ENCYCLOPAEDIA;
OR, A
DICTIONARY
OF
ARTS, SCIENCES,
AND
MISCELLANEOUS LITERATURE;
Constructed on a Plan,
BY WHICH
THE DIFFERENT SCIENCES AND ARTS
Are digested into the Form of Distinct
TREATISES OR SYSTEMS,
COMPREHENDING
THE HISTORY, THEORY, AND PRACTICE, OF EACH,
According to the Latest Discoveries and Improvements;
AND FULL EXPLANATIONS GIVEN OF THE
VARIOUS DETACHED PARTS OF KNOWLEDGE,
WHETHER RELATING TO
NATURAL AND ARTIFICIAL OBJECTS, OR TO MATTERS ECCLESIASTICAL,
CIVIL, MILITARY, COMMERCIAL, &C.
Including ELUCIDATIONS OF THE MOST IMPORTANT TOPICS RELATIVE TO RELIGION, MORALS, MANNERS,
AND THE ECONOMY OF LIFE:
TOGETHER WITH
A DESCRIPTION OF ALL THE COUNTRIES, CITIES, PRINCIPAL MOUNTAINS, SEAS, RIVERS, &C.
THROUGHOUT THE WORLD;
A GENERAL HISTORY, ANCIENT AND MODERN, OF THE DIFFERENT EMPIRES, KINGDOMS, AND STATES;
AND
AN ACCOUNT OF THE LIVES OF THE MOST EMINENT PERSONS IN EVERY NATION,
FROM THE EARLIEST AGES DOWN TO THE PRESENT TIMES.

Compiled from the writings of the best authors, in several languages; the most approved dictionaries, as well of general science as of its particular branches; the transactions, journals, and memoirs, of various learned societies; the MS. lectures of eminent professors on different sciences; and a variety of original materials, furnished by an extensive correspondence.

THE FIRST AMERICAN EDITION, IN EIGHTEEN VOLUMES, GREATLY IMPROVED.
ILLUSTRATED WITH FIVE HUNDRED AND FOURTY-TWO COPPERPLATES.

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C

C A A

THE third letter, and second consonant, of the Greek alphabet, is pronounced like k before the vowels a, o, and u; and like s before e, i, and y. C is formed, according to Scaliger, from the σ of the Greeks, by retracing the stem or upright line; though others derive it from the z of the Hebrews, which has in effect the same form; allowing only for this, that the Hebrews, reading backwards, and the Latins, &c. forwards, each have turned the letter their own way. However, the C not being the same as to found with the Hebrew capb, and it being certain the Romans did not borrow their letters immediately from the Hebrews or other orientals, but from the Greeks, the derivation from the Greek σ is the more probable. Add, that F. Monfacon, in his Palaeographia, gives us some forms of the Greek ζ, which come very near that of our C; thus, for instance, C: and Suidas calls the C the Roman καββα. The second found of C resembles that of the Greek ζ; and many instances occur of ancient inscriptions, in which ζ has the same form with our C. All grammarians agree, that the Romans pronounced their Q like our C, and their C like our K. F. Mabillon adds, that Charles the Great was the first who wrote his name with a C; whereas all his predecessors of the same name wrote it with a K: and the same difference is observed in their coins.

As an abbreviation, C stands for Caen, Carolus, Caesar, Cesar, Condemnus, &c. and CC for conflitibus.

As a numeral, C signifies 100, CC 200, &c.

C, in music, placed after the :f, intimates that the music is in common time, which is either quick or slow, as it is joined with allegro or adagio: if alone, it is usually adagio. If the C be crossed or turned, the first requires the air to be played quick, and the last very quick.

CAABA, or CAABAH, properly signifies a square stone building; but is particularly applied by the Mahometans to the temple of Mecca, built, as they pretend, by Abraham and Ishmael his son.

Before the time of Mahomet, this temple was a place of worship for the idolatrous Arabs, and is said to have contained no less than 360 different images, equaling in number the days of the Arabian year. They were all destroyed by Mahomet, who sanctified the Caaba, and appointed it to be the chief place of worship for all true believers. The temple is in length from north to south about 24 cubits: its breadth from east to west is 23: and its height 27. The door, which is on the east side, stands about four cubits from the ground; the floor being level with the bottom of the door. In the corner next to the door is the black stone, so much celebrated among the Mahometans. On the north side of the caaba, within a semicircular inclosure 50 cubits long, lies the white stone, said to be the sepulchre of Ishmael, which receives the rain-water from the caaba by a spout formerly of wood, but now of gold. The black stone, according to the Mahometans, was brought down from heaven by Gabriel at the creation of the world; and originally of a white colour; but contrasted the blackness that now appears on it, from the guilt of those sins committed by the sons of men. It is set in silver, and fixed in the south-east corner of the caaba, looking towards Bastra, about seven spans from the ground. This stone, upon which there is the figure of a human head, is held in the highest estimation among the Arabs; all the pilgrims kissing it with great devotion, and some even calling it the right hand of God. Its blackness, which is only superficial, is probably owing to the kites and touches of so many people. After the Karmatians had taken Mecca, they carried away this precious stone, and could by no means be prevailed upon to restore it: but finding at last that they were unable to prevent the concourse of pilgrims to Mecca, they sent it back of their own accord, after having kept it 22 years.

The double roof of the caaba is supported within by three octagonal pillars of aloes-wood: between which, on a bar of iron, hang some silver lamps. The outside is covered with rich black damask, adorned with an embedded band of gold, which is changed every year, and was formerly lent by the khalifs, afterwards by the sultans of Egypt, and is now provided by the Turkish emperors. The caaba, at some distance, is almost surrounded by a circular inclosure of pillars, joined towards the bottom by a low balustrade, and towards the top by bars of silver. Just without this inner inclosure, on the south, north, and west sides of the caaba, are three buildings, which are the oratories or places where three of the orthodoxy fefta assemble to perform their devotions. Towards the south-east stands an edifice which covers the well Zemzem, the treasury, and the cupola of Al Abbas. Formerly there was another cupola, that went under the name of the hemicycle, or cupola of Judea: but whether or not any remains of that are now be seen is unknown; nor is it easy to obtain information in this respect, all Christians being denied access to this holy place. As a small distance from the caaba, on the east side, is the stiletto or place of Abraham; where is another stone much respected by the Mahometans; and where they pretend...
CAB [ 2 ]

CABAL, or Cabáli, a term generally applied to the footsteps of the patriarch, telling us he stood on it when he built the caaba. Here the fourth sect of Arabs, viz.: that of Al Shafei, assembled for religious purposes.

The square colonnade, or great piazza, that at a considerable distance incloses these buildings, consists, according to Al Jannabi, of 448 pillars, and has no less than 38 gates. Mr Sale compares this piazza to that of the royal exchange at London, but allows it to be much larger. It is covered with small domes or cupolas, from the four corners of which rise as many minarets or spires, with double galleries, and adorned with gilded spires and crescents after the Turkish manner, as are also the cupolas which cover the piazza and other buildings. Between the columns of both inclosures hang a great number of lamps, which are constantly lighted at night. The first foundations of this second inclosure were laid by Omar the second khalif, who built no more than a low wall, to prevent the court of the caaba from being incroached upon by private buildings; but by the liberality of succeeding princes, the whole has been raised to that state of magnificence in which it appears at present.

This temple enjoys the privilege of an asylum for all sorts of criminals; but it is most remarkable for the pilgrimages made to it by the devout Mussulmans, who pay so great a veneration to it, that they believe a single sight of its sacred walls, without any particular act of devotion, is as meritorious, in the fight of God, as the most careful discharge of one's duty, for the space of a whole year, in any other temple.

CAAMINI, in botany, a name given by the Spaniards and others to the finest sort of Paraguay tea. It is the leaf of a shrub which grows on the mountains of Maracayaca, and is used in Chili and Peru as the tea is with us. The mountains where this shrub grows naturally are far from the inhabited parts of Paraguay; but the people of the place know so well the value and use of it, that they furnish themselves with great quantities of it from the spot. They used to go out on these expeditions many thousands together; leaving their country in the mean time exposed to the insults of their enemies, and many of themselves perishing by fatigue. To avoid these inconveniences, they have of late planted these trees about their habitations; but the leaves of these cultivated ones have not the fine flavour of those that grow wild. The king of Spain has permitted the Indians of Paraguay to bring to the town of Saintfory 12,000 arbores of the leaves of this tree every year, but they are not able to procure so much of the wild leaves annually: about half the quantity is the utmost they bring of this; the other half is made up of the leaves of the trees in their own plantations; and this fells at a lower price, and is called pabos. The arbores are about 65 pound weight; the general price is four piastras; and the money is always divided equally among the people of the colony.

CAANA, or KAAAN, a town in Upper Egypt, seated on the eastern banks of the river Nile, from whence they carry corn and pulse for the supply of Mecca in Arabia. E. Long. 32° 23'. N. Lat. 24° 30'. Here are several monuments of antiquity yet remaining, adorned with hieroglyphics.

CAB, an Hebrew dry measure, being the sixth part of a seah or samah, and the 18th part of an ephah. A cab contained 2½ pints of English corn-measure: a quarter cab was the measure of dove's dung, or more properly a fort of chick-pea; and this name, was sold at Samaria, during the siege of that city, for five shekels.

CABAL, an apt name currently given to the infamous ministry of Charles II., composed of five persons, Clifford, Ashley, Buckingham, Arlington, and Lauderdale: the first letters of whose names, in this order, furnished the appellation by which they were distinguished.

CABALLIST, in French commerce, a factor or person who is concerned in managing the trade of another.

CABALLARIA, in middle-age writers, lands held by the tenure of furnishing a horseman, with suitable equipage, in time of war, or when the lord had occasion for him.

CABALLEROS, or CAVALLEROS, are Spanish wools, of which there is a pretty considerable trade at Bayonne in France.

CABALLINE, denotes something belonging to horses; thus caballine shoes is so called, from its being chiefly used for purging horses; and common brimstone is called sulphur caballinum for a like reason.

CABALLINUS (anc. geo.), a town of the Eedu in Gallia Celtica; now Chalont sur Saone, which fee.

CABALLINUS (anc. geo.), a very clear fountain of mount Helicon in Boeotia; called Hippocrene by the Greeks, because opened by Pegafus on striking the rock with his hoof, and hence called Pegafus.

CABALLIO, or CABELLO (anc. geo.), a town of the Cavares in Gallia Narbonensis, situated on the Draculina. One of the Latin colonies, in the Notitia called Civitas Cabellorum. Now Cavanillon in Provence.

CABBAGE, in botany. See Brassica; and Agriculture, n° 40, and 169. In the Geological essays, we find this plant greatly recommended as an excellent food for cattle, producing much dung, and being an excellent substitute for hay. The author prefers the Scotch kind, as being most durable, and preferable on all other accounts. He also recommends autumn-sowed plants in preference to those sowed in the spring; the former producing a much more weighty crop than the latter. The expense of raising an acre of good cabbages he values at 14/- 15s. and its produce at 34/-

CABBAGE-Tree, or TRUE CABBAGE-PALM. See Areca.

CABBAGE-BARK Tree. See Goffrea.

CABBALA, according to the Hebrew style, has a very distinct signification from that wherein we understand it in our language. The Hebrew cabbala signifies tradition; and the Rabbins, who are called cabalists, study principally the combination of particular words, letters, and numbers, and by this means pretend to discover what is to come, and to see clearly into the sense of many difficult passages of Scripture. There are no pure principles of this knowledge, but it depends upon some particular traditions of the ancients; for which reason it is termed cabbala.

The cabalists have abundance of names which they call sacred; these they make use of in invoking of spirits, and imagine they receive great light from them.

They
They tell us, that the secrets of the cabbala were discovered to Moses on mount Sinai; and that these have been delivered to them down from father to son, without interruption, and without any use of letters; for to write them down, is what they are by no means permitted to do. This is likewise termed the oral law, because it passed from father to son, in order to distinguish it from the written laws.

There is another cabbala, called artificial, which consists in searching for abstruse and mysterious significations of a word in Scripture, from whence they borrow certain explanations, by combining the letters which compose it; this cabbala is divided into three kinds, the gematriac, the notaricon, and the temura or thumura. The first wherein consists in taking the letters of a Hebrew word for ciphers or arithmetical numbers, and explaining every word by the arithmetical value of the letters whereof it is composed. The second sort of cabbala, called notaricon, consists in taking every particular letter of a word for an entire dictionary; and the third, called thumura, i.e. change, consists in making different transpositions or changes of letters, placing one for the other, or one before the other.

Among the Christians, likewise, a certain fort of magic is, by mistake, called cabbala; which consists in using improperly certain passages of Scripture for magic operations, or in forming magic characters or figures with stars and talismans.

Some visionaries among the Jews believe, that Jesus Christ wrought his miracles by virtue of the mysteries of the cabbala.

CABBALISTS, the Jewish doctors who profess the study of the cabbala.

In the opinion of these men, there is not a word, letter, or accent in the law, without some mystery in it. The Jews are divided into two general sorts: the Karaites, who refuse to receive either tradition or the talmud, or any thing but the pure text of scripture; and the Rabbinists, or Talmudists, who, besides this, receive the traditions of the ancients, and follow the Talmud.

The latter are again divided into two other sects; pure Rabbinists, who explain the scripture in its natural sense, by grammar, history, and tradition; and cabbalists, who, to discover hidden mythicale fancies, which they suppose God to have couched therein, make use of the cabbala, and the mystical methods above-mentioned.

CABECAS, or CABESSE, a name given to the finest silks in the East Indies, as those from 15 to 20 per cent. inferior to them are called carina. The Indian workmen endeavour to pass them off one with the other; for which reason, the more experienced European merchants take care to open the bales, and to examine all the skaines one after another. The Dutch distinguish two sorts of cabecas; namely, the Moor cabeca, and the common cabeca. The former is sold at Amsterdam for about 24 schellinghen Flemish, and the other for about 18s.

CABECAS DE VIDE, a small sea-port town of Alentejo in Portugal, with good walls, and a strong castle. W. Long. 6° 43', N. Lat. 39° 0'.

CABENDA, a sea-port of Congo in Africa, situated in E. Long. 12° 2', S. Lat. 4° 5'.
The number of threads each cable is composed of is always proportioned to its length and thickness; and it is by this number of threads that its weight and value are ascertained: thus, a cable of three inches circumference, or one inch diameter, ought to consist of 48 ordinary threads, and to weigh 192 pounds; and on this foundation is calculated the following table, very useful for all people engaged in marine commerce, who fit out merchantmen for their own account, or freight them for the account of others.

### Table of the number of threads and weight of cables of different circumferences.

<table>
<thead>
<tr>
<th>Circumf.</th>
<th>Threads</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 inches</td>
<td>48</td>
<td>192 lbs.</td>
</tr>
<tr>
<td>4</td>
<td>77</td>
<td>308</td>
</tr>
<tr>
<td>5</td>
<td>121</td>
<td>484</td>
</tr>
<tr>
<td>6</td>
<td>174</td>
<td>696</td>
</tr>
<tr>
<td>7</td>
<td>238</td>
<td>952</td>
</tr>
<tr>
<td>8</td>
<td>311</td>
<td>1244</td>
</tr>
<tr>
<td>9</td>
<td>393</td>
<td>1572</td>
</tr>
<tr>
<td>10</td>
<td>485</td>
<td>1940</td>
</tr>
<tr>
<td>11</td>
<td>598</td>
<td>2392</td>
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<td>12</td>
<td>699</td>
<td>2796</td>
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<td>13</td>
<td>821</td>
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<td>4372</td>
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<tr>
<td>19</td>
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<td>7016</td>
</tr>
<tr>
<td>20</td>
<td>1943</td>
<td>7772</td>
</tr>
</tbody>
</table>

**Sheet Anchor Cable** is the greatest cable belonging to a ship.

**Stream Cable**, a hawser or rope, something smaller than the bowers, and used to moor the ship in a river, or haven, sheltered from the wind and sea, &c.

