was augmented by less than one-seventh of the increase of perpendicular height. Hence it follows, that the higher the wheel is in proportion to the whole descent, the greater will be the effect, because it depends less upon the impulse of the head, and more upon the gravity of the water in the buckets; and if we consider how obliquely the water rising from the head must strike the buckets, we shall not be at a loss to account for the little advantage that arises from the impulse thereof, and shall immediately see of how little consequence this is to the effect of an over-shot wheel. This, however, as well as other things, must be subjected to limitation; for it is necessary that the velocity of the water shall be somewhat greater than the wheel, otherwise the latter will not only be retarded by the striking of the buckets against the water, but some of the power will be lost by the damping of the water over the buckets.

3. To determine the velocity which the circumference of the wheel ought to have in order to produce the greatest effect, Mr. Smeeon observes, that the more slowly any body descends by the force of gravity when acting upon any piece of machinery, the more of that force will be spent upon it, and consequently the effect will be the greater. If a stream of water falls into the bucket of an over-shot wheel, it will be there retained until the wheel discharges it by moving round; and consequently, the slower the wheel moves, the more water it will receive; so that what is lost in velocity is gained by the greater preflure of water upon the buckets. From the experiments, however, it appears, that when the wheel made about 20 turns in a minute the effect was greatest; when it made only 18; the motion was irregular; and when loaded so as not to admit its turning 18 times, the wheel was overpowered with the load. When it made 30 turns, the power was diminished by about one-fourth, and when the number of turns was increased to 40, it was diminished by one-fourth. Hence we see, that in practice the velocity of the wheel should not be diminished farther than what will procure some solid advantage in point of power; because, ceteris paribus, the buckets must be larger as the motion is slower; and the wheel being more loaded with water, the stresses will be proportionably increased upon every part of the work. The best velocity for practice therefore will be that when the wheel made 30 turns in a minute, which is little more than three feet in a second. This velocity is applicable to the highest over-shot wheels as well as the lowest. Experience however determines, that high wheels may deviate further from this rule before they will lose their power, by a given alquart part of the whole, than low ones can be permitted to do; for a wheel of 24 feet high may move at the rate of 6 feet per second; while our author has seen one of 33 feet high move very steadily and well with a velocity of little more than two feet. The reason of this superior velocity in the 24 feet wheels may probably be owing to the small proportion that the head requisite to give the proper velocity to the wheel bears to the whole height.

4. The maximum load for an over-shot wheel is that which reduces the circumference of the wheel to its proper velocity: which is known by dividing the effect it would produce in a given time by the space intended to be descried by the circumference of the wheel in the same time, the quotient will be the resistance overcome at the circumference of the wheel, and is equal to the load required, including the friction and resistance of the machinery.

5. The greatest velocity that an over-shot wheel is capable of, depends jointly upon the diameter or weight of the wheel and the velocity of falling bodies: for it is plain that the velocity of the circumference can never be greater than to describe a semi-circumference, while a body let fall from the top describes the diameter, nor even quite so great; as the difference in point of time must always be in favour of that which falls through the diameter. Thus supposing the diameter of the wheel to be 16 feet, and an inch in diameter, an heavy body would fall through this space in one second; but such a wheel could never arrive at this velocity, or make one turn in two seconds, nor could an over-shot wheel ever come near it; because, after it has acquired a certain velocity, great part of the water is prevented from entering the buckets, and part is thrown out again by the centrifugal force; and these circumstances have a considerable dependence upon the form of the buckets, it is impossible to lay down any general rule for the velocity of this kind of wheels.

6. Though in theory we may suppose a wheel to be made capable of overcoming any resistance whatever, yet as in practice it is necessary to make the wheel and buckets of some certain and determinate size, we always find that the wheel will be stopped by such a weight as is equal to the effort of the water in all the buckets of a semi-circumference put together. This may be determined from the structure of the buckets themselves; but in practice, an over-shot wheel becomes serviceable long before this time; for when it meets with such an obstacle as diminishes its velocity to a certain degree, its motion becomes irregular; but this never happens till the velocity of the circumference is less than the two feet per second when the resistance is equal.

7. From the above observations, we may easily deduce the force of water upon breast-wheels, &c. But in general, all kinds of wheels where the water cannot descend through a given space unless the wheel moves with it, are to be considered as over-shot wheels; and
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those which receive the impulse or shock of the water whether in a horizontal, oblique, or perpendicular direction, are to be considered as undershots. Hence a wheel in which the water strikes at a certain point below the surface of the head, and after that descends through the arch of a circle, preying by its gravity upon the wheel, the effect of such a wheel will be equal to that of an underfoot whose head is equal to the difference of level between the surface of the water in the reservoir and the point where it strikes the wheel, added to that of an overfoot, whose height is equal to the difference of level between the point where it strikes the wheel and the level of the tail-water.

In the 66th volume of the Transactions, our author considers some of the causes which have produced disagreements and disputes among mathematicians upon this subject. He observes, that soon after Sir Isaac Newton had given his definition that the quantity of motion is the measure of the same arising from the velocity and quantity of matter conjointly, it was controverted by his contemporaries. They maintained, that the measure of the quantity of motion should be estimated by taking the quantity of matter and the square of the velocity conjointly. On this subject he remarks, that from equal impelling powers aching for equal intervals of time, equal augmentations of velocity are acquired by given bodies when they are not resisted by a medium. A body Descending one second by the force of gravity passes through a space of 16 feet and an inch; but at the end of that time it has acquired a velocity of 32 feet 2 inches in a second; and the end of two seconds it has acquired one that would carry it through 64 feet 4 inches in a second. If, therefore, in consequence of this equal increase of velocity, we define this to be a double quantity of motion generated in a given time in a certain quantity of matter, we come near to Sir Isaac's definition: but in trying experiments upon the effects of bodies, it appears that when a body is put in motion by whatever cause, the impulsion it makes upon an uniformly resisting medium, or upon uniformly yielding substances, will be as the mass of matter of the moving body multiplied by the square of its velocity. The question therefore properly is whether those terms, the quantity of motion, the momenta, or forces of bodies in motion, are to be esteemed equal, double, or triple, when they have been generated by an equable impulse acting for an equal, double, or triple time? or that it should be measured by the effects being equal, double, or triple, in overcoming resistances before a body in motion can be stopped? For according to the meaning we put upon these words, the momenta of equal bodies will be as the velocities or squares of the velocities of the moving bodies.

Though by a proper attention to the terms employed, however, we will find both these doctrines to be true; it is certain that some of the most celebrated writers upon mechanics have fallen into errors by neglecting to attend to the meaning of the terms they make use of. Desaguliers, for instance, after having been at pains to show that the dipute, which in his time had subsisted for 50 years, was a dispute merely about words, tells us, that both opinions may be easily reconciled in the following case, viz., that the wheel of an underfoot water-mill is capable of doing quadruple work when the velocity of the water is doubled, instead of double work only; "For (says he) the adjutage being the same, we find, that as the water's velocity is double, there are twice the number of particles that issue out, and therefore the impulse or shock of the water is struck twice the matter: which matter moving with twice the velocity that it had in the first case, the whole effect must be quadruple, though the instantaneous stroke of each particle is increased only in a simple proportion of the velocity." In another place the same author tells us, that though "the knowledge of the foregoing particulars is absolutely necessary for letting an underfoot wheel to work, yet the advantage to be reaped from it would be still greater: and we should be at a loss to find out the utmost that it could perform, had it not been for an ingenious proposition of that excellent mechanic M. Parent of the royal Academy of Sciences, who has showed that an underfoot wheel can do the most work, when its velocity is equal to the third part of that of the water; because then two-thirds of the water is employed in driving the wheel, with a force proportional to the square of the velocity. By multiplying the surface of the adjutage or opening by the height of the water, we shall have the volume of water that moves the wheel. The wheel thus moved will sustain on the opposite side only four-ninths of that weight which will keep it in equilibrium; but what it can move with the velocity it has, is only one-third of the equilibrium." This conclusion is likewise adopted by Mr Macclaurin.

Underfoot wheels had been greatly preferred by M. Belidor to those of any other construction. He had even concluded, the water applied in this way will do more than six times the work of an overfoot wheel; while Dr Desaguliers, in overthrowing Belidor's proposition, determined that an overfoot wheel would do 60 times the work of an underfoot wheel with an equal quantity of water. Between these two celebrated authors, therefore, there is a difference of 60 to 1.

In consequence of such monstrous disagreement, Mr Smeaton began the experiments of which we have already given an account. From them, besides the positions already deduced, it appears, that where the velocity of water is double, the adjutage or aperture of the sluices remaining the same, the effect is eight times: that is, not as the square, but as the cube of the velocity. In the other conclusion of Desaguliers and Macclaurin, the error was not less; for from hence it would follow, that by means of the wheel only 4/9ths of the water expended would be raised back again to the height of the reservoir form which it descended, exclusive of the friction, which would still diminish the quantity; but from Mr Smeaton's experiments it appears, that in some cases upwards of one-fourth had been raised. In large works the effects had been still greater, approaching in an underfoot wheel to one half, and in an overfoot one to the whole; which would be the limit, if it were possible to remove the friction and resistance of the air. The velocity of the wheel also, which, according to the conclusions of M. Parent and M. Desaguliers, amounted to no more than one-third of the velocity of the water.
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Mr. Ferguson, in his directions to millwrights, has adopted the maxim which Mr Smeeaton condemns as erroneous, viz. that when the velocity of the wheel is but one-third of that of the water, it then acts to the greatest advantage. He adds, that the mill-stone ought to make about 60 turns in a minute; for when it makes only 40 or 50 turns it grinds too slowly; and when more than 70, it heats the meal too much, and cuts the bran too small, that a part of it mixes with the meal and cannot be separated from it by any means. The utmost perfection of mill-work, therefore, according to this author, lies in making the train so that the mill-stone shall make about 60 turns in a minute, when the wheel moves with one-third of the velocity of the water. To accomplish this he lays down the following rules.

1. Measure the perpendicular height of the fall of water above the middle of the aperture, where it is let out to act by impulse against the float-boards on the lower side of the underfloat wheel. 2. Multiply this constant number 64.2882 by the height of the fall in feet, and extract the square-root of the product, which will give the number of feet that the water moves in a second. 3. The velocity of the floats of the wheel is equal to one-third of the velocity of the water just now found. 4. Divide the circumference of the wheel by the velocity of its floats, and the quotient will be the number of seconds in one turn of the great water-wheel, on whose axis the cog-wheel that turns the trundle is fixed. 5. Divide 60 by the number of seconds in a turn of the water-wheel, and the quotient will be the number of turns it makes in a minute. 6. By this number of turns divide 60, the number of times that a mill-stone ought to have in a minute; the quotient is the number of turns that the mill-stone ought to make for every one of the large wheel. 7. Then as the number of turns required of the mill-stone in a minute is to the number of turns of the cog-wheel in a minute; so must the number of cogs in the wheel be to the number of flakes in the trundle on the axis of the mill-stone, in the nearest whole number that can be found.