**Serve** or **Plate the Cable**, is to bind it about with ropes, cloths, &c. to keep it from galling in the hawse.

To **splice a Cable**, is to make two pieces fast together, by working the several threads of the rope the one into the other.

**Pay more Cable**, is to let more out of the ship. **Pay cheap the Cable**, is to hand it out apace. **'Peer more Cable**, is to let more out, &c.

**Cable's Length**, a measure of 120 fathoms, or of the usual length of the cable.

**Cabled** in heraldry, a term applied to a cross formed of the two ends of a ship's cable; sometimes also to a cross covered over with rounds of rope; more properly called a cross covered.

**Cabled Flute** in architecture, such flutes as are filled up with pieces in the form of a cable.

**Cabo de Istria**, the capital town of the province of Istria, in the territory of Venice; and the see of a bishop. It is seated on a small island in the gulf of Venice, and is joined to the main land by draw-bridges.

E. Long. 14 22 N. Lat. 45 49.

**Caboched**, in heraldry, is when the heads of beasts are borne without any part of the neck, full-faced.

**Cabolto**, in commerce, a coin of the republic of Genoa, worth about 2d. sterling.

**Cabot** (Sebastian), the first discoverer of the continent of America, was the son of John Cabot a Venetian. He was born at Bristol in 1477, and was taught by his father arithmetic, geometry, and cosmography.
CABUL, or CABOUL, a city of Asia, and capital of the province of Cabulistan. It lies in E. Long. 68° 15', N. Lat. 33° 50', on the frontiers of Great Bukharia, on the south side of the mountains which divide the territories of the Mogul from that part of Great Tartary. It is one of the finest places in that part of the world; large, rich, and very populous. As it is considered as the key of the Great Mogul's dominions on that side, great care is taken to keep its fortifications in repair, and a numerous garrison is maintained for its security. It lies on the road between Samarcand and Lahor; and is much frequented by the Tartars, Persians, and Indians. The Uzbek Tartars drive there a great trade in slaves and horses, of which it is said that no fewer are sold than 60,000 annually. The Persians bring black cattle and sheep, which renders provisions very cheap. They have also wine, and plenty of all sorts of cattle. The city stands on a little river which falls into the Indus, and thereby affords a short and speedy passage for all the rich commodities and provisions behind it, which, when brought to Cabul, are there exchanged for slaves and horses, and then conveyed by merchants of different countries to all parts of the world. The inhabitants are most of them Indian pagans, though the officers of the Mogul and most of the garrison are Mahometans.

CABULISTAN, a province of Asia, formerly belonging to the Great Mogul; but ceded in 1729 to Kouli Khan, who at that time governed Perjia. It is bounded on the north by Bukharia, on the east by Cashmere, on the west by Zabulistan and Candahar, and on the south by Multan. It is 250 miles in length, 240 in breadth, and its chief town is Cabul. This country in general is not very fruitful; but in the vales they have good pasture-lands. The roads are much infested with banditti; which obliges the natives to have guards for the security of travellers. The religion of the Cabulistanis is pagan, and their extraordinary time of devotion is the full moon in February, and continues for two days. At this time they are clothed in red, make their offerings, dance to the sound of the trumpet, and make visits to their friends in masquerade dresses. They say, their god Cufman killed a giant, who was his enemy, and that he appeared like a little child; in memory of which, they cause a child to flourish at the figure of a giant. The same tribe make bonfires, and feast together in a joyful manner. The moral part of their religion consists in charity; for which reason they dig wells and build houses for the accommodation of travellers. They have plenty of provisions, mines of gold and myrrh, fragrant woods, and drugs of many kinds. They carry on a great trade with the neighbouring countries; by which means they are very rich, and are supplied with plenty of all things.

CABURNES,
CACALIA, in botany; a genus of the polygamyæqualis order, belonging to the synephygia class of plants. The receptacle is naked; the pappus hairy; the calyx cylindrical, oblong, and calculated, or having a small calyx of very short scales only at the base.

Species. 1. The flavoseus, with a herbaceous stalk, is a native of North America. It hath a perennial creeping root which forms out many stalks, garnished with triangular spear-shaped leaves sharply fawed on their edges, of a pale green on their under side, but a deep shining green above, placed alternately. The stalks rise to the height of seven or eight feet, and are terminated by umbels of white flowers, which are succeeded by oblong seeds covered with down. It flowers in August, and the seeds ripen in October. The stalks decay in autumn, and new ones rise in the spring. This plant multiplies greatly by its spreading roots, as also by the seeds, which are spread to a great distance by the wind, the down which adheres to them being greatly increased so much, that in a few years this species may probably appear as a native of England.

2. The ficioides is a native of the Cape of Good Hope. It rises with strong round stalks to the height of seven or eight feet, woody at bottom, but soft and succulent upward, fending out many irregular branches, garnished more than half their length with thick, taper, succulent leaves, a little compressed on two sides, ending in points, covered with a whitish glaucous farina, which comes off when handled. These, when broken, emit a strong odour of turpentine, and are full of a vitrious juice; at the extremity of the branches the flowers are produced in small umbels; they are white, tumbulous, and cut into five parts at the top. The leaves of this plant are pickled by the French, who esteem them much; and in doing this they have a method of preserving the white farina upon them, which adds greatly to the beauty of the pickle when brought to table.

3. The kleina, with a compound shrubby stalk, grows naturally in the Canary Islands, but has long been cultivated in the English gardens. It rises with a thick fleshy stem divided at certain distances, as it were, into many joints. Each of these divisions swell much larger in the middle than they do at each end; and the stalks divide into many irregular branches of the same form, which, toward their extremities, are garnished with long, narrow, spear-shaped leaves of a glaucous colour, standing all round the stalks without order. As they fall off, they leave a scar at the place, which always remains on the branches. The flowers are produced in large clusters at the extremity of the branches, which are tumbulous, and of a faint carnation colour. They appear in August and September, but continue great part of October, and are not succeeded by seeds in England. There have been flanes and foills dug up at a very great depth in some parts of England having very perfect impressions of this plant upon them; from whence Dr Woodward has supposed the plants were lodged there at the universal deluge; and finding the impressions of many other plants and animals which are natives of those islands, he concludes that the water flowed higher from the south-west. This plant has been called the cabbage-tree, from the resemblance which the stalk of it has to the cabbage; others have intitled it carnation-tree, from the shape of the leaves and the colour of the flowers. Besides these, there are several other species, viz. the alpina, with kidney-shaped leaves; the glabra, with smooth leaves; the atriplicifolia, with heart-shaped incised leaves; the papillosus, with a shrubby stalk guarded on every side with broken rough foossstalks; the antae-euphorbium, with oblong oval leaves; the fonchifolia, with lyre-shaped incised leaves; and the lutea, with leaves divided into five acut parts.

Culture. The three species described above are very easily propagated. The first will propagate itself, as already mentioned, either by roots or seeds. The second is easily propagated by cuttings during the summer months: these should be cut from the plants and laid to dry a fortnight, that the wound may be healed over before they are planted. Most people plunge the pots in which these are planted into an hot bed, to promote their putting out roots; but if planted in June or July, they will root as well in the open air. Even branches broken off by accident have frequently put out roots when fallen on the ground, without any care. These branches may be kept six months out of the ground, and will take root if planted. This should have a light sandy earth, and in winter be placed in an airy glass-house, where they may enjoy the sun and air in mild weather, but must be protected from frost. During the winter feason the plants must have but little water; and in summer, when they are placed in the open air, it should not be given to them too often, nor in great quantity. The third is also propagated by cuttings, and the plants require the same culture; but must have a dry warm glass-case in winter, and very little water, being subject to rot with wet. In summer they must be placed in the open air in a warm sheltered situation, and in very dry weather refreshed moderately with water. With this management the plants will flower annually, and grow to the height of eight or ten feet.

CACAÓ. See Theobroma.
CACCOONS. See Plevillea.
CACERES, a town of Spain, in the province of Extremadura, is seated on the river Saler, and noted for the exceeding fine wool which the sheep bear in the neighbourhood. Between this town and Brocos, there is a wood, where the allies defeated the rear-guard of the duke of Berwick, on the 7th of April 1706. E. Long. 6. 47. N. Lat. 59. 15.
CACHALOT, in ichthyology. See Physeter.
CACHAN, or Cushan, a considerable town of Peria in Iraq Agemi, where they carry on an extensive trade in silk, silver, and gold broacades, and fine earthen ware. It is situated in a vast plain, 55 miles from Isphahan. E. Long. 150. 2. N. Lat. 54. 30.
CACHAO, a province of the kingdom of Tonquin in Asia, situated in the heart of the kingdom, and surrounded by the other seven. Its soil is fertile, and in some places mountainous, abounding with variety of trees, and particularly that of varnish. Most of these provinces carry on some branch of the silk manufacture, but this most of all. It takes its name from the capital, which is also the metropolis of the whole kingdom, though in other respects hardly comparable to a Chinese one of the third rank.
CACHAO, a city of the province of that name, in the kingdom of Tonquin in Asia, situated in E. Long. 105.
The circumference is said to have been between six and seven miles: some arches, porticoes, and other ornaments, are still remaining; from which, and some of its courts paved with marble, it may be concluded to have been as magnificent a structure as any of the eastern parts can show. The arsenal is likewise a large and noble building, well stored with ammunition and artillery. The English factory is situated on the north side of the city, fronting the river Song-kee. It is a handsome low-built house, with a spacious dining-room in the centre; and on each side are the apartments of the merchants, factors, and servants. At each end of the building are smaller houses for other uses, as store-houses, kitchen, &c., which form two wings with the square in the middle, and parallel with the river, near the bank of which stands a long flagstaff, on which they commonly display the English colours on Sundays and all remarkable days. Adjoining to it, on the south side, is the Danish factory, which is neither so large nor so handsome. On the same side of the river runs a long dike, whose timber and fencs are firmly fastened together, so that no part of it can be flirred without moving the whole. This work was raised on those banks to prevent the river, during the time of their vast rains, from overflowing the city; and it has hitherto afforded its end; for though the town stands high enough to be in no danger from land-floods, it might yet have been otherwise frequently damaged, if not totally laid under water, by the overflowing of that river. Some curious observations have been communicated to the royal society concerning differences between the tides of those seas and those of Europe, viz. that on the Tonquinne coast ebbs and flows but once in 24 hours; that is, that the tide is rising during the space of 12 hours, and can be easily perceived during two of the moon's quarters, but can hardly be observed during the other two. In the spring tides, which last 14 days, the waters begin to rise at the rising of the moon; whereas in the low tides, which continue the fame number of days, the tide begins not till that planet is got below the horizon. Whilst it is passing through the fixed northern signs, the tides are observed to vary greatly, to rise sometimes very high, and sometimes to be very low; but when it is once got into the southern part of the zodiac, they are then found to be more even and regular.

CACHETIC, something partaking of the nature of, belonging to, a cachexy.

CACHEO, a town of Negroland in Africa, situated on the river St Domingo. It is subject to the Portuguese, who have three forts there, and carry on a great trade in wax and slaves. W. Long. 14. 55. N. Lat. 12°.

CACHEXY, in medicine, a vicious state of the humours and whole habit. See (the Index subjoined) to Medicine.

CACHYRS, in botany: A genus of the digitina order belonging to the pentandria clafs of plants; and in the natural method ranking under the 45th order, Umbellata. The fruit is subovate, angled, and cork or spongy rind.
The flower of the Cactus, highly celebrated among the Chinese and Indians, and made of several aromatic ingredients, the perfumes, medicinal earth, and precious stones: they make the whole into a stiff paste, and form out of it several figures according to their fancy, which are dried for use; these are principally used in the East Indies, but are sometimes brought over to Portugal. In China, the principal persons usually carry a small piece in their mouths, which is a continued cordial, and gives their breath a agreeably grateful smell. It is a highly valuable medicine also, in all nervous complaints: and it is esteemed a prolonger of life, and a provocative to venery, the two great intentions of most of the medicines in use in the East.

CACOCHYLLIA, or CACOCHYMA, a sticky viscid spirit of the vital humours, especially of the mafs of blood; arising either from a disorder of the secretions or excretions, or from external contagion. The word is Greek, compound of κασσός, ill, and κοχύλε, Jew.

CACOPHONIA, in grammar and rhetoric, the meeting of two letters, or syllables, which yield an uncouth and disagreeable sound. The word is compounded of κακός, evil, and φωνή, voice.

CACOPHONY, in medicine, denotes a voice or deprivation of the voice or speech; of which there are two species, aphonia and dysphonia.

CACTUS, in botany: A genus of the monogynia order, belonging to the icofandria class of plants; and in the natural method, ranking under the 13th order, Succulentae. The calyx is monoplyrophy, superior, or above the receptacle of the fruit imbricated; the corolla polysepalous; the fruit an unilocular, polypernumous berry. To this genus Linnaeus has added the cereus and opuntia. There are 24 species, all natives of the West Indies and Mexico.

The cacti are plants of a singular structure, but especially the larger kinds of them; which appear like a large, flieby, green melon, with deep ribs, set all over with strong sharp thorns; and, when the plants are cut through the middle, their inside is a soft, pale-green, flieby fibres, very full of moisture. The fruit of all the species is frequently eaten by the inhabitants of the West Indies. The fruits are about three quarters of an inch in length, of a taper form, drawing to a point at the bottom toward the plant, but blunt at the top where the emplacement of the flower was situated. The taste is agreeably acid, which in a hot country must render the fruit more grateful.

The cochineal animals are supported on a species called cactus cochinifer. The flower of the cactus grandiflora (one of the creeping cereusses) is said to be as grand and beautiful as any in the vegetable system: it begins to open in the evening about seven o'clock, is in perfection about eleven, and fades about four in the morning; so that the same flower only continues in perfection about six hours. The calyx when expanded is about a foot in diameter, of a splendid yellow within, and a dark brown without; the petals are many, and of a pure white; and the great number of recurved stamens, surrounding the style in the centre of the flower, make a grand appearance, to which may be added the fine scent, which perfumes the air to a considerable distance. It flowers in July.

CACUS, in fabulous history, an Italian shepherd, upon mount Aventine. As Hercules was driving home the herd of King Geryon whom he had slain, Cacus robbed him of some of his oxen, which he drew backward into his den lest they should be discovered. Hercules at last finding them out by their lowing, or the robbery being discovered to him, killed Cacus with his club. He was Vulcan's son, of prodigious bulk, and half man half fayr.

CADAN, a town of Bohemia, in the circle of Zats, seated on the northern bank of the river Egra, in E. Long. 13° 34'. N. Lat. 50° 20'.

CADARI, or KADARI, a sect of Mahometans, who affer free-will; attribute the actions of men to men alone, not to any secret power determining the will; and deny all absolute decrees, and predestination. The author of this sect was Mabed ben Kaled Al Ghoni, who suffered martyrdom for it. The word comes from the Arabic, كدی, cadara, present. Ben Aun calls the Cadarians the Magi, or Manichees of the Musulmen.

CADE, a cag, cach, or barrel. A cade of herrings is a vessel containing the quantity of 500 red herrings, or 1000 sprats.

CADE-Lamb, a young lamb weaned, and brought up by hand, in a house; called pet-lamb.

CADE-Oil, in the Materia Medica, a name given to an oil much in use in some parts of France and Germany. The physicians call it oleum cades, or oleum de cade. This is suppos'd by some to be the pinnatul of the ancients, but improperly; it is made of the fruit of the oxycedrus, which is called by the people of these places cade.

CADE-Worm, in zoology, the maggot or worm of a fly called phryganea. It is used as a bait in angling. See PHRYGANEA.

CADEA, or THE LEAGUE OF THE HOUSE OF GOD, is one of those that compose the republic of the Grifons, and the most powerful and extensive of them all. It contains the bithorpic of Coire, the great valley of Engadine, and that of Bragail or Pregal. Of the 11 great, or 21 small communities, there are but two that speak the German language; that of the rest is called the Rhein, and is a dialect of the Italian. The Protestant religion is most prevalent in this league, which has been allied to the Swifs cantons ever since the year 1498. Coire is the capital town.

CADMINAC, a town of France in Quercy, on the confines of Bouergne, seated on the river Lot, in E. Long. 2° 12'. N. Lat. 44° 36'.

CADENCE, or REPOSE, in music, (from the Latin cadere to fall or descend): the termination of an harmonical phrase on a reposes, or on a perfect chord. See Music, art. 73—76, and 122—137.

CADING, in reading, is a falling of the voice below the key-note at the close of every period. In reading, whether prose or verse, a certain tone is assumed which is called the key-note; and in this tone the bulk of the words
words are founded; but this note is generally lowered towards the close of every sentence. Cadence, in the manage, an equal measure or proportion, observed by a horse in all his motions; so that his times have an equal regard to one another, the one does not embrace or take in more ground than the other, and the horse observes his ground regularly.

Cadene, one of the sorts of carpets which the Europeans import from the Levant. They are the worst sort of all, and are fold by the piece from one to two pieces per carpet.

Cadenet, a town of France in Provence, and in the Viguirie of Apt. E. Long. 5. 30. N. Lat. 43. 40.

Cades, or Kadesh, (anc. geog.) a town in the Wilderness of Zin, in Arabia Petraea; the first encampment of the Israelites, after their departure from Eziongeber; and from which the Wilderness of Zin was called Cades; the burial-place, of Miriam, with the rock and water of Meribah in it. another Cades, a town of the tribe of Judah, Joshua xv. 23. (Cadefsbarnea, called also Cades.)

Cadessbarnea, (anc. geog.) a town of the Wilderness of Paran, on the confines of Canaan, from which the spies were sent out; sometimes simply called Cades, but distinffr from the Cades in the Wilderness of Zin.

Cadet, the younger son of a family, is a term naturalized in our language from the French. At Paris, among the citizens, the cadets have an equal primacy with the reft. At Caux in Normandy, the custom, as in England, is, to leave all to the eldest, except a small portion to the cadets. In Spain, it is usual for one of the cadets in great families to take the mother's name.

Cadet is also a military term denoting a young gentleman who chooses to carry arms in a marching regiment as a private man. His views are, to acquire some knowledge in the art of war, and to pay. Cadets differ from volunteers, as in England, is to leave all to the eldest, except a small portion to the cadets. In Spain, it is usual for one of the cadets in great families to take the mother's name.

Cadet, or Cadet, a judge of the civil affairs in the Turkish empire. It is generally taken for the judge of a town; judges of provinces being distinguished by the appellation of moula.

We find numerous complaints of the avarice, iniquity, and extortion, of the Turkish cadis; all justice is here venal; the people bribe the cadis, the cadis bribe the moulas, the moulas the candlefellers, and the candlefellers the muff. Each cadis has his ferjeants, who are to summon persons to appear and answer complaints. If the party summoned fails to appear at the hour appointed, sentence is passed in favour of his adversary. It is usually vain to appeal from the sentences of the cadis, since the affair is never heard anew, but judgment is passed on the cause as fixed by the cadis. But the cadis are often exhorat and punished for crying injustice with the hawkman and mullets; the law, however, does not allow them to be put to death. Constantine had had cadis ever since the year 1390, when Bajazet I. obliged John Paleologus, Emperor of the Greeks, to receive cadis into the city to judge all controversies happening between the Greeks and the Turks settled there. In some countries of Attica, the cadis are also judges of religious matters. Among the Moors, cadis is the denomination of their higher order of priests or doctors, answering to the rabbins among the Jew.

CADIA, or CADIA, the Turkish name of Chalcedon. See Chalcedon.

Cadileshcher, a capital officer of justice among the Turks, answering to a chief justice among us.

It is said, that this authority was originally confinined to the seldyers; but that, at present, it extends itfelf to the determination of all kinds of law-suits; yet is nevertheless subject to appeals.

There are but three cadileshchers in all the grand signior's territories: the first is that of Europe; the second, of Natolia; and the third resides at Grand Cairo. This law is the most considerable: they have their seats in the divan next to the grand vizir.

Cadillac, a town of France in Guienne, and in Bazadois, near the river Garonne, with a handsome castle, situated in W. Long. o. 15. N. Lat. 44. 37.

Cadi, or Cadhi, the judge of the civil affairs in the Turkish empire. It is generally taken for the judge of a town; judges of provinces being distinguished by the appellation of moula.

This authority was originally confined to the soldiery; but that, at present, a strong line of works defends the city from all approaches along the isthmus; and, to render them still more difficult, all the gardens and little villas on the beach were in 1762 cleared away, and a dreary sandy glacis left in their room, so that now there is scarce a tree on the whole island.

It occupies the whole surface of the western extremity of the island, which is composed of two large circular parts, joined together by a very narrow bank of sand, forming altogether the figure of a chain-flot. At the south-east end, the ancient bridge of Suaco, thrown over a deep channel or river, affords a communication between the island and the continent; a strong line of works defends the city from all approaches along the isthmus; and, to render them still more difficult, all the gardens and little villas on the beach were in 1762 cleared away, and a dreary sandy glacis left in their room, so that now there is scarce a tree on the whole island.

Except the Calle Ancha, all the streets are narrow, ill-paved, and infernally stinking. They are all drawn in straight lines, and most of them intersect each other at right angles. The swarms of rats that in the nights run about the streets are innumerable; whole droves of them pass and repass continually, and these midnight revels are extremely troublesome to such as walk late. The houses are lofty, with each a veiled bimble, which being left open till night, serve passengers to retire to; this custom, which prevails throughout Spain, renders these places exceedingly offensive. In the middle of the house is a court like a deep well, under which is generally a cistern, the breeding-place of gnats and musquitos; the ground floors are ware-houses, the first stories cooking-houses or kitchen, and the principal apartment up two pair of stairs. The roofs are flat, covered with an impenetrable cement, and few are without a mirador or turret for the purpose of commanding a view of the sea. Round the parapet-wall at top are placed rows of square pillars, meant either for ornament according to some traditional mode of decoration, or to fix awnings to, that such as sit there for the benefit of the sea-breeze may be sheltered from the rays of the sun; but the most common use made of them, is to fallen ropes for drying linen upon. High above all these pinnacles, which give Cadiz a most singular appearance, stands the
the tower of signals. Here flags are hung out on the first fight of a sail, marking the size of the ship, the nation it belongs to, and, if a Spanish Indiaman, the port of the Indies it comes from. The ships are acquainted with the proper signals to be made, and these are repeated by the watchmen of the tower: as painted lips in every house, persons concerned in commerce soon learn the marks.

The city is divided into twenty-four quarters, under the inspection of as many commissioners of police; and its population is reckoned at one hundred and forty thousand inhabitants, of which twelve thousand are French, and at least as many more Italians. The square of Saint Antonio is large, and tolerably handsome, and there are a few smaller openings of no great note. The public walk, or Alameda, is pleasant in the evening: it is fenced off the coach-road by a marble rail. The sea air prevents the trees from thriving, and destroys all hopes of future shade.

From the Alameda, continuing your walk westwards, you come to the Campofanto, a large esplanade, the only airing-place for coaches; it turns round most part of the west and south sides of the island, but the buildings are straggling and ugly; the only edifice of any show is the new orphan-house; opposite to it is the fortress of St Sebastian, built on a neck of land running out into the sea. The round tower at the extremity is supposed to have saved the city, in the great earthquake of 1755, from being swept away by the fury of the waves. The building proved sufficiently solid to withstand the shock, and break the immense volume of water that threatened destruction to the whole island. In the narrow part of the isthmus the surge beat over with amazing impetuosity, and bore down all before it; among the rest the grandon of the famous tragic-poet Racine, who strove in vain to escape by urging his horse to the utmost of his speed. On St Sebastian’s feast, a kind of wake or fair is held in the fort; an astonishing number of people then passing and repassing, on a firing of wooden bridges laid from rock to rock, makes a very lively moving picture.

From hence to the wooden circus where they exhibited the bull-feasts, you keep turning to the left close above the sea, which on all these days dashes over large ledges of rock; the shore seems here absolutely inaccessible. On this shore stands the cathedral, a work of great expense, but carried on with so little vigour, that it is difficult to guess at the term of years it will require to bring it to perfection. The vaults are executed with great solidity. The arches, that spring from the clustered pillars to support the roof of the church, are very bold; the minute sculpture bestowed upon them seems superfluous, as all the effect will be lost from their great height, and from the shade that will be thrown upon them by the filling up of the piers. From the sea, the present top of the church resembles the carcase of some huge monster cast upon its side, rearing its gigantic blanched ribs high above the buildings of the city. The outward casings are to be of white marble, the bars of the windows of bronze.

Next, crossing before the land-gate and barracks, a superb edifice for strength, convenience, and cleanliness, you come down to the ramparts that defend the city on the side of the bay. If the prospect to the ocean is solemn, that towards the main land is animated in the highest degree; the men of war ride in the eastern bosom of the bay; lower down the merchantmen are spread far and near; and close to the town an incredible number of barges; of various shapes and sizes, cover the surface of the water, some moored and some in motion, carrying goods to and fro. The opposite shore of Spain is shivered with white houses, and cultivated by the towns of St Mary’s, Port-real, and others, behind which, eastward, on a ridge of hills, stands Medina Sidonia, and further back rise the mountains of Granada. Westward, Rota closes the horizon, near which was anciently the island and city of Tarifa, now covered by the sea, but at low-water some part of the ruins are still to be discerned. In a large balloon, jutting out into the bay, they have built the custom-house, the first story of which is level with the walk upon the walls. When it was resolved to erect a building so necessary to this great emporium of trade, the marquis di Squillace gave orders that no expense should be spared, and the most intelligent architects employed, in order to erect a monument, which by its taste and magnificence might excite the admiration of posterity: the result of these precautions proved a piece of vile architecture, composed of the worst of materials.

The fish here is prodigious during the last months of the flay of the flora. The packers load the art of preserving goods in great perfection; but, as they pay the freight according to the cubic palms of each bale, they are apt to squeeze down the cloths and linens so very close and hard, as sometimes to render them unfit for use. The exportation of French luxuries in dresses is enormous; Lyons furnishes most of them; England sends out bale goods; Brittany and the north, linens. Every commercial nation has a consular resident at Cadiz; those of England and France are the only ones not allowed to have any concern in trade.

In 1596, Cadiz was taken, pillaged, and burnt by the English; but in 1702 it was attempted, in conjunction with the Dutch, without success.

CADDIZADELITES, a sect of Mahometans very like the ancient Stoics. They shun feasts and diversions, and affect an extraordinary gravity in all their actions; they are continually talking of God, and some of them make a jumble of Christianity and Mahometanism; they drink wine, even in the fast of the ramadan; they love and protect the Christians; they believe that Mahomet is the Holy Ghost, practises circumcision, and justify it by the example of Jesus Christ.

CADDIMEN LETTERS, the ancient Greek or Ionic characters, such as they were first brought by Cadmus from Phoenicia; whence Herodotus also calls them Phoenician letters.—According to some writers, Cadmus was not the inventor, nor even importer of the Greek letters, but only the modeler and reformer thereof; and it was hence they acquired the appellation Caddian or Phoenician letters; whereas before that time they had been called Pelagian letters.

CADDIA. See CALAMINE.

CADIUS, in fabulous history, king of Thebes, the son of Agenor king of Phoenicia, and the brother of Phoenix, Cilix, and Europa. He carried into Greece the 16 simple letters of the Greek alphabet, and there built Thebes, in the Boeotia. The poet says, that
Cadmus that he left his native country in search of his father Europa, whom Jupiter had carried away in the form of a bull; and that, inquiring of the Delphic oracle for a settlement, he was answered, that he should follow the direction of a cow, and build a city where the cow lay down. Having arrived among the Phocenses, he was met by a cow, which conducted him through Boreotia to the place where Thebes was afterwards built: but as he was about to sacrifice his guide to Pallas, he sent two of his company to the fountain Dirce for water; when they being devoured by a serpent or dragon, he flew the monster, and afterwards, by the advice of Pallas, fowed his teeth, when there sprung up a number of armed soldiers, who prepared to revenge the death of the serpent; but on his calling a fume among these upstart warriors, they turned their weapons against each other with such animosity, that only five survived the combat, and these assisted Cadmus in founding his new city. Afterwards, to recompose his labours, the gods gave him Harmonia, or Hermione, the daughter of Mars and Venus; and honoured his nuptials with presents and peculiar marks of favour. But at length repulsing Thebes to Pentheus, Cadmus and Hermione went to govern the Elysean fields; when grown old, they were transformed into serpents; or, as others say, fent to the Elysean fields, in a chariot drawn by serpents. See Theseus.

Cadmus of Mileum, a celebrated Greek historian, was, according to Pliny, the first of the Greeks who wrote history in prose. He flourished about 350 before Christ.

Cadore, or Pieve de Cadore, a town of Italy, in the territory of Venice, and capital of a district called Cadore, famous for the birth of Titian the painter. E. Long. 13° 45'. N. Lat. 46° 25'.

Cadurco, a province of Italy, in the territory of Venice; bounded on the east by Friuli Proper, on the south and west by the Bellunese, and by the bosphorus of Brixen on the north. It is a very mountainous country, but pretty populous. The only town is Pieve de Cadore.

Cadrites, a fort of Mahometan friars, who once a-week spend a great part of the night in turning round, holding each others hand, and repeating incessantly the word hau, which signifies living, and is one of the attributes of God; during which one of them plays on a flute. They never cut their hair, nor cover their heads; and always go barefooted: they have liberty to quit their convent when they please, and to marry.

Cadzano, an island on the coast of Dutch Flanders, situated at the mouth of the Scheld, whereby the Dutch command the navigation of that river.

Caduceus, in antiquity, Mercury's rod or sceptre, being a wand entwined by two serpents borne by that deity as the ensign of his quality and office, given him according to the fable by Apollo, for his seven-stringed harp. Wonderful properties are ascribed to this rod by the poets; as laying men asleep, raising the dead, &c.

It was also used by the ancients as a symbol of peace and concord: the Romans sent the Carthaginians a javelin and caduceus, offering them their choice either of war or peace. Among that people, those who denounced war were called feculenses; and those who went to demand peace, caducatores, because they bore a caduceus in their hand.

The caduceus found on medals is a common symbol signifying good conduct, peace, and prosperity. The rod expresses power, the two serpents prudence, and the two wings diligence.

Caduci, (from cadu to "fall"), the name of a class in Linnaeus's catalogue, consisting of plants whose calyx is a simple perianthium, supporting a single flower or fructification, and falling off either before or with the petals. It stands opposed to the claffes periferiantes in the same method, and is exemplified in mustard and rannunculus.

Cadurci, Cadusius, Caduru, and Cadurca, (anc. geogr.), a town of the Cadurci, a people of Aquitania, situated between the rivers Oldes, running from the north, and the Tarnis from the south, and falling into the Garunna: now Cadours, capital of the territory of the Querci, in Guienne. A part of the Cadurci to the south next the Tarnis, were called E-lireri.

Cadus, in antiquity, a wine vessel of a certain capacity, containing 340 amphorae or firkins; each of which, according to the best accounts, held nine gallons.