On these principles Mr Ferguson has constructed the following table, for the sake of such as have occasion to construct mills, and are not willing to take the trouble of particular calculations.
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The Mill-wright's Table.

<table>
<thead>
<tr>
<th>Height of the Fall of Water (Feet.)</th>
<th>Velocity of the Fall of Water per Second.</th>
<th>Velocity of the Wheel per Second.</th>
<th>Revolutions of the Wheel per Minute.</th>
<th>Revolution of the Millstone for One of the Wheel.</th>
<th>Cogs in the Wheel, and Staves in the Trundle.</th>
<th>Revolutions of the Millstone per Minute by these Staves and Cogs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8 02</td>
<td>2 67</td>
<td>2 83</td>
<td>42 40</td>
<td>234 6</td>
<td>119 84</td>
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<td>11 34</td>
<td>3 78</td>
<td>4 00</td>
<td>20 00</td>
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<td>120 10</td>
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For the practical construction of water-mills, Mr. Imilton hath laid down the following rules:

1. To find the velocity or force of any moderate stream of water, let it be obstructed by a dam in such a manner as to force the whole stream into a spout by which it may be conveyed into a large vessel or reservoir. Measure the height of water in the reservoir in one second or minute, and multiplying by the number of seconds or minutes in an hour, we have the whole force of the stream of water per hour.

2. In streams which are too large to be measured in this way, the velocity is determined (though we must own in a vague manner) by that of slaw or other light body floating down it; and calculations may be made accordingly.

Mr. Imilton differs very materially from Mr. Ferguson in the number of revolutions which a mill-stone ought to make in a minute; the latter, as has been already mentioned, being of opinion, that 60 revolutions of a mill-stone in a minute are sufficient, while Mr. Imilton requires 120; though he agrees with him that the velocity of the wheel should be only one-third of that of the water. The mill-stone, according to Mr. Ferguson, ought to be five feet in diameter; but Mr. Imilton makes it only four feet and an half.

To construct a mill by this table, find the height of the fall of water in the first column, and against that height in the sixth column you have the number of cogs in the wheel and staves in the trundle for causing the mill-stone 4 feet 6 inches in diameter to make about 120 revolutions in a minute, as near as possible, when the wheel goes with one-third part of the velocity of the water. And it appears by the 7th column, that the number of cogs in the wheel and staves in the trundle are so near the truth for the required purpose, that the least number of revolutions of the mill-stone in a minute is 118, and the greatest number never exceeds 121; which, according to our author, is the velocity of the best mills he had seen.

With regard to the mere mechanical part, our author observes, that an over-shot wheel acts with greater power than a breast or under-shot wheel; and that where there is a considerable descent, and only a small quantity of water, the over-shot wheel ought always to be made use of.

Where the water runs only upon a little declivity, it can act but slowly upon the under part of the
the wheel; in which case, the motion of the wheel will be very slow: the float-boards therefore ought to be very long; though not high, that a large body of water may act upon them; so that what is wanting in velocity may be made up in power: in which case, the cog wheel may have a greater number of cogs in proportion to the flakes of the trundle, in order to give the mill-floe a sufficient degree of velocity.

For the construction of the different parts of mills, Mr. Imison gives the following general directions:

The method for setting out a four-wheel and wallower.

- Draw the pitch lines $A_1$, $B_1$, $A_2$, $B_2$; then divide them into the number of teeth or cogs required, as $abc$.

Divide one of those distances, as $bc$, into seven equal parts, as $1$, $2$, $3$, $4$, $5$, $6$, $7$: three parts allow for the thickness of the cogs, as $1$, $2$, $3$, in the cog $a$, and four for the thickness of the flake, of the wallower (one reason for allowing three parts for the cog and four for the flake, is, the wallower is in general of less diameter than the wheel, therefore subject to more wear in proportion of the number of cogs to the number of flakes; but if there is the same number of flakes as of cogs, they may be of equal thickness), as $1$, $2$, $3$, $4$, $5$, $6$, $7$.

The height of the cog is equal to four parts; then divide its height into five equal parts, as $1$, $2$, $3$, $4$, $5$, in the cog $C$; allow three for the bottom to the pitch line of the cog; the other two parts for epicycloid, so as to fit and bear on the flake equally. The millwrights in general put the point of a pair of compasses in the dot $3$, of the cog $a$, and strike the line $d$, then remove the point of the compasses to the point $d$, and strike the curve line $3f$, which they account near enough the figure of the epicycloid.

The method for a face-wheel is thus: Divide the pitch line $AB$ into the number of cogs intended, as $abc$; divide the distance $bc$ into seven equal parts; three of those parts allow for the thickness of the cogs, as $1$, $2$, $3$, in the cog $a$, and four for the height and four for the width, as $d$, $e$, and four for the thickness of the flake $m$; draw a line through the centre of the cog, as the line $A1$ at $S$; and on the point $5$ describe the line $d$, remove the compasses to the point $A$, and draw the line $fg$, which forms the shape of the cog; then shape the cog on the sides to a cycloid, as $def$. But this method of setting out the shape of a cog is variable, according to the cycloid in different diameters of wheels.

In common spur-nuts, divide the pitch line $A$ into twice as many equal parts as you intend teeth, as $a$, $b$, $c$, $d$, $e$, fig. 98; with a pair of compasses open to half the distance of any of those divisions, from the points $a1$, $e2$, $e3$, draw the semicircles $a1$, $e2$, $e3$ which will form the ends of the teeth. From the points $2$, $4$, and $6$, draw the semicircles $gh$, which will form the hollow curves for the spaces; but if the ends of the teeth were epicycloids, instead of semicircles, they would act much better.

The principle of bevel gears, consists in two cones, rolling on the surface of each other, as the cone $A$ and $B$ revolving on their centres $ab$, $ac$; if their bases are equal, they will perform their revolutions in one and the same time, or any other two points equally distant from the centre $a$, as $d1$, $d2$, $d3$, &c. will revolve in the same time as $f1$, $f2$, $f3$, &c. In the like manner, if the cones $af$ be twice the diameters at the base $de$, as the cones $af$ are; then if they turn about their centres, when the cone $af$ has made one revolution, the cone $de$ will have but one half a revolution; or fig. 100, when $af$ has made two revolutions, $de$ will have made 201.

But one, and every part equally distant from the centre $a$, as $f1$, $f2$, $f3$, &c. will have made two revolutions to $e1$, $e2$, $e3$, &c. and if the cones were fluted, or had teeth cut in them, diverging from the centre $a$ to the bases $de$, $ef$, they would then become bevel gear. The teeth at the point of the cone being small and of little use may be cut off at $E$ and $F$, figs. 102, 103. as seen by fig. 104, where the upright shaft $ab$, with the bevel wheel $cd$, turns the bevel wheel $ef$ with its shaft $fg$, and the teeth work freely into each other, as $ab$, fig. 105.

The teeth may be made of any dimension, according to the strength required; and this method will enable them to overcome a much greater resistance, and work smoother than a face wheel and wallower of the common form can possibly do; besides it is of great use to convey a motion in any direction, or to any part of a building, with the least trouble and friction.

The method of conveying motion in any direction, and proportioning or shaping the wheels thereto, is as follows: let the line $ab$ represent a shaft coming from a wheel; draw the line $ed$ to intersect the line $ab$, in the direction that the motion is to be conveyed, which will now represent a shaft to the intended motion.

Again, suppose the shaft $cd$ is to revolve three times, while the shaft $ab$ revolves once, draw the parallel line $ii$, at any distance not too great, suppose one foot by a scale; then draw the parallel line $kk$ at three feet distance, after which draw the dotted line $wx$, through the intersection of the shafts $ab$ and $cd$, and likewise through the intersection of the parallel lines $ii$ and $kk$, in the points $x$ and $y$, which will be the pitch line of the two bevel wheels, or the line where the teeth of the two wheels act on each other, as may be seen fig. 107, where the motion may be conveyed in any direction.

The universal joint, as represented fig. 108, may be applied to communicate motion instead of bevel gear, where the speed is to be continued the same, and where the angle does not exceed 30 or 40 degrees, and the equality of motion is not regarded; for as it recedes from a right line, its motion becomes more irregular. This joint may be constructed by a crofs, as represented in the figure; or with four pins fastened at right angles upon the circumference of a hoop or solid ball. It is of great use in cotton-mills, where the tumbling shafts are continued to a great distance from the moving power. But by applying this joint, the shafts may be cut into convenient lengths, by which it will be enabled to overcome greater resistance.

To describe the cycloid and epicycloid, if use in shaping the teeth of wheels, &c. If a point or pencil $a$ on the fig. 109, circumference of the circle $B$ proceeds along the plane $ac$, in a right line, and at the same time revolves round its centre, it will describe a cycloid.

And if the generating circle $D$ moves along the Fig. 110, circumference of another circle $E$, and at the same time turns round its centre, the point of contact will describe an epicycloid.
In the construction of windmills, Mr. Smeaton has been at no loss to explain the principles than in those which go by water. For this purpose he constructed a machine, of which a particular description is given in the 51st volume of the Philosophical Transactions. The general principle of this was, that by means of a determinate weight it carried round an axis with an horizontal arm, upon which were four small moveable fails. Thus the fails met with a constant and equable blast of air, and as they moved round, a string with a weight affixed to it was wound about their axis, and thus showed what kind of size or construction of fails answered the purpose best.

With this machine a great number of experiments were made; the results of which were as follow.

1. The fails set at the angle with the axis, proposed as the best by M. Parent and other geometricians; viz. 51°, was found to be the worst proportion of any that was tried.

2. When the angle of the fails with the axis was increased from 72° to 75°, the power was augmented in the proportion of 31 to 45; and this is the angle most commonly in use when the fails are planes.

3. Were nothing more requisite than to cause the fails acquire a certain degree of velocity by the wind, the position recommended by M. Parent would be the best. But if the fails are intended with given dimensions, to produce the greatest effects possible in a given time, we must, if planes are made of, confine our angle within the limits of 72 and 75 degrees.

4. The variation of a degree or two, when the angle is near the best, is but of little consequence.

5. When the wind fails upon concave fails, it is an advantage to the power of the whole, though each part separately taken should not be disjoined of the best advantage.