Cadusia, (anc. geogr.) a people of Media Atropatene, situated to the west in the mountains, and reaching to the Caspian sea; between whom and the Medes, perpetual war and enmity continued down to the time of Cyrus.

Caecilia, in zoology, a genus of serpents belonging to the amphibia class. The caecilia has no scales; it is smooth, and moves by means of lateral rages or prickles. The upper lip is prominent, and furnished with two tentacula. It has no tail. There are but two species of this serpent, viz. 1. The tentaculata has 135 rages. It is about a foot long, and an inch in circumference, preserving an uniform cylindrical shape from the one end to the other. The teeth are very small. It has such a resemblance to an eel, that it may easily be mistaken for one; but as it has neither fins nor gills, it cannot be mistaken with the fishes. It is a native of America, and its bite is not poisonous. 2. The glutinosus, has 340 rages or prickles above, and to below, the anus. It is of a brownish colour, with a white line on the side, and is a native of the Indies.

Caecum, or Coecum, the blind gut. See Anatomy, No. 93.

Caellum, (anc. geogr.) an inland town of Pucetia, a division of Apulia, a place four or five miles above Barium or Bari; and which still retains that name.

Caellum Mons, (Itinerary); a town of Vindelicia, on the right or west side of the Iargus. Now Kulmuntz, a small town of Suabia, on the Iller.

Caerum Mons at Rome. See Ceilium.

Caelius, (Aurelius) an ancient physician, and the only one of the sect of the methodists of whom we have any remains. He was of Sicea, a town of Numidia; but in what age he lived, cannot be determined: it is probable, however, that he lived before Galen; since, though he carefully mentions all the physicians before him, he takes no notice of Galen. He had read over very diligently the ancient physticians.
CAEN, an handsome and considerable town of France, capital of Lower Normandy, with a celebrated university, and an academy of literature. It contains 60 streets and 12 parishes. It has a castle with four towers, which were built by the English. The town-house is a large building with four great towers. The royal square is the handsomest in all Normandy, and has fine houses on three sides of it; and in the middle is the statue of Louis XIV. in a Roman habit, standing on a marble pedestal, and surrounded with an iron ballustrade. It is seated in a pleasant country on the river Orne, about eight miles from the sea. William the conqueror was buried here, in the abbey of St Stephen, which he founded. W. Long. o. 27. N. Lat. 49. 11.

CAERNARVONSHIRE, a county of Wales, bounded on the north and west by the sea, on the south by Merionethshire, and on the east it is divided from Denbighshire by the river Conway. It is about 40 miles in length, and 20 in breadth; and sends one member to parliament for the shire, and another for the borough of Caernarvon. The air is very piercing; owing partly to the snow that lies seven or eight months of the year upon some of the mountains, which are so high that they are called the British Alps; and partly to the great number of lakes, which are said not to be fewer than 50 or 60. The soil in the valleys on the side next Ireland is pretty fertile, especially in barley; great numbers of black cattle, sheep, and goats, are fed on the mountains; and the sea, lakes, and rivers, abound with variety of fish. The highest mountains in the county are those called Snowdon hills, and Penmaen-mawr, which last hangs over the sea. There is a road cut out of the rock on the side next the sea, guarded by a wall running along the edge of it on that side; but the traveller is sometimes in danger of being crushed by the fall of pieces of the rock from the precipices above. The river Conway, though its course from the lake out of which it issues to its mouth is only 12 miles, yet is so deep, in consequence of the many brooks it receives, that it is navigable by ships of good burden for eight miles. Pearls are found in a large black mussel taken in this river. The principal towns are Bangor, Caernarvon the capital, and Conway. In this county is an ancient road said to have been made by Helena the mother of Constantine the Great; and Matthew of Westminster affirms, that the body of Constantius the father of the same Constantine was found at Caernarvon in the year 1283, and interred in the parish-church there by order of Edward I.

CAERNARVON, a town of Wales, and capital of the county of that name. It was built by Edward I. near the site of the ancient Segontium, after his conquest of the country in 1282, the situation being well adapted to overwhelm new subjects. It had natural resources for strength, being bounded on one side by the arm of the sea called the Menai; by the estuary of the Sciont.
Caernarvon

Exactly where it receives the tide from the former; on a third side, and a part of the fourth, by a creek of the Menai; and the remainder has the appearance of having the intrenchments completed by art. Edward undertook this great work immediately after his conquest of the country in 1282, and completed the fortifications and castle before 1274 for his queen, on April 25th in that year, brought forth within its walls Edward, first prince of Wales of the English line. It was built within the space of one year, by the labour of the peasants, and at the cost of the chief-men of the country, on whom the conqueror imposed the hateful task. The external state of the walls and castle, Mr Pennant informs us, are at present exactly as they were in the time of Edward. The walls are defended by numbers of round towers, and have two principal gates: the eastern, facing the mountains, the west, upon the Menai. The entrance into the castle is very august, beneath a great tower, on the front of which appears the statue of the founder, with a dagger in his hand, as if menacing his new-acquired unwilling subjects. The gate had four portcullises, and every requisite of strength. The towers are very beautiful. The Eagle tower is remarkably fine, and has the addition of three slender angular turrets rising from the top. Edward II. was born in a little dark room in this tower, not twelve feet long or eight in breadth: so little did, in those days, a royal concert confound either pomp or convenience. The gate through which the affectionate Eleanor entered, to give the Welsh a prince of their own, who could not speak a word of English, is at the farthest end, at a vast height above the outside ground; so could only be approached by a draw-bridge. The quay is a most beautiful walk along the side of the Menai, and commands a most agreeable view.

Caernarvon is defitute of manufactures, but has a brisk trade with London, Bristol, Liverpool, and Ireland, for the several necessaries of life. It is the residence of numbers of genteele families, and contains several very good houses. Edward I. bestowed on this town its first royal charter, and made it a free borough. Among other privileges, none of the burgesses could be convicted of any crime committed between the rivers Conway and Dyfi, unless by a jury of their own townspeople. It is governed by a mayor, who, by patent, is created governor of the castle. It has one alderman, two bailiffs, a town-clerk, and two sergeants at law. The representative of the place is elected by its burgesses, and those of Conway, Pwllheli, Nefy, and Crickaeth. The right of voting is in every one, resident or non-resident, admitted to their freedom. The town gives title of earl and marquis to the duke of Chandos, and has a good tide-harbour.

CAERWIS, a market-town of Flintshire in North Wales, situated in W. Long. 3° 25'. N. Lat. 53° 20'.

Cæsalpinia Brasletto, or Brasili-wood: a genus of the monogynous order, belonging to the deciduous elms of plants; and in the natural method ranking under the 33d order, Leguminosæ. The calyx is quincuncial, with the lowest segment larger in proportion. There are five petals, with the lowest most beautiful than the rest. It is a leguminous plant. Of this there are three species, the most remarkable of which is the brasillienis, commonly called Brasletto. It grows naturally in the warmest parts of America, Cæsalpinia from whence the wood is exported for the dye, with which it is dyed. The demand has been so great, that none of the large trees are left in any of the British plantations: so that Mr Catesby owns himself ignorant of the dimensions to which they grow. The largest remaining are not above two inches in thickness, and eight or nine feet in height. The branches are slender and full of small prickles; the leaves are pinnate; the lobes growing opposite to one another, broad at their ends, with one notch. The flowers are white, papilionaceous, with many stamens and yellow stigmas, growing in a pyramidal spike, at the end of a long slender stalk; the pods include several small round seeds. The colour produced from this wood is greatly improved by solution of tin in aqua regia.* See Cæsar, Julian, the illustrious Roman general and historian, was of the family of the Julii, who pretended they were descended from Venus by Æneas. The descendants of Aeneas, son of Æneas and Creusa, and surnamed Julianus, lived at Alba till that city was taken by Tullus Hostilius king of Rome, who carried them to Rome, where they flourished. We do not find that they produced more than two branches. The first bore the name of Tullius, the other that of Caesar. The first branch of the Caesars were those who were in public employments in the 1st year of the first Punic war. After that time we find there was always some of that family who enjoyed public offices in the commonwealth, till the time of Augustus Caesar, the subject of this article. He was born at Rome the 11th of the month Quintilis, year of the city 635, and left his father an 660. By his valour and eloquence he soon acquired the highest reputation in the field and in the senate. Beloved and respected by his fellow-citizens, he enjoyed successively every magisterial and military honour the republic could bestow consistent with its own free constitution. But at length having subdued Pompey the great rival of his growing power, his boundless ambition effaced the glory of his former actions: for, purging his favourite maxim, “that he had rather be the first man in a village than the second in Rome;” he procured himself to be chosen perpetual dictator, and, not content with this unconstitutional power, his faction had resolved to raise him to the imperial dignity; when the friends of the civil liberties of the republic hastily assassinated him in the senate-house, where they should only have seized him and brought him to a legal trial for usurpation. By this impetuous
impolitic measure they defeated their own purpose, involving the city in confusion and terror, which produced general anarchy, and paved the way to the revolution they wanted to prevent; the monarchial government being absolutely founded on the murder of Julius Cæsar. He fell in the 63rd year of his age, 43 years before the Christian era. His commentaries contain a history of his principal voyages, battles, and victories. The London edition in 1712, in folio, is preferred.

The detail of Cæsar’s transactions (so far as is consistent with the limits of this work) being given under the article Rome, we shall here only add a portrait of him as drawn by a philosopher.*

* From the Mélanges Philosophiques of M. Ophelot.

If, after the lapse of 18 centuries, the truth may be published without offence, a philosopher might, in the following terms, censure Cæsar without calumniating him, and applaud him without exciting his blushes.

"Cæsar had one predominant passion: it was the love of glory; and he passed 40 years of his life in seeking opportunities to foster and encourage it. His soul, entirely absorbed in ambition, did not open itself to other impulses. He cultivated letters; but he did not love them with enthusiasm, because he had not leisured to become the first orator of Rome. He corrupted the one half of the Roman ladies, but his heart had no concern in the fiery ardours of his enemies. In the arms of Cleopatra, he thought of Pompey; and this singular man, who disdained to concern in the fiery ardours of the world, would have been the founder of a new religion; in Arabia, he would have been the conqueror of India; in the arms of Cato watch for glory, wept, because, at the age of 30, he had not conquered the world like Alexander; and who, with the haughty temper of a despot, was more delirious to be the first man in a village than the second in Rome."

"Cæsar had the good fortune to exist in times of trouble and civil commotions, when the minds of men are put into a ferment; and opportunities of great actions are frequent; when talents are every thing, and those who can only boast of their virtues are nothing. If he had lived an hundred years sooner, he would have been no more than an obscure villain; and, instead of giving laws to the world, would not have been able to produce any confusion in it."

"I will here be bold enough to advance an idea, which may appear paradoxical to those who weakly judge of men from what they achieve, and not from the principle which leads them to act. Nature formed in the same mould Cæsar, Mahomet, Cromwell, and Koul Khan. They all of them united to genius that profound policy which makes his famous; they all of them had an evident superiority over those with whom they were surrounded; they were conscious of this superiority, and they made others conscious of it. They were all of them born subjects, and became fortunate usurpers. Had Cæsar been placed in Persia, he would have made the conquest of India; in Arabia, he would have been the founder of a new religion; in London, he would have stabbed his sovereign, or have procure his assassination under the sanction of the laws. He reigned with glory over men whom he had reduced to be slaves; and, under one aspect, he is to be considered as a hero; under another, as a monster. But it would be unfortunate, indeed, to society, if the possession of superior talents gave individuals a right to trouble its repose. Usurpers accordingly have flatterers, but no friends; strangers respect them; their subjects complain and submit; it is in their own families that humanity finds her avengers. Cæsar was assassinated by his son, Mahomet was poisoned by his wife, Koul Khan was miscarried by his nephew, and Cromwell only died in his bed because his son Richard was a philosopher."

"Cæsar, the tyrant of his country; Cæsar, who destroyed the agents of his crimes, if they failed in ad. dres; Cæsar, in fine, the husband of every wife, and the husband of every husband, has been accounted a great man by the mob of writers. But it is only the philosopher who knows how to mark the barrier between celebrity and great arts. The talents of this singular man, and the good fortune which constantly attended him till the moment of his assassination, have concealed the enormity of his actions."

Cæsar, in Roman antiquity, a title borne by all the...
CAE

CAESAR, (anc. geog.) a town of the Turones in Celtic Gaul; now Tours, the capital of Touraine. See Tours.

CAESAROMAGUS, (anc. geog.) a town of the Tribunobantes in Britain; by some supposed to be Chelmsford, by others Brentford, and by others Burford.

CAESANA, (anc. geog.) a town of Gallia Cispadana, situated on the rivers Iapis and Rubicon; now CASSONA, which see.

CAESIA SYLVIA, (anc. geog.) a wood in Germany, part of the great Sylva Hercynia, situated partly in the duchy of Cleves, and partly in Westphalia between Welfel and Kessedon.

CAESONES, a denomination given to those cut out of their mother's wombs. Pliny ranks this as an auspicious kind of birth; the elder Scipio Africallus, and the first family of Caesars, were brought into the world in this way.

CAESUS, in antiquity, a large gantlet made of raw hide, which the wrestlers made use of when they fought at the public games.—This was a kind of leathern strap, strengthened with lead or plates of iron, which encompassed the hand, the wrist, and a part of the arm, as well to defend these parts as to enforce their blows.

CAESUS, or CAESARIUS, was also a kind of girdle, made of wool, which the husband united for his spouse the first day of marriage, before they went to bed.

This relates to Venus's girdle, which Juno borrowed of her to entice Jupiter to love her. See CAESUS.

CAESURA, in the ancient poetry, is when, in the scanning of a verse, a word is divided so, as one part seems cut off, and goes to a different foot from the rest; as,

Menti nos, nunquam mendacia profunt,
where the syllables ri, li, quam, and men, are Caesars.

CAESURE, in the modern poetry, denotes a rest or pause towards the middle of an Alexandrian verse, by which the voice and pronunciation are aided, and the verse, as it were, divided into two hemistichs. See CAESUS.

CAETERIS PARIBUS, a Latin term in frequent use among mathematical and physical writers. The words literally signify, the rest (or other things) being alike or equal. Thus we say the heavier the bullet, caeteris paribus, the greater the range; i. e. by how much the bullet is heavier, if the length and diameter of the piece and strength of the powder be the same, by so much will the utmost range or distance of a piece of ordnance be the greater. Thus also, in a physical way, we say, the velocity and quantity circulating in a given time through any section of any artery, will, caeteris paribus, be according to its diameter, and nearness to or distance from the heart.

CAETOBRIX, (anc. geog.) a town of Lucania, near the mouth of the Tagus on the east side; now extinct. It had its name from its situation on the coast of Phenicis. It was very conveniently situated for trade; but had a very dangerous harbour, so that no ships could be safe in it when the wind was at south-west. Herod the Great king of Judea remedied this inconvenience at an immense expense and labour, making it one of the most convenient havens on that coast. He also beautified it with many buildings, and bestowed 12 years in the finishing and adorning it.

CAESARIAN operation. See MIDWIFERY.

CAESARIANS, Caesarienses, in Roman antiquity, were officers or ministers of the Roman emperors: They kept the account of the revenues of the emperors; and took possession, in their name, of such things as devolved or were consecrated to them. 

CÆSARODUNUM, (anc. geog.) a town of the Cesarodunenses in Britain

CAFFA, in commerce, painted cotton-cloths manufactured in the East Indies, and sold at Bengal.

CAFFA, or CAFE, a city and port-town of Crim Tartary, situated on the south-east part of that peninsula. E. Long. 37. O. Lat. 44. 55.
CAFFILA, a company of merchants or travellers, who join together in order to go with more security through the dominions of the Grand Mogul, and through other countries on the continent of the East Indies.

The Caflila differs from a caravan, at least in Persia: for the caflila belongs properly to some sovereign, or to some powerful company in Europe, whereas a caravan coming Euxine or black Indies.

The mountains afford food for the fiercer sorts; were usually brought to Rome flutt up in oak en beechen cages, artfully formed, and covered or shaded with boughs, that the creatures, deceived with the appearance of a wood, might fancy themselves in their forest. The fiercer sort were pent in iron cages, left wooden prisons should be broke through. In some prisons there are iron cages for the closer confinement of criminals. The French laws distinguish two forts of bird-cages, viz. high or singing cages, and low or dumb-cages; those who expose birds to sale are obliged to put the hens in the latter, and the cocks in the former, that persons may not be imposed on by buying a hen for a cock.

Cages, (castrum) denote also places in the ancient amphitheatres, wherein wild beasts were kept, ready to be let out for sport. The cæsære were a sort of iron cages different from dens, which were built underground and dark; whereas the cæsære being airy and light, the beasts rushed out of them with more alacrity and fierceness than if they had been pent underground.

Cage, in carpentry, signifies an outer-work of timber, enclosing another within it. In this sense we say, the cage of a wind-mill. The cage of a faf’ica-fote the wooden sides or walls which

CAGEAN, or CAGAYAN, a province of the island of Luzon, or Manila, in the East Indies. It is the largest in the island, being 80 leagues in length, and 40 in breadth. The principal city is called New Segovia, and 15 leagues eastward from this city lies cape Bajador. Doubling that cape, and coasting along 20 leagues from north to south, the province of Cagayan ends, and that of Illocos begins. The pleasurely Cagayans who pay the tribute are about 8000; but there are a great many not subdued. The whole province is fruitful: the men apply themselves to agriculture, and are of a martial disposition; and the women apply to several works in cottager. The mountains afford food for many beasts, as boars; but not so good as those of Europe. There are also abundance of deer, which they kill for their skins and horns to sell to the Chinese.

CAGLI, an ancient episcopal town of Italy, in the duchy of Urbino, situated at the foot of the Apennine mountains. E. Long. 14. 12. N. Lat. 42. 30.

CAGLIARI, (Paolo) called Paolo Veronese, an excellent painter, was born at Verona in the year 1532.

Caggiaso his father was a sculptor, and Antonio Badile his uncle was his master in painting. He was not only esteemed the best of all the Lombard painters, but for his extensive talents in the art was peculiarly styled II pittor felice, "the happy painter!" and there is scarcely a church in Venice where some of his performances are not to be seen. De Piles says, that "his picture of the marriage at Cana, in the church of St. George, is to be distinguished from his other works, as being not only the triumph of Paul Veronese, but almost the triumph of painting itself."

When the senate sent Grimani, procurator of St Mark, to be their ambassador at Rome, Paul attended him, but did not stay long, having left some pieces at Venice unfinished. Philip II. King of Spain, sent for him to paint the Eufcharist, and made him great offers; but Paul excused himself from leaving his own country, where his reputation was so well established, that most of the princes of Europe ordered their several ambassadors to procure something of his hand at any rate.

He was indeed highly esteemed by all the principal men in his time; and so much admired by the great masters, as well his contemporaries, as those who succeeded him, that Titian himself neded to say, he was the ornament of his profession. And Guido Reni being asked which of the matters his predecessors he would choose to be, were it in his power, after Raphael and Correggio,
Cajetan was employed in several other negotiations and transactions, being as ready at business as at letters. He died in 1554. He wrote Commentaries upon Aristotel's philosophy, and upon Thomas Aquinas's theology; and made a literal translation of the Old and New Testaments.

Cajem was born at Cajeta in the kingdom of Naples in the year 1469. His proper name was Thomas de Vio; but he adopted that of Cajetan from the place of his nativity. He defended the authority of the Pope, which suffered greatly at the council of Nice, in a work entitled Of the power of the Pope; and for this work he obtained the bishopric of Cajeta. He was afterwards raised to the archiepiscopal see of Palemon, and in 1557 was made a cardinal by Pope Leo X. The year following, he was sent as legate into Germany, to quiet the commotions raised against indulgences by Martin Luther; but Luther, under protection of Frederic elector of Saxony, set him at defiance; for though he obeyed the cardinal's summons in repairing to Augsburg, yet he rendered all his proceedings ineffectual.

Cajem was employed in several other negotiations and transactions, being as ready at business as at letters. He died in 1554. He wrote Commentaries upon Aristotel's philosophy, and upon Thomas Aquinas's theology; and made a literal translation of the Old and New Testaments.

CAIFONG, a large, populous, and rich town of Asia, in China, seated in the middle of a large and well cultivated plain. It stands on a strait, and when besieged by the rebels in 1642, they ordered the dykes of the river Hohangho to be cut, which drowned the city, and destroyed 300,000 of its inhabitants. E. Long. 112. 27. N. Lat. 25. 0.

CAILLE, (Nicholas Louis de la) an eminent mathematician and astronomer, was born at a small town in the diocese of Rheims in 1713. His father had served in the army, which he quitted, and in his retirement studied mathematics; and amused himself with mechanic exercises, wherein he proved the happy author of several inventions of considerable use to the public. Nicholas, almost in his infancy, took a fancy to mechanics, which proved of signal service to him in his mature years. He was sent young to school at Montes­fur-Seine, where he discovered early tokens of genius.

In 1729, he went to Paris; where he studied the classics, philosophy, and mathematics. Afterwards he went to study divinity at the college of Navarre, proposing to embrace an ecclesiastical life. At the end of three years he was ordained a deacon, and officiated as such in the church of the college de Mazarin several years; but he never entered into priests orders, apprehending that his astronomical studies, to which he became more and more devoted, might too much interfere with his religious duties. In 1739, he was joined with M. de Thury, son to M. Caffini, in verifying the meridian of the royal observatory through the whole extent of the kingdom of France. In the month of November the same year, whilst he was engaged day and night in the operations which this great undertaking required, and at a great distance from Paris, he was, without any solicitation, elected into the vacant mathematical chair which the celebrated M. Varignon had so worthy filled. Here he began to teach about the end of 1740; and an observatory was ordered to be erected for his use in the college, and furnished with a suitable apparatus of the best instruments. In May 1741, M. de la Caille was admitted into the royal academy of sciences as an adjoint member for astronomy. Besides the many excellent papers of his dispersed up and down in their memoirs, he published Elements of geometry, mechanics, optics, and astronomy. Moreover, he carefully computed all the eclipses of the sun and moon that had happened since the Christian era, which were printed in a book published by two Benedictines, entitled L'Art de voriérer les dates, &c. Paris, 1750, in 4to. Besides these, he compiled a volume of astronomical ephemerae for the years 1745 to 1755; another for the years 1755 to 1765; and a third for the years 1765 to 1775; an excellent work entitled Astronomie fundamenta nova, sive, et stellarum observationibus stabilita; and the most correct solar tables that ever appeared. Having gone through a few years series of astronomical observations in his own observatory, he formed a project of going to observe the southern stars at the
Caille.

Cape of Good Hope. This was highly approved by the academy, and by the prime minister Comte de Argent- fon, and very readily agreed to by the states of Hol- land. Upon this, he drew up a plan of the method he proposed to pursue in his southern observations; setting forth, that besides settling the places of the fixed stars, he proposed to determine the parallax of the moon, Mars, and Venus. But whereas this required corres- pondent observations to be made in the northern parts of the world, he lent to those of his correspondents who were expert in practical astronomy previous no- tice, in print, what observations he designed to make at such and such times for the said purpose. At length, on the 21st of November 1750, he failed for the Cape, and arrived there on the 10th of April 1751. He forth- with got his instruments on shore; and, with the affi- dence of some Dutch artificers, set about building an astronomical observatory, in which his apparatus of in- struments was properly disposed of as soon as it was in a fit condition to receive them.

The sky at the Cape is generally pure and serene, unless when a south-eaft wind blows. But this is of- ten the case; and when it is, it is attended with some strange and terrible effects. The stars look bigger, and seem to caper; the moon has an undulating tremor; and the planets have a fort of beard like comets. Two hundred and twenty-eight nights did our astronomer survey the face of the southern heavens; during which space, which is almost incredible, he observed more than 10,000 stars; and whereas the ancients filled the heavens with monsters and old-wives tales, the abbe de la Caille chose rather to adorn them with the instru- ments and machines which modern philosophy has made use of for the conquest of nature. With no lefs success did he attend to the parallax of the moon, Mars, Venus, and the sun. Having thus executed the purpose of his voyage, and no present opportunity offer- ing for his return, he thought of employing the vaca- tant time in another arduous attempt; no lefs than that of taking the measure of the earth, as he had al- ready done that of the heavens. This indeed had, through the munificence of the French king, been done before by different sets of learned men both in Europe and America: some determining the quantity of a de- gree under the equator, and others under the arctic circle; but it had not as yet been decided whether in the southern parallels of latitude the fame dimensions obtained as in the northern. His labours were re- warded with the satisfaction he wished for; having de- termined a distance of 410,814 feet from a place cal- led Kip-Fentyn to the Cape, by means of a bafe of 28,802 feet, three times actually measured; whence he discovered a new secret of nature, namely, that the radii of the parallels in south latitude are not the fame as those of the corresponding parallels in north lati- tude. About the 23d degree of south latitude he found a degree on the meridian to contain 342,222 Paris feet. He returned to Paris the 27th of September 1754; hav- ing in his almost four years absence expended no more than 9144 livres on himself and his companion; and at his coming into port, he refused a bribe of 100,000 livres, offered by one who thrifled lefs after glory than gain, to be flarcer in his immuity from culthom house searches. After receiving the congratulatory visits of his more intimate friends and the astronomers, he first of all thought fit to draw up a reply to some ftrictures which professor Euler had publifhed relative to the meridian, and then he fetted the results of the comparison of his own with the observations of other astronomers for the paralaxes. That of the fun he fixed at 56°; of the moon, at 56° 56'; of Mars in his opposition, 36°; of Venus, 38°. He also fetted the laws whereby astronomical refractions are varied by the different den- sity or rarity of the air, by heat or cold, and drynefs or moisture. And, lafly, he showed an easy, and by common navigators practicable, method of finding the longitude at sea by means of the moon, which he illus- trated by examples selected from his own observations during his voyages. His fame being now establisht upon fo firm a basis, the moft celebrated academies of Europe claimed him as their own; and he was unani- mously elected a member of the royal society at Lon- don; of the institute of Bologna; of the imperial academy at Petersburg; and of the royal academies of Berlin, Stockholm, and Gottenburg. In the year 1760, Mr de la Caille was attacked with a fevere fit of the gout; which, however, did not interrupt the course of his studies; for he then planned out a new and immense work, no lefs than a history of astronomy through all ages, with a comparison of the ancient and modern ob- servations, and the conftuction and use of the instru- ments employed in making them. In order to pursue the task he had imposed upon himself in a suitable re- tirement, he obtained a grant of apartments in the royal palace of Vincennes; and whilst his astronomical apparatus was erecting there, he began printing his Catalogue of the southerm stars, and the third volume of his Ephemerides. The state of his health was, towards the end of the year 1763, greatly reduced. His blood grew inflamed; he had pains of the head, ob- structions of the kidneys, loss of appetite, with an op- position of the whole habit. His mind remained un- affected, and he resolutely persifed in his studies as usual. In the month of March, medicines were ad- ministered to him, which rather aggravated than al- leviated his symptoms; and he was now fenfible, that the fame dieter which in Africa, ten years before, yielded to a few simple remedies, did in his native country bid defiance to the best physicians. This in- duced him to settle his affairs; his manuscripts he com- mitted to the care and difterction of his esteemed friend M. Maraldi. It was at laft determined that a vein should be opened; but this brought on an obfolute lethargy, of which he died, aged 32.

CAIMACAN, or CAIMACAN, in the Turkish affairs, a dignity in the Ottoman empire, anfwering to lieutenant, or rather deputy, amongst us.

There are ufually two Caimacans; one residing at Conflantinople, as governor thereof; the other attend- ing the grand vizir in quality of his lieutenant, secre- tary of state, and first minifter of his council, and gives audience to ambafladors. Sometimes there is a third caimakan, who attends the sultan; whom he acquaints with any public difturbarces, and receives his orders concerning them.

CAIMAN ISLANDS, certain American islands lying south of Cuba, and north-west of Jamaica, between 81° and 86° of weft longitude, and in 21 of north lati- tude. They are moft remarkable on account of the

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Cairns. Food, and killing them as they want them.

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Carnes, the vulgar name of thofe

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CARNES, or Carnes, the vulgar name of thofe

heaps of ftones which are to be feen in many places of

Britain, particularly Scotland and Wales.—They are

compofed of ftones of all dimensions thrown together

in a conical form, a flat ftone crowning the apex; (fee

Plate CXXXVII.)

Various caufes have been alphabeted by the learned for

thofe heaps of ftones. They have fuppofed them to have.

been, in times of inauguration, the places where the chief-

tain-elect ftood to flrow himfelf to behard advantage to

the people; or the place from whence judgment was pro-
nounced; or to have been erected on the road-side in ho-

nor of Mercury; or to have been formed in memory of

fome folemn conclave, particularly where accompanied

by flanding pillars of ftones; or for the celebration of

certain religious ceremonies. Such might have been

the reafons, in fome inftances, where the evidences of

fhone-chefts and urns are wanting; but there are fo

generally found, that they feem to determine the

nature of the purpofe of the piles in queftion to have

been for fepulchral monuments. Even this defination

might render them fuitable to other purpofes;

particularly religious, to which by their nature they

might be fuppofed to give additional folemnity.—

According to Toland, fires were kindled on the

tops or flat ftones, at certain times of the year, par-

icularly on the eves of the 1st of May and the 1st of

November, for the purpofe of facrificing; at which
time all the people having extinguiihed their domeftic

hearth's rekindled them from the facred fires of the

cairns. In general, therefore, these accumulations ap-

pear to have been defigned for the fepulchral protection

of heroes and great men. The fhone-chefts, the repo-

itory of the urns and ashes, are lodged in the earth be-

neath; fometimes only one, fometimes more, are found

thus depofited; and Mr Pennant mentions an ifance of 17

being difcovered under the fame pile.

Cairns are of different fizes, fome of them very large.

Mr Pennant describes one in the ifland of Arran, 114

feet over and of a vaft height. They may juftly be

fuppofed to have been proportioned in fize to the rank

of the perfon, or to his popularitv: the people of a

whole diftrift assembled to show their reftpect to the

deeafcd; and, by an active honouring of his me-

mory, fon accumulated heaps equal to thofe that af-

tonifh us at this time. But thefe honours were not mere-

ly thofe of the day; as long as the memory of the de-

eeafcd endured, not a passenger went by without add-

ing a ftone to the heap; they fuppofed it would be an

honour to the dead, and acceptable to his namcs.

Quaquam feffinam, non fui mora longa: fiecbis

Injedtis tur puleare, curras.

To this moment there is a proverbial expreffion am-

ong the highlanders allusive to the old practice: a

fupplicant will tell his patron, Carri iu dcfch or do

charms, "I will add a ftone to your cairn;" meaning,

When you are no more, I will do all poflible honour to

your memory.

Cairns are to be found in all parts of the iflands, in

Cornwal, Wales, and all parts of North Britain; they

were in ufe among the northern nations; Dahlerg,

in his 323d plate, has given the figure of one. In

Wales they are called cerneddaus; but the proverb taken

from them there, is not of the complimential kind; Kairn

ar dy ben, or, "A cairn on your head," is a token

of imprecation.

CAIRO, or Grand Cairo, the capital of Egypt,

fittuated in a plain at the foot of a mountain, in E.