6. From several experiments on a large scale, Mr. Smeaton has found the following angles to answer as well as any. The radius is supposed to be divided into six parts; and 5th, reckoning from the centre, is called 1, the extremity being denoted 6.

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<tr>
<th>No.</th>
<th>Angle with that axis.</th>
<th>Angle with the plane of motion.</th>
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<tbody>
<tr>
<td>1</td>
<td>72°</td>
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<td>3</td>
<td>72°</td>
<td>18 middle</td>
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<tr>
<td>4</td>
<td>74°</td>
<td>16°</td>
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<td>5</td>
<td>77°</td>
<td>125°</td>
</tr>
<tr>
<td>6</td>
<td>83°</td>
<td>7 extremity</td>
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7. Having thus obtained the best method of weathering the fails, i.e., the most advantageous manner in which they can be placed, our author's next care was to try what advantage could be derived from an increase of surface upon the same radius. The result was, that a broader fail requires a large angle; and when the fail is broader at the extremity than near the centre, the figure is more advantageous than that of a parallelogram. The figure and proportion of enlarged fails, which our author determines to be most advantageous on a large scale, is where the extreme bar is one-third of the radius or whip (as the workman call it), and is divided by the whip in the proportion of 3 to 5. The triangular or loading fail is covered with board from the point downward of its height, the rest as usual with cloth. The angles above-mentioned are likewise the most proper for enlarged fails; it being found in practice, that the fails would rather be too little than too much exposed to the direct action of the wind.

Some have imagined, that the more fail the greater would be the power of the windmill, and have therefore proposed to fill up the whole area; and by making each fail a sector of an ellipse, according to M. Parent's method, to intercept the whole cylinder of wind, in order to produce the greatest effect possible. From our author's experiments, however; it appeared, that when the surface of all the fails exceeded seven-eighths of the area, the effect was rather diminished than augmented. Hence he concludes, that when the whole cylinder of wind is intercepted, it cannot then produce the greatest effect for want of proper interlaced to escape.

"It is certainly desirable (says Mr. Smeaton), that the fails of windmills should be as short as possible; but it is equally desirable, that the quantity of cloth should be the least that may be, to avoid damage by sudden squalls of wind. The best structure, therefore, for large mills, is that where the quantity of cloth is the greatest in a given circle that can be: on this condition, that the effect holds out in proportion to the quantity of cloth; for otherwise the effect can be augmented in a given degree by a lesser increase of cloth upon a larger radius, than would be required if the cloth was increased upon the same radius.

8. The ratios between the velocities of windmill fails unloaded, and when loaded to their maximum, turned out very different in different experiments, but the most common proportion was 3 to 2. In general it happened, that where the power was greatest, whether by an enlargement of the surface of the fails, or an increased velocity of the wind, the second term of the ratio was diminished.

9. The ratios between the least load that would flop the fails and the maximum with which they would turn, were confined between that of 10 to 8, and 10 to 9; being at a medium about 10 to 8.5, and 10 to 9, or about 6 to 5; though on the whole it appeared, that where the fails or quantity of cloth was greatest, the second term of the ratio was less.

10. The velocity of windmill fails, whether unloaded or loaded, to as to produce a maximum, is nearly as the velocity of the wind, their shape and position being the same. On this subject, Mr. Forgeon remarks, that it is almost incredible to think with what velocity the tips of the fails move when acted upon by a moderate wind. He has several times counted the number of revolutions made by the fails in 10 or 15 minutes; and from the length of the arms from tip to tip, has computed, that if a hoop of the same size was to run upon plain ground with an equal velocity, it would go upwards of 30 miles in an hour.

11. The load at the maximum is nearly, but somewhat less, than as the square of the velocity of the wind; the shape and position of the fails being the same.

12. The effects of the same fails at a maximum are nearly, but somewhat less, than as the cubes of the velocity of the wind.

13. The load of the same fails at a maximum is nearly
govern, suppose 2 to 3; let the line AB represent the impulse of the wind upon the plane AB when acting with its whole velocity BE, but when acting with its relative velocity FE, let its impulse be denoted by some aliquot part of AB, as for instance $t$; then will $t$s of the parallelogram AF represent the mechanical power of the plane, that is, $t$s ABx;BE.

2. Let IN be the section of a plane inclined in such a manner that the base IK of the right angled triangle IKN may be equal to AB; and the perpendicular NK=BE; let the plane IN be struck by the wind in the direction LM, perpendicular to IK; then, according to the known rules of oblique forces, the impulse of the wind upon the plain IN, tending to move it according to the direction LM or NK, will be denoted by the base IK; and that part of the impulse tending to move it, according to the direction IK, will be expressed by the perpendicular NK. Let the plane IN be moveable in the direction of IK only; that is, the point I in the direction of IK, and the point N in the direction NO parallel thereto. Now it is evident, that if the point I moves through the line IK, while a particle of air, setting forwards at the same time from the point N, moves through the line NK, they will both arrive at the point K at the same time; and consequently there can be no preflure or impulse of the particle of air upon the plane IN. Now let IO be to IK as BF to BE; and let the plane IN move at such a rate, that the point I may arrive at O, and acquire the position OQ, in the same time that a particle of air would move through the space NK; as OQ is parallel to IN, by the properties of similar triangles, it will cut NK in the point P in such a manner, that NP will be equal to BF, and PK to FE. Hence it appears, that the plane IN, by acquiring the position OQ, withdraws itself from the action of the wind by the same space NP that the plane AB does by acquiring the position FG; and consequently, from the equality of PK to FE, the relative impulse of the wind PK upon the plane OQ will be equal to the relative impulse of the wind upon the plane FG: and since the impulse of the wind upon AB, with the relative velocity FE, in the direction BE, is represented by $t$ AB; the relative impulse of the wind upon the plane IN in the direction NK will in like manner be represented by $t$ IK; and the impulse of the wind upon the plane IN, with the relative velocity PK, in the direction IK will be represented by $t$ NK; and consequently the mechanical power of the plane IN in the direction IK will be represented by $t$ of the parallelogram IQ; that is, $t$ IKx;NK: that is, from the equality of IK to AB, and NK to BE, we shall have $t$IQ=$t$ABx;BE=$t$ABx;BE=$t$; the area of the parallelogram AF.

Hence we deduce this general proposition; that all planes, however situated, that intercept the same section of the wind, and having the same relative velocity in regard to the wind, when reduced into the same direction, have equal powers to produce the same mechanical effects. For what is lost by the obliquity of the impulse, is gained by the velocity of the motion.

Hence it appears, that an oblique fail is under no disadvantage in respect of power, compared with a direct one; except what arises from a diminution of its breadth,
M E C H A N I C S.

Sect. VI.

Of the Motion of Bodies in Straight Lines and Curves; the Acceleration, Accumulation, and Retardation, of Motion in various Circumstances.

To understand this subject, it is necessary to keep in mind what has been said concerning the momentum or quantity of motion in any moving body, viz. that it is compounded of the velocity multiplied into the quantity of matter. Thus, suppose there are two bodies, one containing twice the quantity of matter contained in the other, but moving with thrice its velocity, the quantities of matter will be expressed by any numbers in the proportion of 2 to 1, and their velocities by any others in the proportion of 3 to 1. Multiplying therefore the quantity of matter in the first (2) by its velocity (3), the product is 6; and multiplying the quantity of matter (1) by its velocity (1), the product is only 1; whence it appears that the momenta or absolute forces of these bodies are to one another as 6 to 1.

As some bodies are elastic and others non-elastic, the effect of motion communicated from one to another becomes very different, according to this circumstance. The motion is likewise very different, according to the manner in which one body acts upon another, and according to which it will be driven forward in a rectilinear direction, or describe curves of various kinds, revolving on its axis, &c. These different kinds of motion have been considered by different authors, but by none more particularly than by Mr G. Atwood, who has published a large octavo volume upon the rectilinear motion and rotation of bodies. The fundamental laws of motion advanced by this author are these.

1. Every body perseveres in its state of rest or uniform motion in a right line, until a change is effected by the agency of some external force.
2. Any change in the quiescence or motion of a body is in the direction of the force impressed, and is proportional to it in quantity.
3. Action and reaction are equal and in contrary directions.

From these three simple axioms, the truth of which must, from what has been already said, be abundantly evident, our author proceeds to demonstrate the most difficult problems concerning the impulse and motion of
Mathematical quantities of any sort, the standard to which each of those quantities is referred may be taken as 1. Thus, supposing we compare the weight, magnitude, and density of any substance with water, we may take a cubic inch of that element for a standard, and call the weight, magnitude, and density of it 1; by which means we may readily compare the weights, magnitude, or density, of any quantity, however large, of another substance with water.

We now proceed to that part of the work which treats directly of the motion of bodies acted upon by any external impulse.

8. Any force acting continually upon a body in the same direction, will produce a continual acceleration or retardation of the motion. Thus, if a body depends by the force of gravity, its motion is continually accelerated; or if it be thrown up against the force of gravity, the motion will be continually retarded until it be totally destroyed.

9. If, while a body moves, equal quantities of motion be communicated to it, or taken from it in equal spaces of time, the force is said to be constant, and equally accelerated or retarded.

10. When unequal velocities are generated or destroyed in equal spaces of time, the force is said to be variable.

11. When a body is acted upon by a constant force, we must consider the space through which it moves, the time it takes to move through it, the velocity it acquires, and the force which produces it; any two of which being given, we may from them find the other two. Here we must observe, that the force mentioned relates only to the communication of the velocity, without any regard to the quantities of matter moved. As it is proportioned to the velocity generated in a given time, it is thence called the accelerating force. That which relates to the quantity of matter moved, as well as the velocity communicated, is called the moving force: being proportional to the quantity of motion produced in a given time.

12. The moving forces which communicate the same velocity in a given time to different bodies, will be as the quantities of matter contained in the bodies moved. This will appear from a consideration of what has already been said concerning the moments of bodies. For if one body contains ten times the quantity of matter that another does, it will of course require ten times as much force to move it with an equal degree of velocity; for the former is equivalent to ten such bodies, and it is the same thing whether they be separate or altogether.