Long. 32. o. N. Lat. 30. o. It was founded by Jau-

har, a Magrebian general, in the year of the Hegira

258. He had laid the foundations of it under the ho-

roscope of Mars; and for that reafon gave his new city

the name of Al Kahirah, or the Victorious, an ephemer

applied by the Arab astronomers to that planet. In

362 it became the residence of the kaliffs of Egypt,

and of conquence the capital of that country, and

has ever since continued to be fo. It is divided into

the New and Old cities. Old Cairo is on the eastern

fide of the river Nile, and is now almoft uninhabited.

The New, which is properly Cairo, is feated in a fandy

plain about two miles and a half from the old city.

It ftands on the western fide of the Nile, from which

it is not three quarters of a mile diftant. It is ex-

tended along the mountain on which it is built, for

the fake of which it was removed hither, in order, as

fome pretend, to be under its protection. Howev-

er, the change is much for the worse, as well with

gard to air as water, and the pleafantnefs of

walking in them is very inconvenient,

Some travellers have made Cairo of a

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Cairo.

There are about 500 public mosques in this city, some of which have fine minarets. The mosque of Aisha had several buildings adjoining, which were once a famous university, and 14,000 scholars and students were maintained on the foundation; but has now not above 1400, and those are only taught to read and write. All the mosques are built upon the same plan, and differ only in magnitude. The entrance is thro' the principal gate into a large square, open on the top, but well paved. Round this are covered galleries, supported by pillars; under which they pay their prayers, in the shade. On one side of the square there are particular places with basins of water, for the convenience of performing the ablutions enjoined by the Koran. The most remarkable part of the mosque, besides the minaret, is the dome. This is often bold, well proportioned, and of an astonishing magnitude. The inside foyers are carved like lace, flowers, and melons. They are built so firm, and with such art, that they will last 600 or 700 years. About the outward circumference there are large Arabic inscriptions, in relief, which may be read by those who stand below, though they are sometimes of a wonderful height.

The khanes or caravanserais are numerous and large, with a court in the middle, like their houses. Some are several stories high, and are always full of people and merchandise. The Nubians, the Abyssinians, and other African nations, which come to Cairo, have one to themselves, where they always meet with lodging. Here they are secure from insults, and their effects are all safe. Besides these, there is a bazar, or market, where all sorts of goods are to be sold. This is in a long broad street; and yet the crowd is so great, you can hardly pass along. At the end of this street is another short one, but pretty broad, with shops full of the best sort of goods, and precious merchandise. At the end of this short street there is a great khan, where all sorts of white slaves are to be sold. Farther than this is another khan, where a great number of blacks, of both sexes, are exposed to trade. Not far from the best market-place is an hospital, and a hospital for madpeople. They also receive and maintain sick people into this hospital, but they are poorly looked after.

Old Cairo has scarce anything remarkable but the granaries of Joseph; which are nothing but a high wall, lately built, which includes a square spot of ground, where they deposite wheat, barley, and other grain, which is a tribute to the baths, paid by the owners of land. This has no other covering but the heavens, and therefore the birds are always sure to have their share. There is likewise a tolerable handsome church, which is made use of by the Copts, who are Christians and the most ancient inhabitants of Egypt. Joseph's well is in the castle, and was celebrated by king Mohammed about 700 years ago. It is called Joseph's well, because they attribute everything extraordinary to that remarkable person. It is cut in a rock, and is 280 feet in depth. The water is drawn up to the top by means of oxen, placed on platforms, at proper distances, which turn about the machines that raise it. The descent is so sloping, that, though there are no steps, the oxen can descend and ascend with ease.
The river Nile, to which not only Cairo, but all Egypt is so much indebted, is now known to have its rise in Abyssinia. The increasement of the Nile generally begins in May, and in June they commonly proclaim about the city how much it is riven. Over against old Cairo the Bahr has a house, wherein the water enters to a column, which has lines at the distance of every inch, and marks at every two feet, as far as 30. When the water rises to 22 feet, it is thought to be of a dangerous height; when it rises much higher, it does a great deal of mischief. There is much pomp and ceremony used in letting the water into the canal, or half-abovementioned. The Bahr gives the first stroke towards the removal of the dike or dam. When the water has filled the canal and lakes in the city, and the numerous cisterns that are in the mosques and private houses, it is let into a vast plain, to the north-east, the extent of which is 50 miles. When the country is covered with water, it is an unpleasant sight to view the towns appearing like little islands, and the people paddling and repelling in boats.

The inhabitants of Cairo are a mixture of Moors, Turks, Jews, Greeks, and Copts, or Copits. The only difference between the habit of the Moors and Copts is their turbans; those of the Moors being white, and of the Copts white striped with blue. The common people generally wear a long black loose frock, fewed together all down before. The Jews wear a frock of the same fashion, made of cloth; and their caps are like a high crowned hat, without brims, covered with the same cloth, but not so taper. The Jewish women's are not very unlike the men's, but more light and long. The Greeks are habited like the Turks, only their turbans differ.

Provisions of all kinds are exceeding plentiful; for 20 eggs may be bought for a parrahi or penny, and bread is six times as cheap as with us. They have almost all sorts of flesh and fish; and in particular have tame buffaloes, which are very useful. They bring goats into the streets in great numbers, to sell their milk. Their gardens are well stocked with fruit-trees of various kinds, as well as roots, herbs, melons, and cucumbers. The most common flesh meat is mutton. The goats are very beautiful, and have ears two feet in length; but their flesh is in no great esteem.

CAIROAN, or CAYWAN, a city of Africa, in the kingdom of Tunis, seated in a sandy barren soil, about five miles from the gulf of Capres. It has neither spring, well, nor river; for which reason they are obliged to preserve rain-water in tanks and cisterns. It was built by the Aglabites; and is the ancient Cyrene*, but now almost lost its splendor. There is a well, however, a very superb mosque, and the tombs of the kings of Tunis are yet to be seen. E. Long. 9. 12. N. Lat. 35. 40.

CAISSON, in the military art, a wooden chest, into which several boms are put, and sometimes filled only with gunpowder: this is buried under some work, whereof the enemy intend to posses themselves, and, when they are masters of it, is fired, in order to blow them up.

CAISSON is also used for a wooden frame or chest used in laying the foundations of the piers of a bridge.

CAITHNESS, otherwise called the shire of Wick, is the most northern county of all Scotland; bounded on the east of the ocean, and by Strathnaver and Sutherland on the south and south-west: from these it is divided by the mountains Orde, and a continued ridge of hills as far as Knockfin, then by the whole course of the river Hallowdale. On the north it is washed by the Pentland or Pentland frith, which flows between this county and the Orkneys. It extends 35 miles from north to south, and about 20 from east to west. The coast is rocky, and remarkable for a number of bays and promontories. Of these, the principal are Sand-side-head to the west, pointing to the opening of Pentland frith; Orca, now Holborn-head, and Dunnet-head, both pointing northward to the frith. Dunnet-head, is a peninsula about a mile broad, and seven in compass; affording several lakes, good pasture, excellent mill-flores, and a lead-mine. Scribister bay, on the north-west, is a good harbour, where ships may ride securely. Rice-bay, on the east side, extends three miles in breadth; but is of dangerous access, on account of some sunk rocks at the entrance. At the bottom of this bay appear the ruins of two strong castles, the seat of the earls of Caithness, called Castle Sinclair, and Gernego, joined to each other by a draw-bridge. Duncan's bay, otherwise called Dunby-head, is the northern point of Caithness, and the extremest point of Caithness in Britain. At this place, the breadth of the frith does not exceed 12 miles, and in the neighbourhood is the ordinary ferry to the Orkneys. Here is likewise Clythnes pointing east, and Nohead pointing north-east. The sea in this place is very impetuous, being in constant agitation from violent counter-tides, currents, and vortices. The only island belonging to this country is that of Stroma, in the Pentland frith, at the distance of two miles from the main land, extending about a mile in length, and producing good corn. The navigation is here rendered very difficult by conflicting tides and currents, which at both ends of the island produce a great agitation in the sea. At the south end, the waves dance so impetuously, that the sailors term them the merry men of May, alluding to the house of one Mr May, on the opposite shore of Caithness, which served them as a land-mark, in the dangerous passage between the island and the continent. The property of this island was once disputed between the earls of Orkney and Caithness; but adjudged to the latter, in consequence of an experiment, by which it appeared, that venomous creatures will live in Stroma, whereas they die immediately if transported to the Orkneys. The county of Caithness, though chiefly mountainous, flattens towards the sea-coast, where the ground is arable, and produces good harvests of oats and barley, sufficient for the natives, and yielding a surplus for exportation. Caithness is well watered with small rivers, brooks, lakes, and fountains, and affords a few woods of birch, but is in general bare of trees; and even those the inhabitants plant are stinted in their growth. Lead is found at Dunnet, copper at Old Urk, and iron ore at several places; but these advantages are not improved. The air of Caithness is temperate, though in the latitude of 58, where the longeas day in summer is computed at 18 hours; and when the sun sets, he makes so small an arch of a circle below the horizon, that the people enjoy a twilight until he rises again. The fuel used by the inhabitants of Caithness consists of peat and turf, which the ground yields in great plenty. The forests
C A I

Caitheuf. forests of Moravias and Berriedale afford abundance of red-deer and roe-bucks: the country is well stored with hares, rabbits, growie, heathcocks, plover, and all kinds of game, comprehending a bird called snow-fleet, about the size of a parrow, exceedingly fat and delicious, that comes hither in large flights about the middle of February, and takes its departure in April. The hills are covered with sheep and black cattle; so numerous, that a fat cow has been sold at market for 8 s. sterling. The rocks along the coasts are frequented by eagles, hawks, and all manner of sea-fowl, whose eggs and young are taken in vast quantities by the natives. The rivers and lakes abound with trout, salmon, and eels; and the sea affords a very advantageous fishery. Divers obelisks and ancient monuments appear with hares, red-deer and roe-bucks: the country is well furnished with turf and sea-plants. The common people are well provided for their fishing boats, and cut artificial granaries: the corn is raised, sharp, but in bad sea-sons the farmer kills and feeds them to the lairds, an invincible impediment to the prosperity of the country. The women are also condemned to a shameful drudgery; it not being uncommon to see them trudging in droves of 60 or 70 to the fields, with baskets of dung on their backs, which are filled at pleasure from the dunghills by their lords and masters with their pitchforks.

The last private war in Scotland was occasioned by a dispute relating to this county. An earl of Breadalbane married an heiress of Caithness: the inhabitants would not admit her title, but set up another person in opposition. The earl, according to the custom of those times, designed to assert his right by force of arms: he raised an army of 1,500 men; but thinking the number too great, he dismissed first one 500, and then another. With the remainder he marched to the borders of Caithness. Here he thought proper to add stratagem to force. He knew that the enemy's army waited for him on the other side of the promontory of Ord. He knew also, that whilisby was then the seat of Caithness; and therefore ordered a ship laden with that precious liquor to pass round, and wilfully strand itself on the shore. The directions were punctually obeyed; and the crew in a seeming fright escaped in the boats to the invading army. The Caithness men made a prize of the ship; but making too free with the freight, became an easy prey to the earl, who attacked them during their intoxication, and gained the county, which he disposed of very soon after his conquest.

CAIUS, KEVE, or KEVE, (Dr John), the founder of Cains college in Cambridge, was born at Norwich in 1520. He was admitted very young a student in Gonville hall in the abovementioned university; and at the age of 21 translated from Greek into Latin some pieces of divinity, and into English Erasmus's paraphrase on Jude, &c. From these his juvenile labours, it seems probable that he first intended to prosecute the study of divinity. Be that as it may, he travelled to Italy, and at Padua studied physic under the celebrated Montanus. In that university he continued some time, where we are told he read Greek lectures with great applause. In 1543, he travelled through part of Italy, Germany, and France; and returning to England commenced doctor of physic at Cambridge. He practised first at Shrewbury, and afterwards at Cambridge; but removing to London, in 1547 he was admitted fellow of the college of physicians, to which he was several years president. In 1557, being then physician to queen Mary, and in great favour, he obtained a licence to advance Gonville-hall, where he had been educated, into a college; which he endowed with several considerable estates, adding an entire new square at the expense of 18341. Of this college he accepted the mastership, which he kept till within a short time of his death. He was physician to Edward VI. queen Mary, and queen Elizabeth. Towards the latter end of his life he retired to his own college at Cambridge; where, having resigned the mastership to Dr Legge of Norwich, he spent the remainder of his life as a fellow-commoner. He died in July 1572, aged 63; and was buried in the chapel of his own college. Dr Cains was a learned, active, benevolent man. In 1557, he erected a monument in St Paul's to the memory of the famous Linacre. In 1565, he obtained a grant for the college of physicians 'to take the bodies of two male-factors...
CALABRIA, a country of Italy, in the kingdom of Naples, divided into Calabria Ultra, and Calabria Citera, commonly called Ulterior and Citerior, or Further and Hither Calabria. Calabria Citerior is one of the 12 provinces of the kingdom of Naples; and bounded on the south by Calabria Ultra, on the north by Basilicata, and on the west and east by the sea; Cosenza is the capital. Calabria Ultra is washed by the Mediterranean sea on the east, south, and west, and bounded by Calabria Citera on the north. Reggio is the capital town.

This country has been almost entirely depopulated by the earthquakes of 1783. The reiterated shocks extended from Cape Spartivento to Amantea above the gulf of St Eufemia, and also affected that part of Sicily which lies opposite to the southern extremity of Italy. Those of the 5th and 7th of February, and of the 28th of March, were the most violent, and completed the destruction of every building throughout the above-mentioned space. Not one stone was left upon another south of the narrow isthmus of Squillace; and what is more disastrous, a very large proportion of the inhabitants was killed by the falling of their houses, near 40,000 lives being lost. Some perfons were dug out alive after remaining a surprising length of time buried among the rubbith. Melina became a mafs of ruins; its beautiful Palazzata was thrown in upon the town, and its quay cracked into ditches full of water. Reggio almost destroyed; Tropea greatly damaged; every other place in the province levelled to the ground.

Before and during the concussion the clouds gathered, and then hung immovable and heavy over the earth. At Palmy, the atmosphere wore so fiery an aspect, that many people thought part of the town was burning. It was afterwards remembered that an unusual heat had affected the skin of several persons just before the shock; the rivers assume a muddy ash-coloured tinge, and a sulphurous smell was almost general. A frigate passing between Calabria and Lipari felt to fever a shock, that the steerman was thrown from the helm, and the cannons were raised upon their carriages, while all around the sea exhaled a strong smell of brimstone.

Suspendent alterations were occasioned in the face of the country; rivers cooaked up by the falling in of the hills, were converted into lakes, which if not speedily drained, by some future convulsion, or opened by human labour, will fill the air with pestiferous vapours, and destroy the remnants of population. Whole acres of ground, with houses and trees upon them, were broken off from the plains, and washed many furlongs down the deep hollows which the course of the rivers had worn; there, to the astonishment and terror of beholders, they found a new foundation to fix upon, either in an uprightness or an inclining position. In short, every species of phenomenon, incident to these destructive commotions of the earth, was to be seen in its utmost extent and variety in this ruined country. Their Sicilian majesties, with the utmost expedition, dispatched vessels loaded with every thing that could be thought of on the occasion for the relief and accommodation of the diftreffed Calabrians; a general officer went from Naples with engineers and troops to direct the operations of the persons employed in clearing away and rebuilding the houses, and to defend the property.
Cala4e

property of the sufferers. The king ordered this officer to take all the money the royal treasures could supply or borrow; for, rather than it should be wanting on this pressing call, he was determined to part with his plate, nay, the very furniture of his palace. A messenger scot off from a town near Reggio on the 8th of February, travelled four days without shelter, and without being able to procure a morsel of bread; he reported nothing with a piece of cheese which he had brought in his pocket, and the vegetables he was lucky enough to find near the road. To add to all their other sufferings, the Calabrians found themselves and the miserable wreck of their fortunes exposed to the depredations of robbers and pirates. Villains landed from boats and plundered several places, and thieves went even from Naples in search of booty: In order to strike a greater terror, they dressed themselves like Algerines; but were discovered and driven off. To this accumulated distress succeeded a most insensible feaon, which obstructed every effort made to alleviate it; and almost daily earthquakes kept the inhabitants in continual dread, but of being destroyed by falls of houses, for none were left, but of being swallowed up by the splitting, or buried in the waves by some sudden inundation.