13. The moving forces which act upon bodies, and the degrees of velocity communicated to them in a certain time, are proportional to the quantities of matter moved and the velocities communicated jointly: for, by the last proposition, when the velocity communicated in a certain time is the same, the moving force is as the quantity of matter moved. Thus, if a ball of ten pounds weight is made to move at the rate of 10 feet in a second, and another of one pound is made to move at the same rate, the moving forces will be in proportion to the quantities of matter; that is, as 10 to 1. Hence we may easily perceive, that when the quantity of matter is given, the moving force will be as the velocity. Thus, if two balls of ten pounds each
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Each are caused to move, one with the velocity of ten feet in a second, and the other with a velocity of five feet in the same time, the forces will be as the velocities; that is, as 10 to 5, or as 2 to 1; and hence, when both quantities of matter and velocities are different, the moving forces will be according to these jointly. Thus if a ball of ten pounds is moved with a velocity of ten feet in a second, and a ball of one pound moves with a velocity of five feet in a second, the moving forces will be as 10 x 10 or 100 to 1 x 5, or as 20 to 1.

Here our author takes occasion to deny that there is any such thing as a communication of motion by an instantaneous impulse or stroke, as has commonly been supposed. Every degree of motion, according to him, is effect of acceleration. "The latter way (says he) viz. the communication by instantaneous impulse, can obtain only in bodies perfectly hard and inflexible, which exist not in nature; and even in the abstract consideration of these as well as of other cases in mechanics, when metaphysical possibilities instead of the natural state of bodies are attended to, difficulties arise hardly explicable by any method of reasoning: but it is certain, that when finite velocity is communicated to any natural body, the time in which it is communicated must be finite also: so that when the body acted upon begins to move from quiescence, it must, during the action of the force, posses all the intermediate degrees of velocity between 0 and the velocity ultimately communicated.

"To exemplify this further, let it be supposed that a soft and flexible bell of clay impinges against another of the same sort, in the direction of a line joining the centres of the balls. At the first instant of the impact, the body struck will begin to move, and will proceed with a velocity inferior to that of the impinging body, the velocity of which will continue to decrease, and that of the other body to increase, as long as the impinging force causes a change in the figure of the two bodies; that is, till they have both acquired a common velocity; at which instant all acceleration ceases if the bodies be perfectly non-elastic. If the bodies be of such a kind as, after having received impression from any impact, posses a power of restoring their changed figure with a force equal to that of the impact, it is manifest, that whatever velocity was communicated during the change of figure, an equal quantity will be superadded during the reformation of it. In this case, after the acceleration arising from the impact during the change of the figure of the bodies has ceased, the bodies having then acquired a common velocity, a new acceleration will begin, being caused by the elastic force of the ball, which, acting in a direction of lines joining their centres, tends to separate them, accelerating the ball struck, and retarding the other.

"From these considerations it appears, that in whatever degree the hardness of perfectly elastic bodies may differ, the effects of their impact will be the same, the weights and velocities before the stroke being given. For the figures of the striking and of the other body continuously change, till they have acquired a common velocity, which depends only on the velocity of bodies and their impact, and is determined by the rules for the collision of non-elastic bodies. Moreover, the reformation of the changed figures, how great or how small forever may have been the change, must be equal to move, one with the velocity of ten feet in a second, and the other with a velocity of five feet in the same time, the forces will be as the velocities; that is, as 10 to 5, or as 2 to 1; and hence, when both quantities of matter and velocities are different, the moving forces will be according to these jointly. Thus if a ball of ten pounds is moved with a velocity of ten feet in a second, and a ball of one pound moves with a velocity of five feet in a second, the moving forces will be as 10 x 10 or 100 to 1 x 5, or as 20 to 1.

Here our author takes occasion to deny that there is any such thing as a communication of motion by an instantaneous impulse or stroke, as has commonly been supposed. Every degree of motion, according to him, is effect of acceleration. "The latter way (says he) viz. the communication by instantaneous impulse, can obtain only in bodies perfectly hard and inflexible, which exist not in nature; and even in the abstract consideration of these as well as of other cases in mechanics, when metaphysical possibilities instead of the natural state of bodies are attended to, difficulties arise hardly explicable by any method of reasoning: but it is certain, that when finite velocity is communicated to any natural body, the time in which it is communicated must be finite also: so that when the body acted upon begins to move from quiescence, it must, during the action of the force, posses all the intermediate degrees of velocity between 0 and the velocity ultimately communicated.

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"It follows also, that the effect will be the same, whether the bodies be both perfectly elastic, or whether one of them be perfectly elastic and the other perfectly hard; every thing else being given for the figure of the elastic body must change until the bodies have obtained a common velocity, which depends on the weights and velocities before the stroke only; and will be the same as if the bodies were non-elastic: the reformation of the figure will in this, as well as in the former case, cause an increase of velocity in the ball struck, equal to that before communicated. Although no substance in nature posses a perfect elasticity, or is entirely destitute of it, yet there are several elastic and non-elastic bodies subject to experimental trials, wherein the laws relating to collision are found to agree with fact to a considerable degree of exactness.

14. The accelerating forces which communicate velocity to bodies are directly as the moving forces, and inversely as the quantity of matter moved; for since by prop. 11. the accelerating force is as the velocity generated in a given time; and by prop. 13. the moving force is as the quantity of matter and velocity generated in a given time, it follows, that the moving force is as the accelerating force and quantity of matter moved jointly; that is, the accelerating force is as the moving force directly, and the quantity of matter moved inversely. Thus, let a mass of matter, equal to four ounces, be impelled by a force equal to three ounces; then the force which accelerates the mass of four ounces will be three-fourths when the acceleration of gravity is 1; or in other words, it will generate, in a given time, three parts in four of the velocity which gravity generates during any given time.

15. In bodies impelled in a rectilinear direction by forces acting uniformly, the velocities generated are as the forces and times in which they act, conjointly. Thus, suppose a force equal to ten acting upon a ball of ten pounds, and another also equal to ten acting upon a ball of equal weight, the former for one second, and the latter for two; it is plain that the velocity generated in the latter will be double to that generated in the former. But if we suppose the latter ball to be acted upon by a force equal only to five, then will both the velocities be equal, though the latter should continue for two seconds and the former only for one. In all practical inquiries of this kind, however, it must be remarked, that a standard velocity is to be obtained from observing what degree of velocity is generated by the force of gravity during a given time; one second, for instance.

16. If a quiescent body be impelled by any constant force acting upon it for a given time, the space described will be to the space described in the same time by a body moving uniformly with the last acquired velocity, in the ratio of one to two. In order to understand this, we must suppose the time to be divided into such small parts that the acceleration during any one of them is imperceptible: then it is evident, that at the end of two moments, the impulse continuing the same, it will have gained double the velocity it did the first moment; and this
19. The constant forces which accelerate bodies from a state of rest, are in a direct duplicate ratio of the velocities generated, and in an inverse ratio of the spaces described. Hence the following corollary is deduced, viz. that the last acquired velocities are in a subduplicate ratio of the accelerating forces, and a subduplicate ratio of the spaces described jointly.

20. If bodies unequal in quantity of matter be impelled from rest through equal spaces, by the action of moving forces which are constant, these forces are in a duplicate ratio of the last acquired velocities, and the ratio of the quantity of matter jointly.

In his observations on this proposition, our author takes occasion to consider the theory of those who infer, contrary to the opinion of Sir Isaac Newton, that the absolute force of bodies is compounded of the quantity of matter and square of the velocity, instead of the velocity itself. "In the experiments (says he) which have been made on the force of bodies, the loss of motion from resistance has been more attended to than the communication of it by acceleration; and the reason probably arose from a want of adequate methods of ascertaining accelerating forces, velocities acquired, and quantities of matter moved, to experimental trials; whereas the impact of bodies on substances which they penetrate, by affording convenient opportunity for observing the depths to which bodies sink before all motion is destroyed, regard being had to the velocities of impact, and the weight and form of the impinging body, has seemed a more eligible method, however imperfect, of investigating the principles of motion.—When a body descends for three seconds by the force of gravity, it acquires, by a force of acceleration, a velocity of 96 feet in a second; also, if a body be projected perpendicularly upward, with a velocity of 96 feet in a second, the whole velocity will be destroyed in three seconds; and in like manner, every other property demonstrated concerning accelerated motions is found to belong to retarded ones, provided we attend to the following circumstances: If in any proposition relating to accelerated motion, the force is constant, it follows, that when this is applied to retarded motion, the retardation must also be constant. Moreover, since in accelerated motions the spaces are estimated from quiescence, so in retarded motions the bodies are supposed to move from quiescence; that is, till all motion is destroyed by retardation: in whatever concerns motions of this kind, therefore, we must consider the retarding force to be directly as the force of resistance, and inversely as the quantity of matter.

"In order to illustrate this subject, it is to be observed, that if a body projected with different initial velocities be retarded by any constant given force, the whole spaces which the body describes are in a duplicate ratio of the initial velocities, which follows from what has been already demonstrated; and conversely, since when bodies are impelled by an accelerating force through various spaces, if these spaces are always as the squares of the last acquired velocities, it follows that the force of acceleration is constant: so when a given body is projected with different velocities, and is retarded by a given force, if the whole spaces described be always in a duplicate ratio of the initial velocities, it is concluded that the force of retardation
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is constant. It is from this argument inferred, that the force whereby blocks of wood, banks of earth, &c., reft the penetration of bodies impinging on them, is constant; for it is observed, that the depths to which military projectiles of a given magnitude and weight, striking against a body of this kind, enter its substance, are in a duplicate ratio of the initial velocities, which has been sufficiently proved by Mr. Robins, who first ascertained the velocities of military projectiles, and applied his method, among other useful purposes, to the discovery of the retardation which bodies suffer by passing through refting substances.

The forces of resistance, which are opposed to the motion of bodies impinging on substances which they penetrate, being granted constant, the propositions concerning acceleration already demonstrated may be applied to explain the motion of bodies, which having been projected with given initial velocities, are interrupted by such obstacles as blocks of wood, banks of earth, or others of a similar kind.—For example, it has been demonstrated, that bodies moving from reft by the acceleration of constant forces describe spaces which are as the accelerating forces and squares of the times jointly. By applying this proposition to retarded motions, we shall have the whole spaces or depths to which bodies impinging on the substance penetrate, as the forces of retardation and squares of the times wherein the bodies move, jointly. Moreover, it has been demonstrated, that if different quantities of matter be impelled from reft through equal spaces, the moving forces will be in a ratio compounded of the duplicate ratio of the velocities last acquired, and the ratio of the quantities of matter moved. It is from hence inferred, that in retarded motions also, if different quantities of matter be projected against any of the substances above described, with different initial velocities, and the whole spaces to which the bodies penetrate are equal, the forces whereby the bodies reft the progress of the impinging bodies will be in a duplicate ratio of the initial velocities of impact and the quantities of matter jointly.

By this proposition we may examine some of the experiments concerning the force of moving bodies, and the conclusions deduced from them by Bernoulli, Leibnitz, Poleni, &c. against the measure of force delivered by Sir Isaac Newton, which he described in the following definitions:

The quantity of motion is measured by the quantity of matter in a moving body and its velocity jointly.

The moving forces whereby bodies tend towards centres of attrition are as the quantities of motion generated in a given time.

It follows, then, from these definitions: that the moving forces, acting for a given time, will be proportional to the quantities of matter moved, and velocities generated jointly; so that if the ratio of the moving forces be known, and we can find by experiment what velocities are generated in given bodies by the action of them for the same time; the quantities of motion generated in the bodies may be estimated according to Sir Isaac Newton's definition. Moreover, since it is allowed that the effects of a resisting force to destroy are the same as those of an equal force to generate motion in a given time; it follows, that if the ratio of two resisting forces be known, the quantities of matter in bodies which impinge on substances, and penetrate them, and the velocities destroyed in a given time, will give the ratio of the quantities of motion destroyed, according to Sir Isaac Newton's definition.

In many of the experiments alluded to, which have been greatly varied and multiplied, the resisting forces were made equal, by causing spheres equal in magnitude to impinge on a given substance which they penetrated; and the spheres being of given densities, it was observed in experiments, that whenever the density or weights of these equal spheres were in an inverse duplicate ratio of their velocities, the depths to which they penetrated would be equal. The conclusions were these: the quantities of matter displaced by the moving bodies were equal, the depths to which the equal spheres penetrated were the same. Moreover, the whole motions which had been communicated to the bodies were destroyed; that is, the whole motion of the impinging bodies must have been as the squares of the velocities into the quantities of matter, but it plainly appears, that this conclusion is not applicable to the Newtonian definition, according to which the moving force generates motion in bodies and it follows by what has preceded, than the resisting force by which the motion of bodies is destroyed, is proportional to the quantities of motion generated or destroyed in a given time respectively: and consequently to estimate the quantity of motion destroyed, the time wherein resisting forces act should be equal. If, therefore, the times wherein the bodies in the experiment describe the equal spaces can be proved different, this will plainly show that the quantities of motion destroyed cannot be inferred from the experiment the different times of the bodies describing the depths to which they sink not being taken into the account this will be easily proved, since from proposition 17. it appears, that the spaces described are universally as the velocities and spaces last described jointly; and from what has been said, the converse of this proposition when applied to retarded motions must also be true. The spaces therefore being given as in the experiment, the times will be inversely as the initial velocities; which velocities being unequal from the experiment it follows that the times are unequal. This being the case, it is manifest that no conclusion can be drawn from these experiments concerning the quantity of motion destroyed, tending to prove any inconsequence between the Newtonian estimation of force and matter of fact.

It is next to be shown, that the experiments are strictly consistent with the Newtonian measure, and with the theory in general.—It has already been proved, that in accelerated motions the spaces described are in a duplicate ratio of the velocities last acquired, and the quantities of matter moved, and an inverse ratio of the moving forces. This proposition being applied to retarded motions, it will follow, that the whole spaces or depths to which the impinging bodies sink are in a duplicate ratio of the quantities of matter, and an inverse ratio of the resisting forces; whence also the depths to which the bodies penetrate must be equal when spheres of equal diameters are projected against a given substance, the weights being in an inverse duplicate
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Motion of projectiles ratio of the initial velocities, which we find entirely correspondent to experiment. It seems indeed rational to suppose, independent of all theory, that, in considering the quantities of motion generated or destroyed by given moving or resisting forces, regard must be had to the times wherein the forces act: because moving forces, or those of resistance, may be equal, and may generate or destroy quantities of motion varying in any assignable degree. For it is manifest, that a small resistance, opposed to a moving body for a longer time, may destroy more motion than a greater force acting for a shorter time; which sufficiently shows, that the times wherein the moving and resisting forces act, must either be equal, or must be taken into the account in estimating the quantities of motion generated or destroyed.

21. The moving forces which communicate, and the forces of resistance which destroy, the motion of bodies in the same time, will be in a compound ratio of the quantities of matter in the moving bodies and velocities generated or destroyed.—This and the preceding propositions have been fully illustrated and confirmed by experiments. From them we deduce the following facts: 1. When mullet-balls, equal in weight and magnitude, impinge on a block of wood with different velocities, the resisting force being constant, we shall have the whole spaces through which the balls move in the wood as the squares of the velocities. 2. If balls of equal diameters, but different weights, impinge against a block with the same velocity, we have the depths to which they penetrate the block as the weights. 3. If balls of the same kind of substance, that is, of the same density, but of different diameters, impinge against a given block of wood or the same bank of earth with equal velocities, the depths to which they penetrate will be directly as the diameters of the balls.

When the force of resistance is not uniform, the same principle obtains in degree, though the laws are then various; for greater bodies always suffer less by retardation than smaller ones of the same density, moving through the same resisting medium, and projected with a given initial velocity: because, though the force of resistance increases with the increase of the body's magnitude, yet the weight in most bodies increases in a greater proportion. Thus, in cannon-balls, and other solid bodies, though the resistance of the air increases as the square of the ball's diameter, yet the weight increases as the cube. Thus, if a ball two inches in diameter is projected from the mouth of a piece, it is resisted by the atmosphere four times less than one four inches in diameter; but the weight of the latter, being eight times greater, makes the resistance less upon the whole in the large ball than in the small one. It is otherwise when the weight does not increase in this manner: for then the smaller the body is, the less resistance it meets with, and the faster it goes. This is manifest from aerostatical experiments; for small air-balloons always outstrip the larger ones: and the same thing is observable in boats; for the smaller ones, if they have the same advantages in proportion to their bulk, will always sail faster than the larger ones.

22. If bodies, projected with the same velocity, be resisted by different constant forces, these forces will be in an inverse ratio of the whole spaces described by the projected bodies, until all motion is destroyed. For example, let a body be projected on an inclined plane, in a direction contrary to that in which gravity acts in the plane, and with a velocity of 144.57 inches in a second. Suppose the body then projected, ascending along the plane, to describe 216 inches before its motion is destroyed; let it be required to ascertain the retarding force which opposes its ascent, that is, the proportion of it to the force of gravity. If the body were projected perpendicularly upward, with the given velocity of 144.467 inches in a second, it would rise only to 27 inches, as follows in Prop. 19. And since it ascends along the plane 216 inches, the retarding force on the plane will be to that of gravity as 27 to 216, or as 1 to 8; which is also the proportion of the height of the plane to the length of it.

From this proposition, having given the depth to which a body impinging against another penetrates it, the proportion of the retarding force of gravity may be determined. For example, Mr. R. found that a leaden ball of ½ of an inch, or ¼ of a foot in diameter, impinging on a block of elm with a velocity of 1700 feet in a second, penetrated it to the depth of five inches, or ½ of a foot; whereas, if a body projected upwards with a velocity of 1700 feet in a second, it would rise, if the atmosphere made no resistance, to the height of 4922 feet. We have the force by which elm retards the ball to the force of gravity as 4922 to 1; or as 107.83 to 1.

On this theory it may further be observed, that the resistances offered to spherical bodies, which impinge on a block of wood, a bank of earth, &c. depend not only on the tenacity or density of the parts, of which the penetrating substances are composed, but upon the diameters of the impinging spheres: so that, although the resisting and retarding forces be determined in any substance for a single cafe; yet when the diameters an equal weights of the impinging bodies vary, the forces of resistance and retardation opposed to the impact on the same substance will be different. By the preceding proposition, however, we may be enabled, from a single experiment made on the retardation of any substance opposed to a sphere, the weight and diameter of which are known, to infer the retardation in any other case, however the weights and diameters may vary.

23. If spheres of different diameters and different specific gravities impinge perpendicularly on fixed obstacles, the resisting forces of which are constant, but of different quantities, the forces which retard the progress of the impinging spheres will be in a direct ratio of the absolute forces of resistance, and the joint inverseratio of the diameters and specific gravities of the spheres. No absolute conclusion can be drawn from this proposition concerning any matter of fact, unless an experiment be first made on the retarding and resisting force of some substance which is to be considered as a standard.

24. The whole spaces or depths to which spheres, impinging on different resisting substances, penetrate, are in the ratio compounded of the duplicate ratio of the velocities of impact, the joint ratios of the diameters and specific gravities of the spheres, and an inverse ratio of the absolute forces whereby the substances resist the progress of the spheres.
Mr. Atwood concludes this section with some problems relative chiefly to military projectiles; and in his next section (the 4th) considers the rectilinear motion of bodies acted upon by forces which vary in some ratio of the distances from a fixed point. This section chiefly relates to the powers of gravity and projection, by which the several bodies are accelerated, and which consequently chiefly regards astronomy and the motion of pendulums; though there are like wise some curious particulars relating to the action of compressed air, the vibration of musical strings, and the undulation of fluids. The fifth section considers the motion of bodies immersed in fluids; but the sixth treats of a subject which properly belongs to mechanics, viz. the communication of motion to bodies revolving round an axis.

In treating this subject Mr. Atwood observes, that in the former part of his work he had supposed the accelerating, as well as resisting, forces, to act upon the body in a straight line passing through the centre of gravity of the moving; in which case every particle of the body must partake of the same degree of velocity, being equal to that with which the common centre of gravity moves. "But (says he) it frequently happens, that a body, or system of bodies, is so constituted, that when any force is impressed upon it, no motion can be produced except round a fixed axis; so that the velocity of the particles which compose the system will be greater or less according as these particles are farther from the common axis or nearer it. These circumstances should be attended to in order to ascertain the motion of revolving bodies; the preceding principles of acceleration being not wholly of themselves sufficient for that purpose.

In this investigation two things must be attended to. 1. The moving force by which the revolving motion is generated; and, 2. The inertia of the parts of which the system is composed. The moving force exerted on any given particle of the system, as well as its inertia, depends on its distance from the axis of motion; every thing else being the same; and if both these be ascertained, the absolute acceleration of the particle will be determined, and consequently the absolute velocity generated in a certain time. The method therefore of determining these forces in any given circumstance should next be described.

Let AFGH (fig. 112.) represent the circumference of a wheel which turns in its own plane round an horizontal axis, passing through its centre; and let a weight P, fixed at the extremity of a line AP, communicate motion to the wheel. Moreover, let the whole weight of the wheel be Q; and suppose this weight to be collected uniformly into the circumference AFGH; then, during the defcent of the weight P, each point of the circumference must move with a velocity equal to that with which P descends; and consequently, since the moving force is the weight P, and the mass moved P+Q, the force which accelerates P in its descent will, by Prop. 14, be that part of the accelerating force of gravity which is expressed by the fraction \( \frac{P}{P+Q} \). The velocity, therefore, which is generated in P in any given time, is found from the rules before demonstrated. Thus, supposing Q to be equal to P, then will \( \frac{P}{P+Q} = \frac{1}{2} \); and the weight P will be accelerated by a power which is to that of gravity, as 1 : 0, 2, and hence gravity generates in bodies which descend for one second of time near the earth's surface a velocity of 52 foot in a second; it follows, that the weight P will in the same time have acquired a velocity of 16 feet in a second only.