For further particulars concerning this dreadful catastrophe, and the phenomena attending it, see Earthquake.

CALADE, in the majestic, the defecut or floping declivity of a rising manege-ground, in the form of a triangle, one side of which is towards the sea. The citadel is as large as the town, and has streets, and several churches and monastaries; the number of inhabitants is reckoned to be 4000.

Calais was taken by Edward III. in 1347. Hither he marched his victorious army from Creacy, and invested the town on the 8th of September. But finding that it could not be taken by force without the destruction of great multitudes of his men, he turned the siege into a blockade, and having made strong entrenchments to secure his army from the enemy, huts to protect them from the inclemency of the weather, and stationed a fleet before the harbour to prevent the introduction of provisions, he resolved to wait with patience till the place fell into his hands by famine. The besieged, discovering his intention, turned seventeen hundred women, children, and old people out of the town, to save their provisions; and Edward had the goodness, after entertaining them with a dinner, and giving them two pence a-piece, to suffer them to pass. The garrison and inhabitants of Calais having at length consumed all their provisions, and even eaten all their horses, dogs, cats, and vermin, in the place, the governor John de Vienne appeared upon the walls, and offered to capitulate. Edward, greatly incensed at their obstinate refusal, which had detained him eleven months under their walls, at an immense expence both of men and money, sent Sir Walter Manny, an illustrious knight, to squaint the governor, that he would grant them no terms; but that they must surrender at discretion. At length, however, at the spirited remonstrances of the governor, and the persuasions of Sir Walter Manny, Edward consented to grant their lives to all the garrison and inhabitants, except fix of the principal burgesses, who should deliver to him the keys of the city, with ropes about their necks. When these terms were made known to the people of Calais, they were plunged into the deepest distress; and after all the miseries they had suffered, they could not think without horror of giving up fi.x of their fellow-citizens to certain death. In this extremity, when the whole people were drowned in tears, and uncertain what to do, Euflace de Pierre, one of the richest merchants in the place, stepped forth, and voluntarily offered himself to be one of those fix devoted victims. His noble example was soon imitated by other five of the most wealthy citizens. These true patriots, barefooted, and bare-headed, with ropes about their necks, were attended to the gates by the whole inhabitants, with tears, blessings, and prayers, for their safety. When they were brought into Edward's presence, they laid the keys of the city at his feet, and their necks. When the queen, falling upon her knees implored him to spare them, he said to her, You have no other friends who can save you. The king's remonstrance was so strong for the many toils and dangers he had suffred in this tedious siege, that he was in some danger of forgetting his usual humanity; when the queen, falling upon her knees before him, earnestly begged and obtained their lives. This great and good prince conducted these virtuous citizens, whose lives he had saved, to her own apartment, entertained them honourably, and dismissed them with presents. Edward took possession of Calais August 4th; and in order to secure a conquest of so great importance, and which had cost him so dear, he found it necessary to turn out all the ancient inhabitants, who had discovered so strong an attachment to their native prince, and to people it with English. Calais remained in subjection to England till the reign of queen Mary, when it was retaken by the duke of Guife. This general began the enterprise by ordering the privateers of Normandy and Breagute to cruise in the channel, more especially in the very straits of Calais; he then detached the duke of Nevers, with a considerable army, towards the country of Luxembourg; a motion which drew the attention of the Spaniards that way: when all things were ready, he procured an application from the people Boulogne, for a body of troops to secure them against the incursions of the Spaniards; he sent a strong detachment at their request, which was followed by another, under colour of supporting them, then repaired thither in person, secure that his officers would follow his instructions; and thus, on the first day of the new year, 1557, Calais was invested. He immediately attacked
and retired I, received from officers with 1,000 was easily carried, though the governor made three considerable number of men, kept their posts; lodge them; but the French, gorgeous attacks before the break of day, in order make a better defence; and therefore, when the lord the best terms for himself that he able to bear arms. and here were not more than 10,000, was refused, it being believed to be only an attempted the design of the French upon this fortress, to be attacked hands. The truth of the matter seems to be this: Some gave notice of it. There are very different accounts given of this matter: Some English historians say, that king Philip penetrated the design of the French upon this fortress, gave notice of it in England, and offered to take the defence of it upon himself; but that this, out of jealousy, was refused, it being believed to be only an artifice to get a place of such consequence into his own hands. The truth of the matter seems to be this: The strength of Calais confisted in its situation and outworks, which required a very numerous garrison; but this being attended with a very large expence, the best part of the troops had been sent to join Philip's army, so that the governor had not above 500 men, and there were not more than 250 of the townsmen able to bear arms. As to ammunition, artillery, and provisions, the French found there abundance, but with to render a garrison, that it was impossible to make a better defence; and therefore, when the lord Wentworth, who was governor, and whom the French call lord Damfort, was tried by his peers for the loss of this place, he was acquitted. The duke obliged all the English inhabitants to quit Calais; and beflowered the government of it upon des Termes, who was soon after made a marshall of France.

The fortifications of Calais are good; but its great-st strength is its situation among the marshes, which may be overflowed at the approach of an enemy. The harbour is not so good as formerly, nor will it admit vessels of any great burden. In times of peace, there are packet-boats going backward and forward twice a week from Dover to Calais, which is 21 miles distant. E. Long. 2. 6. N. Lat. 50. 56.

Calais and Zeetes, in fabulous history, sons of Bo-

...
CALAMUS, in botany. See Melissa, and Mentha.

CALAMUS, in botany: A genus of the monogynous order, belonging to the hexandria class of plants; and in the natural method ranking under the 5th order, Tripelaloidae. The calyx is hexaphyllous, there is no corolla, the fruit is a dry monosperous berry, imbricated backwards. There is but one species, the rotag; the stem is without branches, has a crown at top, and is every where beft with straight spines. This is the true Indian cane, which is not visible on the outside; but the bark being taken off discovers the smooth flick, which has no marks of spine on the bark, and is exactly like those which the Dutch fell to us; keeping this matter very secret, left travellers going by should take as many canes out of the woods as they please. Sumatra is said to be the place where most of these flicks grow. Such are to be chosen as are of proper growth between two joints, suitable to the fashionable length of canes as they are then worn: but such are scarce.—The calamus rotang is one of several plants from which the drug called Dragon’s-blood is obtained.

CALAMUS, in the ancient poets, denotes a simple kind of pipe or fistula, the musical instrument of the shepherds and herdsmen; usually made either of an oaten flalk or a reed.

CALAMUS Aromaticus, or Sweet-scented Flag, in the materia medica, a species of flag called aorus by Linnaeus. See Acorus.

CALAMUS Scriptrarius, in antiquity, a reed or rush to write with. The ancients made use of styles to write on tables covered with wax; and of reed, or rushes, to write on parchment, or Egyptian paper.

CALAMY (Edmund), an eminent Presbyterian divine, born at London in the year 1600, and educated at Pembroke-hall, Cambridge, where his attachment to the Arminian party excluded him from a fellowship. Dr Felton bishop of Ely, however, made him his chaplain; and, in 1639, he was chosen minister of St Mary Aldermay, in the city of London. Upon the opening of the long parliament, he distinguished himself in defence of the Presbyterian cause; and had a principal hand in writing the famous Sermo Synodicus, which, himself says, gave the start of Republicanism in England. The authors of this tract were five, the initials of whose names formed the name under which it was published; viz. Stephen Marishal, Edmund Calamy, Thomas Young, Matthew Newcomen, and William Sparrow.

He was after that an active member in the assembly of divines, was a fierce opposer of sectarism, and used his utmost endeavours to prevent those violations committed after the king was brought from the island of Wight. In Cromwell’s time he lived privately, but was illustrious in promoting the king’s return, for which he was afterwards offered a bishopric, but refused it. He was ejected for nonconformity in 1662; and died of grief at the sight of the great fire of London.

CALAMY (Edmund), grandson to the preceding (by his eldest son Mr Edward Calamy, who was ejected out of the living of Moxton in Essex on St Bartholomew’s day 1662), was born in London, April 5th 1671. After having learned the languages, and gone through a course of natural philosophy and logic at a private academy in England, he studied philosophy and civil law at the university of Utrecht, and attended the lectures of the learned Gravius. Whilst he resided here, an offer of a professor’s chair in the university of Edinburgh was made him by Mr Carlairs, principal of that university, sent over on purpose to find a person properly qualified for such an office. This he declined; and returned to England in 1691, bringing with him letters from Gravius to Dr Pocock canon of Christ church and regius professor of Hebrew, and to Dr Bernard Savilian professor of astronomy, who obtained leave for him to prosecute his studies in the Bodleian library. Having resolved to make divinity his principal study, he entered into an examination of the controversy between the conformists and non-conformists; which determined him to join the latter: and coming to London in 1692, he was unanimously chosen affidavit to Mr Matthew Sylvester at Blackfriars; and in 1694, he was ordained at Mr Annelfy’s meetinghouse in Little St Helen, and soon after was invited to become assistant to Mr Daniel Williams in Hand Alley. In 1702, he was chosen to be one of the lecturers in Salter’s-hall; and, in 1703, succeeded Mr Vincent Allot as pastor of a great congregation in Westminster. He drew up the table of contents to Mr Baxter’s history of his life and times, which was sent to the press in 1696; made some remarks on the work itself, and added to it an index; and, reflecting on the usefulness of the book, he saw the expediency of continuing it, for Mr Baxter’s history came no lower than the year 1684. Accordingly he composed an abridgment of it, with an account of many other ministers who were ejected after the restoration of Charles II.; their apology, containing the grounds of their non-conformity and practice as to the liturgy, and the useful sermons and other writings necessary to his history, till the year 1691. This work was published in 1702. He afterwards published a moderate defence of nonconformity, in three tracts, in answer to some tracts of Dr Hoadley. In 1709, Mr Calamy made a tour to Scotland; and had the degree of doctor of divinity conferred on him by the universities of Edinburgh, Aberdeen, and Glasgow. In 1713, he published a second edition of his Abridgment of Mr Baxter’s history of his life and times, which, among other additions, there is a continuation of the chirography through King William’s reign, and Queen Anne’s, down to the passing of the occasional bill; and in the close is subjoined the reformed liturgy, which was drawn
that this was a common practice among protestants. The officers of justice adopted the popular tale, and were supplied by the mob with what they accepted as evidences of the fact. The fraternity of white penitents got the body, buried it with great ceremony, and performed a solemn service for him as a martyr; the Franciscans did the same; and after these formalities no one doubted the guilt of the devoted heretical family. They were all condemned to the torture, to bring them to confession: they appealed to the parliament, who, as weak and as wicked as the subordinate magistrates, sentenced the father to the torture ordinary and extraordinary, to be broken alive upon the wheel, and then to be burned to ashes. A diabolical decree! which, to the shame of humanity, was actually carried into execution. Peter Calas, the other son, was banished for life; and the rest were acquitted. The distraught widow found some friends, and among the rest M. Voltaire, who laid her case before the council of state at Versailles, and the parliament of Thoulouze were ordered to transmit the proceedings. There the king and council unanimously agreed to annul; the capitoul, or chief magistrate of Thoulouze, was degraded and fined; old Calas was declared to have been innocent; and every imputation of guilt was removed from the family, who also received from the king and clergy considerable gratuities.

CALASH, or Caleo, a small light kind of chariot or chair, with very low wheels, used chiefly for taking the air in parks and gardens. The calash is for the most part richly decorated, and open on all sides for the convenience of the air and prospect, or at most indlosed with light mantlets of wax-cloth to be opened and shut at pleasure. In the Philosophical Transactions we have a description of a new sort of calash going on two wheels, not hung on traces, yet easier than the common coaches, over which it has this further advantage, that whereas a common coach will overturn if one wheel go on a surface a foot and a half higher than the other, this will admit of a difference of 3 feet without danger of overturning. Add, that it should turn over and over; that is, after the spokes being so turned as that they are parallel to the horizon, and one wheel flat over the head of him that rides in it, and the other flat under him, it will turn once more, by which the wheels are placed in statu quo, without any disorder to the horse or rider.

CALASIO (Marius), a Franciscan, and professor of the Hebrew language at Rome, of whom there is very little to be said, but that he published there, in the year 1621, a Concordance of the Bible, which consisted of four great volumes in folio. This work has been highly approved and commended both by Protestants and Papists, and is indeed a most admirable work. For besides the Hebrew words in the Bible, which are in the body of the book with the Latin version over against them; there are, in the margin, the differences between the Septuagint version and the vulgate; so that at one view may be found wherein the three Bibles agree, and wherein they differ. Moreover, at the beginning of every article there is a kind of dictionary, which gives the signification of each Hebrew word; affords an opportunity of comparing it with other oriental languages, viz. with the Syriac, Arabic, and Chaldee; and is extremely useful...
CALAFIRIS, for determining more exactly the true meaning of the Hebrew words.

CALASIRIS, in antiquity, a linen tunic fringed at the bottom, and worn by the Egyptians under a white woollen garment; but this last they were obliged to pull off when they entered the temples, being only allowed to appear there in linen garments.

CALATAJUD, a large and handsome town of Flanders, situated at the confluence of the rivers Xalmon and Xlioca, at the end of a very fertile valley, with a good castle on a rock.

W. Long. 2. p. N. Lat. 47. 22.

CALATHUS, as represented on ancient monuments, is it, returned it him again. Then Don Reymond, of the order of the Calatrava to the Moorish of Andalusian, he gave do. W. Long. 4.

CALATRAVA, a city of New Caste, in Spain, situated on the river Guadiana, 45 miles south of Toledo.

W. Long. 4. 20. N. Lat. 39. 0.

Knights of CALATRAVA, a military order in Spain, instituted at the Spanish town of Calatrava, upon the following occasion. When that prince took the fortress of Calatrava from the Moors of Andalusia, he gave it to the templars, who, wanting courage to defend it, returned it him again. Then Don Reymond, of the order of the Cistercians, accompanied with several persons of quality, made an offer to defend the place, which the king thereupon delivered up to them, and instuted that order. It increased so much under the reign of Alphonso, that the knights desired they might have a grand master, which was granted. Ferdinand and Isabella afterwards, with the consent of pope Innocent VIII. re-united the grand mastership of Calatrava to the Spanish crown; so that the kings of Spain are now become perpetual administrators thereof.

The knights of Calatrava bear a crown of gules, flowered, with green, &c. Their rule and habit was originally that of the Cistercians.