If the parts of the weight Q which are uniformly disposed over the circumference AFGH, balance each other round the common centre of gravity S; their weight therefore is of no effect in accelerating or retarding the descent of P: and this will be the case whenever the axis of motion passes through the common centre of gravity. But in order to render the properties of rotary motions more obvious, it will be convenient to dispose the parts of the revolving system so that the axis of motion shall not accedally pass through the common centre of gravity; thus, instead of having the weight Q uniformly disposed over the circumference AFGH, let it be collected into any point Q. Here it is manifest, that if the weight Q be acted upon by gravity, the force which communicates motion to the system round S will be variable, it being the greatest when SQ is horizontal, and gradually diminishing till Q has arrived at its lowest point. But as we would begin with the most simple cases, the moving force must be constant. This will be affected by supposing the mass which is collected in Q to be definite in weight, and to possess inertia only. It follows therefore, that during the revolution of Q round S as an axis, the moving force will be constantly equal to P, and the mass moved = P+Q. Consequently the force which accelerates the descending weight, or any point in the circumference, will be that part of gravity which is expressed by the fraction \( \frac{P}{P+Q} \) as before.

In these cases, the force which communicates motion to the system has been supposed a weight or body acted upon by the earth's gravity, and consequently constitutes a part of the mass moved, at the same time that it acts as a moving force; but motion may be communicated by a force which shall add nothing to the inertia of the matter moved; and it will be convenient in many demonstrations to assume the force of this kind; and in this case we have not to take the inertia into the account. Thus if any number of bodies without gravity collected into the points F, H, Q. (fig. 112.) are caused to revolve round the axis S, by a moving force P, the force which accelerates these bodies in their revolution will be \( P + \frac{P}{P+Q} \); provided the bodies F, H, Q. be disposed at a distance from the axis of motion equal to the radius of the circle AFGH, at the circumference of which the moving force P is applied.

In the preceding example, F, H, Q. &c. have been supposed to move with the same velocity; but when bodies revolve at unequal distances from the axis, their velocities of motion being different, other rules will be necessary to determine the force whereby any given point of the system is accelerated. In demonstrating the properties of rotary motion, the revolv-
Mentioning different bodies, the circumference of a sphere, while it rolls down an inclined plane, is to the force by which it would be accelerated were it to slide in the ratio of five to seven. As our limits will not admit of inserting at length the demonstration of this and other propositions, we shall in this only observe, that when a wheel or a sphere rolls, the circumference goes backward, while the centre moves forward; which retrograde motion must of necessity make the other slower than it would otherwise be; and this retardation Mr. Arwood has determined to be in the proportion abovementioned.

From this proposition the following corollaries are deduced. 1. The absolute force whereby motion is generated in the circumference of a sphere in such a situation, is expressed by a fraction consisting of twice the weight of the sphere divided by seven, and multiplied into another fraction consisting of the height of the plane divided by the central force; that is, suppose the weight of the sphere to be represented by w, the height of the plane by h, and its length by l, the force by which the circumference of the sphere is impelled will be represented by \( \frac{w}{l^2} \).

2. Let AB (fig. 115.) represent a straight line moveable round an horizontal axis of motion, which passes through S. Let the arms be SB, SA. Suppose a weight W to be affixed to the extremity of the shorter arm.
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Motion of the longer arm, and to be raised by the weight P applied at the extremity of the longer arm, when the lever is horizontal. Required to determine the time in which W will be raised through any given height, the weight and inertia of the lever itself not being considered.

Where there is an equilibrium (says Mr Atwood) on any mechanical power, the proportion of the weight sustained to the power sustaining it, will, in all cases, be assigned from having given the dimensions of the mechanical power. An equilibrium having been once formed, the smallest addition of weight will cause the body to which it is applied on either side to preponderate. In this case a certain degree of motion is generated; and since the uses of the mechanic powers are not only to sustain forces in equilibriam, but to raise weights and overcome resistances, it is a problem of principal consequence to assign the absolute quantity of motion generated by a known moving force in given circumstances.

The general solution of the problem is as follows:

Let AB be the lever, W the weight moved by the power P; each acting in a direction perpendicular to the horizon. Let C be the common centre of gravity of the whole system, including the weights P and W with the lever itself; and the centre of oscillation S, when AB vibrates round the axis S; the force which accelerates B when the lever is horizontal is as follows:

\[ \frac{SG \times SB}{SB} \]

wherein P depends through a perpendicular space \( x \), and consequently wherein W ascends through the corresponding space \( y \); then

\[ \frac{SA}{SB} = \frac{x}{y} \]  

\[ \frac{SB}{SB+5} \]  

If this be put \( F \), the time of ascent is

\[ \frac{\sqrt{\frac{2g}{1+x^2}}}{F} \]

\[ \frac{SB}{SB+5} \]

3. Let ABC (fig. 116.) represent a wheel and axle, its weight \( w \), and let the axle be horizontal, having a given weight \( Q \) applied to the circumference of the axle, and P applied to the circumference of the wheel in order to raise \( Q \). Required to assign the space described by the elevated weight \( Q \) in any given time. The solution of this problem, without attending to the demonstration, is this: Having found the accelerating power, which here is

\[ \frac{P \times SD - Q \times SA}{w \times SB^2} \]

All this he puts \( \approx F \); and then \( F \) being \( 193 \) inches as before, the space described by \( Q \) in any number of seconds will be the square of that number of seconds multiplied into \( IF \). On this proposition our author makes the following observations.

Whenever motion is communicated to a body, a certain resistance must have been overcome by the moving force. This resistance is of various kinds. 1. The inertia of the mass, moved, whereby it endeavour to persevere in its state of quiescence, or of uniform motion in a right line. 2. That of a weight or other absolute force opposed to the action of the moving body.

3. Obstacles upon which the moving bodyimpeding is retarded in its progress; such, for example, is the resistance which arises from the particles of a fluid thrown which a body moves. The estimation of these resistances, and their effects in retarding the motion of bodies acted upon by a given force, are deductible from the laws of motion, and constitute a part of the solution of almost all problems relating to the motion of bodies.

The moving forces also are of various kinds, viz.

The power of gravity, muscular power, the impact of bodies, solid and fluid, &c. It has been shown, that the effects of these moving forces which are exerted on bodies in order to create motion, exclusive of the resistance opposed to them, depend on the various circumstances of the time in which they act, and on the spaces through which the bodies moved are impelled, &c.

These considerations are urged, to show, that from the great variety of undetermined conditions which may enter into mechanical problems, there must of course be various methods of producing the same mechanical effect: and it is a very material part of the art, considered either in a theoretical or practical view, to proportion the means to the end, and to effect this with all advantages which the nature of the case is capable of. It is the due observation of these particulars which contributes to render mechanic instruments complete, and the neglect of them defective, in their construction. This proper choice of means to produce mechanical effects, is frequently the result of long continued experience independent of all theory; the knowledge of which, however, when applied to practical, would save the artificer time and trouble, as well as would be productive of other advantages, which experience alone must be substitutive of.

4. ABC (fig. 116.) is a wheel and axis moveable round an horizontal axis, which passes through S. Suppose a given weight \( Q \) which is applied to the circumference of the axle; let it be required to assign the proportion of the radii of the wheel, and axle, so that the time in which the weight \( Q \) ascends through any given space shall be the least possible. In this case, supposed the radius of the wheel to be 10 inches, and its weight 20 ounces; let the radius of the axle \( SA = 1 \) inch, the weight to be raised through any given space to be 100 ounces, the moving force by which it is raised to be 33 ounces; then the distance of the centre of gyration from the axis is 9.55 inches; and the length of the radius sought is 9.55 inches. If, instead of raising the weight perpendicularly, it be required to draw it horizontally, and to assign the distance SD, at which, if a given force \( P \) be applied, the time of describing a given space shall be the least, and the moment of \( g \) the greatest possible, we have the following conclusion. "Let the quantity of matter to be drawn along the plane be four times greater than that which is contained in the moving..."
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VI.
Mechanics.

Chapter VI.

Motion of Bodies.

It is in vain to attempt the application of the theory of mechanics, to the motion of bodies, except every cause which can sensibly influence the moving power and the resistance to motion be taken into account: if any of these be omitted, error and inconstancy in the conclusions deduced must be the consequence. It was at one time supposed, from this inadequate application of the theory, that the same laws of motion would not extend to all branches of mechanics, but that different principles were to be accommodated to different kinds of motion. If this were truly the case, the science of mechanics would fall short of that superior excellence and extent which it is generally allowed to possess. For it is probable, that there is no kind of motion but what may be referred to three easy and obvious propositions, the truth of which it is impossible to doubt: and if we are not enabled to investigate the effects from the data in all cases, the deficiency must not be imputed to the science of mechanics, but to the want of methods of applying mathematics to it.

This may be illustrated by an example, in order to show that the motion communicated to water-wheels, however complicated the data may be, is equally referable to the laws of motion, with the effects of the most unconfounded force. If a stream of water falls perpendicularly on a plain surface, the moving force arising from the impact only is equal to the weight of a column of water, the base of which is the surface upon which the water impinges, and altitude that through which a body must fall to acquire the velocity of impact. If the inclination of the stream to the surface should be changed, the force exerted in a direction perpendicular to the plane will be diminished in a duplicate ratio of the radius to the sine of inclination; the surface on which the water impinges remaining. Now, when the water falls on the boards of a water-wheel, the direction of the stream makes different angles with the planes of those boards; for since the particles of water descend in curve lines, they will strike any plain surface in the direction of a tangent to the curve on the point of impact. Moreover, the water will strike the higher boards TT with less velocity, and in a direction more inclined to their planes, than the lower ones HH; it is also to be considered, that the stream will impinge on the boards at different distances from the axis of motion; all which circumstances must be taken into account, to find the force which tends to communicate motion to the wheel when quiescent; and when motion has been communicated, the force of the stream to turn the wheel will be determined in the manner already mentioned. But this is not the only consideration which affects the moving force: The force hitherto considered has supposed to proceed from the impact of the particles only; in which case, each particle after it has struck the board is imagined to be of no other effect in communicating motion: but this is not wholly the case; for after the particle has impinged on the board, it will continue some time to operate by its weight; and this time will be longer or shorter according to the different constructions of the wheel. In the overflown wheel, the continuance of the pressure, arising from the weight of the water, will be longer than in the under-

shot, the force which arises from the impact of the water being nearly the same in each case. The whole moving force, therefore, will consist of the impact determinable as above, and of the weight of the water descending along with the circumference, and communicating additional motion to it: this entire moving force being determined either by theory or experience, may be denoted by A. After the moving force which impels the circumference has been determined, the resistance to this force must be found; for the proportion between the moving force and the resistance, the acceleration of the machine will depend. This resistance is of various kinds: 1. That of inertia. 2. If the machine is of that kind which raises weights, such for instance as water; the weight raised, allowing for its mechanical effect on the point of which we desire to know the acceleration, must be subducted from the moving force before found; and this will be a constant quantity. There are other resistances also homogeneal to weight, viz. those of friction and tenacity, etc. which are variable in some ratio of the machine's velocity; in order to proceed with the investigation, the exact quantity of weight which the friction is equal to, when the wheel moves with a given velocity, must be considered, as well as the variation of the resistances in respect to the velocities; which circumstances must be determined by experiment. If the force equivalent to the friction, etc. be subducted from the moving force, the remainder will give the moving power, by which the circumference is impelled upon the whole: this being divided by the inertia of the mass moved, will give the force which accelerates the circumference.

The following apparatus has been invented by Mr. Arwood, for illustrating his doctrines concerning accelerated motion, and has been found to answer the purpose more completely than any other we have heard of: discovering at once the quantity of matter moved, the force which moves it, the space described from rest, the time of description and the velocity acquired.

1. Of the mass moved.—In order to observe the effects of the moving force, which is the object of any experiment, the interference of all other forces should be prevented: the quantity of matter moved, therefore, considering it before any impelling force has been applied, should be without weight; for although it is impossible to abstract the natural gravity or weight from any substance whatever, yet the weight may be so counteracted as to be of no sensible effect in experiments. Thus in the instrument constructed to illustrate this subject experimentally, A, B, fig. 120, represent two equal weights affixed to the extremities of a very fine and flexible silk line; this line is stretched over a wheel or fixed pulley abed, moveable round an horizontal axis: the two weights A, B, being precisely equal and acting against each other, remain in equilibrio; and when the least weight is superposed to either (letting aside the effects of friction), it will preponderate. When AB are let in motion by the action of any weight m, the sum A+B+m would constitute the whole mass moved, but for the inertia of the materials which must necessarily be used in the communication of motion: these materials consist of,
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Motion of Bodies. The wheel a b c d, over which the line sustaining A and B runs. 2. The four friction wheels on which the axle of the wheel a b c d rolls; the use of these wheels is to prevent the loss of motion, which would be occasioned by the friction of the axle if it revolved on an immovable surface. 3. The line by which the bodies A and B are connected, so as when in motion to move with equal velocities. The weight and inertia of the line are to be estimated by the ratio of the circumference of the wheel a b c d to which the line is applied; it follows, that if the whole mass of the wheels were accumulated in this circumference, its inertia would be truly estimated by the quantity of matter moved; but since the parts of the wheels move with different velocities, their effects in refuting the communication of motion to A and B by their inertia will be different; those parts which are nearer from the axis refuting more than those which revolve nearer in a duplicate proportion of those distances. If the figures of the wheels were regular, from knowing their weights and figures, the distances of their centres of gravity from their axes of motion would be known, and consequently an equivalent weight, which being accumulated uniformly in the circumference a b c d, would exert an inertia equal to that of the wheels in their constructed form. But as the figures are wholly irregular, recourse must be had to experiment, to ascertain the equivalent quantity of matter, which being accumulated uniformly in the circumference a b c d, would resist the communication of motion to A in the same manner as the wheels.

In order to ascertain the inertia of the wheel a b c d, with that of the friction wheels, the weights A B being removed, the following experiment was made. A weight of 30 grains was affixed to a silk line (the weight of which was so much as 5th of a grain, and consequently too inconsiderable to have sensible effect in the experiment); this line being wound round the wheel a b c d, the weight 30 grains by descending from rest communicated motion to the wheel, and by many trials was observed to describe a space of about 38 inches in 3 seconds. From these data the equivalent mass or inertia of the wheel will be known from this rule:

\[ \text{Let a weight } A \text{ (fig. 121.) be applied to communicate motion to a system of bodies by means of a very slender and flexible line going round the wheel, through the centre of which the axis passes; } B \text{ the centre of gravity of the matter contained in this line, and } O \text{ the centre of oscillation. This weight } \text{A} \text{ will descend from rest through any convenient space of } x, \text{ and let the observed time of its descent be } t \text{ seconds; then if } \text{be the space through which bodies descend freely by gravity in one second, the equivalent weight sought } = \frac{\text{W}\times\text{S}\times\text{R}\times\text{X}\times\text{X}}{\text{P}\times\text{t}^2}. \]

Here we have \( p = 30 \text{ grains, } = 3 \text{ seconds, } = 193 \text{ inches, } = 38.5 \text{ inches, } = \frac{32}{385} \text{ P X}^2 t^2. \]

This is the inertia equivalent to that of the wheel a b c d, and the friction wheels together; for the rule extends to the estimation of the inertia of the masses contained in all the wheels.

The resistance to motion therefore arising from the wheel's inertia, will be the same as if they were absolutely removed, and a mass of 29 ounces were uniformly accumulated in the circumference of the wheel a b c d. This being premised, let the boxes A and B be replaced, being suspended by the silk line over the wheel or pulley a b c d, and balancing each other: suppose that any weight m is added to A so that it shall descend, the exact quantity of matter moved, during the descent of the weight A, will be ascertained, for the whole mass will be \( A + B + m + 24 \text{ oz.} \)

In order to avoid troublesome computations in adjusting the quantities of matter moved and the moving forces, some determinate weight of convenient magnitude may be assumed as a standard, to which all the others are referred. This standard weight in the subsequent experiments is \( \frac{1}{10} \) of an ounce, and is represented by the letter m. The inertia of the wheels being therefore \( \frac{32}{10} \) ounces, will be denoted by \( 11m \). A and B are two boxes constructed to contain different quantities of matter, according as the experiment may require them to be varied: the weight of each box, including the hook to which it is suspended, is \( 1 \frac{1}{10} \) oz. or according to the preceding estimation, the weight of each box will be denoted by \( 6m \); these boxes contain such weights as are represented by fig. 122, each of which weighs an ounce, so as to be equivalent to \( 4m \); other weights of \( 4oz = 2m, \frac{1}{2} = m, \) and aliquot parts of \( m, \) such as \( 5m, \frac{1}{5}m, \) may also be included in the boxes, according to the conclusions of the different experiments hereafter described.

If \( 4m \) or \( 10m \) be included in either box, this with the weight of the box itself will be \( 25m \), so that when the weights A and B, each being \( 25m, \) are balanced in the manner above represented, their whole mass will be \( 50m, \) which being added to the inertia of the wheels \( 11m, \) the sum will be \( 61m \). Moreover, three circular weights, such as that which is represented at fig. 123, are constructed: each of which is \( 4oz, \) or \( 4m \); if one of these is added to A and one to B, the whole mass will now become \( 63m, \) perfectly in equilibrio, and moveable by the least weight added to either (letting aside the effects of friction), in the same manner precisely as if the same weight or force were applied to communicate motion to the mass \( 63m, \) existing in free space and without gravity.

2. The moving Force. Since the natural weight or gravity of any given substance is constant, and the exact quantity of it easily estimated, it will be convenient here to apply a weight to the mass A as a moving force: thus, when the system consists of a mass \( 63m, \) according to the preceding description, the whole being perfectly balanced, let a weight \( 4oz. \) or \( m, \) such as is represented in fig. 124, be applied on the mass A; this will communicate motion to the whole system by adding a quantity of matter \( \mu, \) to the former mass \( 63m, \) the whole quantity of matter moved will now become...
become \(0.4 \text{ m}^2\) and the moving force being \(\frac{1}{2} \text{m}\), this will give the force which accelerates the descent of \(\frac{1}{2} \text{m}\) part of the accelerating force by which the bodies descend freely towards the earth's surface.

By the preceding consideration, the moving force may be altered without altering the masses moved; for suppose the three weights \(m\), two of which are placed on A, and one on B to be removed, then will A balance B. If the weights \(2 \text{ m}\) be all placed on A, the moving force will now become \(3 \text{ m}\), and the masses moved \(6 \text{ m}^2\) as before, and the force which accelerates the descent of A equal to \(\frac{1}{2} \text{m}\) parts of the force by which gravity accelerates bodies in their free descent to the surface.

Suppose it were required to make the moving force \(2 \text{ m}\), the masts moved continuing the same. In order to effect this, let the three weights, each of which is \(\frac{1}{2} \text{m}\), be removed; A and B will balance each other; and the whole masts will be \(6 \text{ m}^2\); let \(\frac{1}{2} \text{m}\), fig. 124, be added to A, and \(\frac{1}{2} \text{m}\) to B, the equilibrium will be perfectly preserved, and the masts moved will be \(2 \text{ m}^2\); now let \(\frac{1}{2} \text{m}\) be added to A, the moving force will be \(2 \text{ m}\), and the masts moved \(6 \text{ m}^2\); as before; wherefore the force of acceleration is \(\frac{1}{2}\) part of the acceleration of gravity. These alterations in the moving force may be made with great ease and convenience in the more obvious and elementary experiments; there being no necessity for altering the contents of the boxes A and B: but the proportion and absolute quantities of the moving force and masts moved may be of any assigned magnitude, according to the conditions of the proposition to be illustrated.

3. Of the space described. The body A, fig. 120, descends in a vertical line; and a scale about 64 inches in length graduated into inches and tenths of an inch is adjusted vertical, and so placed that the descending weight A may fall in the middle of a square stage, fixed to receive it at the end of the descent: the beginning of the descent is estimated from o on the scale, when the bottom of the box A is on a level with o. The descent of A is terminated when the bottom of the box strikes the stage, which may be fixed at different distances from the point o; so that by altering the position of the stage, the space described from quiescence may be of any given magnitude less than 64 inches.

The time of motion is observed by the beats of a pendulum, which vibrates seconds; and the experiments, intended to illustrate the elementary propositions, may be easily so constructed that the time of motion shall be a whole number of seconds: the estimation of the time, therefore, admits of considerable exactness, provided, the observer takes care to let the bottom of the box A begin its descent precisely at any beat of the pendulum; then the coincidence of the stroke of the box against the stage, and the beat of the pendulum at the end of the time of motion, will show how nearly the experiment and the theory agree together. There might be various mechanical devices thought of for letting the weight A begin its descent at the instant of a beat of the pendulum W; let the bottom of the box A, when at o on the scale, rest on a flat rod, held in the hand horizontally, its extremity being coincident with o, by attending to the motion of the beats of the pendulum; and with a little practice, the rod which supports the box A may be removed at the moment the pendulum beats, so that the descent of A shall commence at the same instant.

4. Of the velocity acquired. It remains only to describe in what manner the velocity acquired by the descending weight A, at any given point of the space through which it has descended, is made evident to the senses. The velocity of A's descent being continually accelerated will be the same in no two points of the space described. This is occasioned by the constant action of the moving force; and since the velocity of A at any instant is measured by the space which would be described by it, moving uniformly for a given time with the velocity it had acquired at that instant, this measure cannot be experimentally obtained, except by removing the force by which the descending body's acceleration was caused.

In order to show in what manner this is affected particularly, let us again suppose the boxes A and B each \(\frac{1}{2} \text{m}\), so as together to be \(\frac{1}{2} \text{m}\); this with the wheel's inertia is \(\frac{1}{2} \text{m}\) will make \(6 \text{ m}^2\); now let \(\frac{1}{2} \text{m}\), fig. 122, be added to A, and an equal weight \(\frac{1}{2} \text{m}\) to B, these bodies will balance each other, and the whole masts will be \(3 \text{ m}^2\). If a weight \(\frac{1}{2} \text{m}\) be added to A, motion will be communicated, the moving force being \(\frac{1}{2} \text{m}\), and the masts moved \(6 \text{ m}^2\). In estimating the moving force, the circular weight \(\frac{1}{2} \text{m}\) was made use of as a moving force; but for the present purpose of showing the velocity acquired, it will be convenient to use a flat rod, the weight of which is also \(\frac{1}{2} \text{m}\). Let the bottom of the box A be placed on a level with o on the scale, the whole masts being as described above \(\frac{1}{2} \text{m}\); perfectly balanced in equilibrio. Now let the rod, the weight of which \(\frac{1}{2} \text{m}\), be placed on the upper surface of A; this body will descend along the scale precisely in the same manner as when the moving force was applied in the form of a circular weight. Suppose the masts A, fig. 125, to have descended by constant acceleration of force \(\frac{1}{2} \text{m}\), for any given time, or through a given space; let a circular frame be so affixed to the scale, contiguous to which the weight descends, that A may pass centrally through it, and that this circular frame may intercept the rod \(\frac{1}{2} \text{m}\) by which the body A has been accelerated from quiescence. After the moving force \(\frac{1}{2} \text{m}\) has been intercepted at the end of the given space or time, there will be no force operating in any part of the system which can accelerate or retard its motion: this being the case, the weight A, the instant after \(\frac{1}{2} \text{m}\) has been removed, must proceed uniformly with the velocity which it had acquired that instant: in the subsequent part of its descent, the velocity being uniform will be measured by space described in any convenient number of seconds.

Other Uses of the Instrument. It is needless to describe particularly, but it may not be improper just to mention the further uses of this instrument; such as the experimental estimation of the velocities communicated by the impact of bodies elastic and nonelastic; the quantity of resistance opposed by fluids, as well as for various other purposes. These uses we shall not insist upon; but the properties of retarded motion being a part of the present subject, it may be necessary to show in
in what manner the motion of bodies resisted by constant forces are reduced to experiment by means of the instrument above described, with as great ease and precision as the properties of bodies uniformly accelerated. A single instance will be sufficient: Thus, suppose the masses contained in the weights A and B, fig. 125, and the wheels to be $61\ m$, when perfectly in equilibrio; let a circular weight $m$ be applied to B, and let two long weights or rods, each $= m$, be applied to A, then will $A$ descend by the action of the moving force $m$, the mass moved being $64\ m$; suppose that when it has described any given space by constant acceleration, the two rods $m$ are intercepted by the circular frame above described, while $A$ is descending through it, the velocity acquired by that descent is known; and when the two rods are intercepted, the weight $A$ will begin to move on which the velocity acquired, being now retarded by the constant force $m$; and since the mass moved is $62\ m$, it follows, that the force of retardation will be $\frac{1}{2}$ part of that force whereby gravity retarded bodies thrown perpendicularly upwards. The weight $A$ will therefore proceed along the graduated scale in its descent with an uniformly retarded motion, and the spaces described, times of motion, and velocities destroyed by the resisting force, will be subject to the same measures as in the examples of accelerated motion above described.

In the foregoing descriptions, two suppositions have been assumed, neither of which are mathematically true: but it may be easily shown that they are so in a physical sense; the errors occasioned by them in practice being insensible.

1. The force which communicates motion to the system has been assumed constant; which will be true only on a supposition that the line, at the extremities of which the weights $A$ and $B$, fig. 120, are affixed, is without weight. In order to make it evident, that the line’s weight and inertia are of no sensible effect, let a case be referred to, wherein the body $A$ descends through 48 inches from rest by the action of the moving force $m$, when the mass moved is $64\ m$; the time wherein $A$ describes 48 inches is increased by the effects of the line’s weight by no more than $\frac{1}{120}$ of a second; the time of descent being 3.9596 seconds, when the string’s weight is not considered, and the time when the string’s weight is taken into account = 4.0298 seconds; the difference between which is wholly insensible by observation.

2. The bodies have also been supposed to move in vacuo, whereas the air’s resistance will have some effect in retarding their motion: but as the greatest velocity communicated in these experiments, cannot much exceed that of about 26 inches in a second (suppose the limit 26.2845), and the cylindrical boxes being about $\frac{1}{2}$ inches in diameter, the air’s resistance cannot increase the time of descent in so great a proportion as that of 240 : 241; its effect therefore will be insensible in experiment.

The effects of friction are almost wholly removed by the friction wheels; for when the surfaces are well polished and free from dust, &c. if the weights $A$ and $B$ be balanced in perfect equilibrio, and the whole mass consists of $63\ m$, according to the example already described, a weight of $\frac{1}{4}$ grains, or at most 2 grains, being added either to $A$ or $B$, will communicate motion to the whole; which shows that the effects of friction will not be so great as a weight of $\frac{1}{4}$ or $\frac{1}{2}$ grains. In some cases, however, especially in experiments relating to retarded motion, the effects of friction become sensible; but may be very readily and exactly removed by adding a small weight 1.5 or 2 grains to the descending body, taking care that the weight added is such as is in the least degree smaller than that which is just sufficient to set the whole in motion, when $A$ and $B$ are equal and balance each other before the moving force is applied.

MECHANCAN.

MECHOACAN, a province of Mexico, or New Spain, in America, bounded on the north by Panama and Guadalajara, on the east by Panama and Mexico Proper, on the south by the Pacific Ocean, and on the west by Guadalajara and the South Sea. The soil is exceedingly fertile; and the climate so wholesome, that the Spaniards imagine it to be puffed with some peculiarly refractive quality; for which reason the flock and infirm flock to it from all quarters.

The commodities are sulphur, indigo, farfaparilla, farfars, cacao, vaneloes, ambergrieve, hides, wool, cotton, silk, sugar, the root mechoacan or white jalap, and silver. This province formed an independent kingdom at the time Mexico was reduced by Cortez. The sovereign had been the inverteate enemy of the Mexicans, and was considered, next to the republic of Tlalcata, as the most formidable barrier against the extension of the imperial frontier. However, he submitted to Cortez without striking a blow, being intimidated by the wonders he had performed with a handful of men: and thus Mechoacan became a province of the Spanish empire, and a valuable addition to Mexico.

The country at that time was exceedingly populous, but the natives are now much thinned; and that rather by the luxury and effeminacy introduced by the Spaniards, than by their tyranny. The capital of the province is also called Mechoacan by the natives, but Valladolid by the Spaniards.

MECHOACAN, or White Jalap, in the materia medica, the root of an American species of convolvulus brought from Mechoacan, a province of Mexico, in thin slices like jalap, but larger, and of a whitish colour. It was first introduced into Europe about the year 1524, as a purgative universally safe, and capable of evacuating all morbid humours from the most remote parts of the body; but as soon as jalap became known, mechoacan gradually lost its reputation, which it has never since been able to retrieve. It is nevertheless by some still deemed an useful cathartic; it has very little smell or taste, and is not apt to offend the stomach; its operation is slow, but effectual and safe. Geoffrey affirms, that there is scarce any purgative accompanied with fewer inconveniences. It items to differ from jalap only in being weaker; the 5 G
MECKLENBURG, a duchy of Germany, containing that of Schwerin and Güstrow, is bounded by Pomerania on the east, by part of the marquisate of Hanover and the duchy of Lüneburg on the south, the Baltic on the north, and Holstein and Saxe-Lauenburg on the west. Their greatest length is about 120 miles, and greatest breadth upwards of 60. With respect to the soil, much cannot be said in favour of it; as it consists in general, either of sand, or large and depauperate hills, interspersed with moors, woods, fens, and lakes. It yields very little wheat, and not a great deal of oats, rye, and barley; but breeds a considerable number of sheep and cattle; has plenty of fish, with stone quarries, salt- springs, alun, iron, and some copper. The principal rivers here are the Elbe and Stor, which fall into the Elbe as it glides along the borders of this country to the south-west; the Recknitz, which discharges itself into the Baltic; as do the Peene, the Werne, and the Stope- nitz. This country has only one harbour on the Baltic, namely that of Rostock. In both duchies, exclusive of Rostock, are 45 great and small cities, with three convents, and a great number of manors and farms, belonging either to the duke, the nobility, or convents. The peasants are in a state of villainage; but the nobility enjoy very considerable privileges. The taxes are composed of the nobility and towns; and the diets, which are summoned annually, are held alternately at Sternburg and Mulchin. The duchy of Schwerin appoints four provincial counsellors, and that of Güstrow as many; who rank according to fe- niority with the duke's actual privy-councillors as their marshals do with the colonels. The lefier com- mittee represents the whole body of the nobility and commons, by whom the members are chosen freely and without control, and no edict relative to the whole country can be published without their consent, or in prejudice of their rights. The inhabitants of this country are mostly Lutherans, under their super- intendants. There are also some Calvinists and Roman Catholics. Besides the grammar-schools in the towns, there is an university at Rostock. The commodities of the duchy are corn, flax, hemp, hops, wax, honey, cattle, butter, cheese, wool, and wood, a part of which is exported, but hardly any manu- factures.

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In all, 22 Plates.