CALAURIA, (anc. geog) an island of Greece in the Saronic bay, over against the port of Trozen, at a distance of 40 stadia. Hither Demosthenes went twice into banishment; and here he died. Neptune was said to have accepted this island from Apollo, in exchange for Delos. The city stood on a high ridge nearly in the middle of the island, commanding an extensive view of the gulph and its coasts. There was his holy temple. The priestess was a virgin, who was dismissed when marriageable. Seven of the cities near this island held a congress at it, and sacrificed jointly to the deity. Athens, Egin, and Epidaurus were of this number, with Nauplia, for which place Argos contributed. The Macedonians, when they had reduced Greece, were afraid to violate the sanctuary, by forcing from it the fugitives, his suppliants. Antipater commanded his general to bring away the orators who had offended him, alive; but Demosthenes could not be prevailed on to surrender. His monument remained in the second century, within the cloister of the temple. The city of Calauria has been long abandoned. Traces of buildings, and of ancient walls, appear nearly level with the ground; and some flones, in their places, each with a seat and back, forming a little circle, once perhaps a bath. The temple, which was of the Doric order, and not large, as may be inferred from the fragments, is reduced to an inconsiderable heap of ruins. The island is now called Poro. It stretches along before the coast of the Morea in a lower ridge, and is separated from it by a canal only four stadia or half a mile wide. This, which is called Poro or the Ferry, in still weather may be passed on foot, as the water is not deep. It has given its name to the island, and also to the town, which consists of about 200 houses, mean and low, with flat roofs; rising on the slope of a bare disagreeable rock.

CALCADA, or St Dimiento CALCADA, a town of Spain, situated in W. Long. 3. 5. N. Lat. 42. 36.

CALCAR, a very strong town of Germany, in the circle of Westphalia, and duchy of Cleves. It belongs to the king of Prussia, and is seated near the Rhine, in E. Long. 5. 41. N. Lat. 51. 45.

CALCAR, in glas-making, the name of a small oven, or reverberatory furnace, in which the first calcination of sand and salt of potash is made for the turning them into what is called frit. This furnace is made in the fashion of an oven ten feet long, seven broad in the widest part, and two feet deep. On one side of it is a trench six inches square, the upper part of which is level with the calcar, and separated only from it by the mouth by bricks nine inches wide. Into this trench they put sea-coal, the flame of which is carried into every part of the furnace, and is reverberated from the roof upon the frit, over the surface of which the smoke flies very black, and goes out at the mouth of the calcar; the coals burn on iron grates, and the ashes fall through.

CALCAR (John de), a celebrated painter, was the disciple of Titian, and perfected himself by studying Raphael. Among other pieces he drew a nativity, representing the angels and the infant Christ; and so ordered the disposition of his picture, that the light all proceeds from the child. He died at Naples, in 1546, in the flower of his age. It was he who designed the anatomical figures of Vesal, and the portraits of the painters of Vesal.

CALCAROUS, something that partakes of the nature and qualities of calc, or lime. We say, a calcareous earth, calcareous stone. See CHEMISTRY-Index.

CALCARIUM, in antiquity, a donative or largess beffowed on Roman folders for buying shoes. In monasteries, calcarium denoted the daily service of cleaning the shoes of the religious.
CALCEOLARIA, in botany, a genus of the monogynia order, belonging to the diandria class of plants. The corolla is ringent and inflated; the calyx has two cells, and two valves; the calyx four parted and equal.

CALCHAS, in fabulous history, a famous diviner, followed the Greek army to Troy. He foretold that the siege would last ten years; and that the fleet, which was detained in the port of Aulis by contrary winds, would not sail till Agamemnon's daughter had been sacrificed to Diana. After the taking of Troy, he retired to Colophon; where, it is said, he died of grief, because he could not divine what another of his profession, called Mopsus, had discovered.

CALCULATION, in chemistry, the reducing of substances to a calx by fire. See Chemistry-Index.

CALCINATO, a town of Italy, in the duchy of Mantua, remarkable for a victory gained over the Imperialists by the French in 1706. E. Long, 9. 55. N. Lat. 45 25.

CALCULARY of a PEAR, a congeries of little strong knots dispersed through the whole parenchyma of the fruit. The calculary is most observed in rough-tasted or chock-pears. The knots lie more continuous and compact together towards the pear where they surround the acetary. About the stalk they stand more distant; but towards the cork, or flesh of the flower, they still grow closer, and there at last gather into the firmness of a plum-flone. The calculary is no vital or essential part of the fruit; the several knots whereof it consists being only so many concretions or precipitations out of the sap, as we see in urines, wines, and other liquors.

CALCULATION, the act of computing several sums, by adding, subtracting, multiplying, or dividing. See Arithmetic.

Calculation is more particularly used to signify the computations in astronomy and geometry, for making tables of logarithms, ephemerides, finding the time of eclipses, &c. See Astronomy, Geometry, and Logarithms.

CALCULUS, primarily denotes a little stone or pebble, anciently used in making computations, taking of suffrages, playing at tables, and the like. In aftertimes, pieces of ivory, and counters struck of silver, gold, and other matters, were used in lieu thereof, but still retaining the ancient names. Computals were by the lawyers called calculones, when they were either slaves or newly freed men; those of a better condition were named calculatores or numerariss; ordinarily there was one of these in each family of distinction. The Roman judges anciently gave their opinions by calculi, which were white for abolition, and black for condemnation. Hence calculus albus, in ancient writers, denotes a favourable vote, either in a person to be absolved and acquitted of a charge, or elected to some dignity or post; as calculus niger did the contrary. This usage is said to have been borrowed from the Thracians, who marked their happy or prosperous days by white, and their unhappy by black, pebbles, put each night into an urn.

Besides the diversity of colour, there were some calculi also which had figures or characters engraved on them, as those which were in use in taking the suffrages both in the senate and at assemblies of the people. These calculi were made of thin wood, polished and covered over with wax. Their form is still seen in some medals of the Caflian family; and the manner of calling them into the urns, in the medals of the Licinius family. The letters marked upon these calculi were U. R. for uti regat, and A. for antiquo; the first of which expressed an approbation of the law, the latter a rejection of it. Afterwards the judges who sat in capitol caesus used calculi marked with the letter A. for abfolute; C. for condemnans, and N. L. for non liquet, signifying that a more full information was required.

Calculation is also used in ancient grammatic writers for a kind of weight equal to two grains of cicer. Some make it equivalent to the litre, which is equal to three grains of barley. Two calculi made the ceratium.

CALCULUS Differentialis is a method of differing quantities, or of finding an infinitely small quantity, which, being taken infinite times, shall be equal to a given quantity; or, it is the arithmetic of the infinitely small differences of variable quantities.

The foundation of this calculus is an infinitely small quantity, or an infinitesimal, which is a portion of a quantity incomparable to that quantity, or that is less than any assignable one, and therefore accounted as nothing; the error accruing by omitting it being less than any assignable one. Hence two quantities, only differing by an infinitesimal, are reputed equal. Thus, in Astronomy, the diameter of the earth is an infinitesimal, in respect of the distance of the fixed stars; and the fame holds in abstract quantities. The term, infinitesimal, therefore, is merely relative, and involves a relation to another quantity; and does not denote any real ens, or being. Now infinitesimals are called differentials, or differential quantities, when they are considered as the differences of two quantities.

Sir Isaac Newton calls them momenta; considering them as the momentary increments of quantities, v. g. of a line generated by the flux of a point, or of a surface by the flux of a line. The differential calculus, therefore, and the doctrine of fluxions, are the fame thing under different names; the former given by M. Leibnitz, and the latter by Sir Isaac Newton; each of whom lay claim to the discovery. There is, indeed, a difference in the manner of expressing the quantities resulting from the different views wherein the two authors consider the infinitesimals, the one as moments, the other as differences; Leibnitz, and most foreigners, express the differentials of quantities by the same letters as variable ones, only prefixing the letter d: thus the differential of x is called d x; and that of y, d y; now d x is a positive quantity, if x continually increase; negative, if it decrease. The English, with Sir Isaac Newton, instead of d x write x (with a dot over it); for d y, &c. which foreigners object again, on account of that confusion of points, which they imagine arises when differentials are again differentiated, besides, that the printers are more apt to overlook a point than a letter. Stable quantities being always expreessed by the first letters of the alphabet d a = x, d b = y, d c = z; wherefore d (x + y) = d x + d y, and d (x - y) = d x - d y. So that the differentiating of quantities is easily performed, by the addition or subtraction of their compounds.

To difference quantities that multiply each other; the rule is, first, multiply the differential of one factor into the other factor, the sum of the two factors is the differential sought; thus, the quantities being x, y, the dif-
Calculus. differential will be \( x \cdot dy + y \cdot dx \), i.e. \( d(xy) = x \cdot dy + y \cdot dx \). Secondly, if there be three quantities mutually multiplying each other, the product of the two must then be multiplied into the differential of the third: thus suppose \( v \cdot x \cdot y \), let \( v = x \), then \( v \cdot x \cdot y \cdot dx \); consequently \( d(v \cdot x \cdot y) = d(v) \cdot x \cdot y + v \cdot d(x \cdot y) \). These values, therefore, being subtilized in the antecedent differential, \( d(x \cdot y) \cdot d(v) \), the result is, \( d(v \cdot x \cdot y) = d(v) \cdot x \cdot y + v \cdot d(x \cdot y) \). Hence it is easy to apprehend how to proceed, where the quantities are more than three. If one variable quantity increases, while the other decreases, it is evident that \( x \cdot dx - x \cdot dy \) will be the differential of \( x \cdot y \).

To differentiate quantities that mutually divide each other; the rule is, first, multiply the differential of the divisor into the dividend; and on the contrary, the differential of the dividend into the divisor; subtract the last product from the first, and divide the remainder by the square of the divisor; the quotient is the differential of the quantities mutually dividing each other. See Fluxions.

**Calculus Exponentialis.** is a method of differencing exponential quantities, or of finding and summing up the differentials or moments of exponential quantities; or at least bringing them to geometrical confections.

By exponential quantity, is here understood a power, whose exponent is variable; e.g. \( x^a \cdot a^x \cdot x' \). where the exponent \( x \) does not denote the same at all the points of a curve, but in some stands for 2, in others for 3, in others for 5, &c.

To difference an exponential quantity; there is nothing required but to reduce the exponential quantities to logarithmic ones, which done, the differencing is managed as in logarithmic quantities.—Thus, suppose the differential of the exponential quantity \( x \) required, let 

\[ x^2 = x \]

Then will \( y \cdot x = x \cdot dy \)

\[ 1 \cdot x \cdot dy + y \cdot dx = \frac{d x}{x} = \frac{d z}{x} \]

That is, \( x \cdot l x \cdot dx + x \cdot d y + x' = \cdot d x = d z \).

**Calculus Integralis, or Summatorius.** is a method of integrating, or summing up moments, or differential quantities; i.e. from a differential quantity given, to find the quantity from whose differencing the given differential results.

The integral calculus, therefore, is the inverse of the differential one: whence the English, who usually call the differential method fluxions, give this calculus, which ascends from the fluxions, to the flowing or variable quantities; or, as foreigners exprefs it, from the differences to the sums, by the name of the inverse method of fluxions.

Hence, the integration is known to be justly performed, if the quantity found, according to the rules of the differential calculus, being differenced, produce that proposed to be summed.

Suppose \( f \) the sign of the sum, or integral quantity, then \( f \cdot dx \) will denote the sum, or integral of the differential \( x \cdot dx \).

To integrate, or sum up a differential quantity: It is demonstrated, first, that \( f \cdot dx \cdot x = \) secondly, \( f \cdot (d(x+y)) = x \cdot dx \); thirdly, \( f \cdot (d(x+y)) = x \cdot dx + y \cdot dy \); fourthly, \( f \cdot (x^m \cdot dx) = \frac{dx}{x^1} \cdot \frac{d x}{x^2} \cdot \frac{d x}{x^3} \cdot \frac{d x}{x^4} \cdot \frac{d x}{x^5} \).

Sixthly, \( f \cdot (x \cdot dx) = y \cdot dy \). Of these, the fourth and fifth cases are the most frequent, wherein the differential quantity is integrated, by adding a variable unity to the exponent, and dividing the sum by the next exponent multiplied into the differential of the root, viz. the fourth case, by \( m \cdot (1 + 1) \cdot dx \), i.e. by \( m \cdot dx \).

If the differential quantity to be integrated doth not come under any of these formulas, it must either be reduced to an integral finite, or an infinite series, each of whose terms may be summed.

It may be here observed, that, as in the analysis of finites, any quantity may be raised to any degree of power; but vice versa, the root cannot be extracted out of any number required: so in the analysis of infinites, any variable or flowing quantity may be differenced; but vice versa, any differential cannot be integrated. And as, in the analysis of finites, we are not yet arrived at a method of extracting the roots of all equations, so neither has the integral calculus arrived at its perfection: and as in the former we are obliged to have recourse to approximation, so in the latter we have recourse to infinite series, where we cannot attain to a perfect integration.

**Calculus Literalis, or Literal Calculus.** is the same with spheric arithmetic, or algebra, so called from its using the letters of the alphabet; in contradistinction to numeral arithmetic, which uses figures. In the literal calculus given quantities are expreseed by the first letters, \( a b c d \); and quantities sought by the last \( x y z \), &c. Equal quantities are denoted by the same letters.

**Calculus Minus.** among the ancient lawyers, denoted the decision of a cause, wherein the judges were equally divided. The expression is taken from the history of Orestes, represented by Achilles and Euripides; at whose trial, before the Areopagites, for the murder of his mother, the votes being equally divided for and against him, Minerva interposed, and gave the casting vote or calculus in his behalf.

M. Cramer, professor at Marpurg, has a discourse expres, De Calculo Minus; wherein he maintains, that all the effect an entire equality of voices can have, is to leave the cause in flagr quo.

**Calculus Tihurrinus.** a sort of figured stone, formed in great plenty about the cata¬ractis of the Anio, and other rivers in Italy; of a white colour, and in shape oblong, round, or echinated. They are a species of the flille lapides, and generated like them; and so like sugar-plums in the whole, that is a common jest at Rome to deceive the inexperienced by serving them up as dates.

**Calculus.** in Medicine, the disease of the stone in the bladder, or kidneys. The term is Latin, and signifies a little pebble. The calculus in the bladder is called lithiasis; and in the kidneys, nephritis. See Medicine and Surgery.

Human calculi are commonly formed of different strata.
CALCUTTA, the capital of the province of Bengal, and of all the British possessions in the East-Indies, is situated on the river Hugely, a branch of the Ganges, about 100 miles from the sea, in N. Lat. 23: 30, and 88° 28'. E. Long. from Greenwich. It is but a small city, built on the site of a village called Gemindpoor. The English first obtained the Mogul's permission to settle in this place in the year 1690; and Mr. Job Channock, the company's agent, made choice of the spot on which the city stands, on account of a large shady grove which grew there; though in other respects it was the worst he could have pitched upon; for three miles to the north coast, there is a salt-water lake, which overflows in September, and when the flood retires in December, leaves behind such a quantity of fish and other putrefactive matter, as renders the air very unhealthy. The custom of the Gentooos throwing the dead bodies of their poor people into the river is also very disgraceful, and undoubtedly contributes to render the place unhealthy, as well as the cause already mentioned.

Calcutta is now become a large and populous city, being suppos'd at present to contain 500,000 inhabitants. It is elegantly built, at least the part inhabited by the English; but the rest, and that the greatest part, is built after the fashion of the cities of India in general. The plan of all these is nearly the same; their streets are exceedingly confined, narrow, and crooked, with a vast number of ponds, reservoirs, and gardens intermixed. A few of the streets are paved with brick. The houses are built, some with brick, others with mud, and a still greater number with bamboos and mats; all which different kinds of fabrics standing intermixed with one another, form a very unceon appearance. The brick houses are seldom above two stories high, but those of mud and bamboos are only one, and are covered with thatch. The roofs of the brick houses are flat and terraced. These, however, are much fewer in number than the other two kinds; so that fires, which often happen, do not sometimes meet with a brick house to obstruct their progress in a whole street. Within these 20 or 25 years Calcutta has been greatly improved both in appearance and in the salubrity of its air: the streets have been properly drained, and the ponds filled; thereby removing a vast surface of stagnant water, the exhalations of which were particularly hurtful. The citadel is named Fort William, and is superior as a fortress to any in India; but is now on too extensive a scale to answer the purpose for which it was intended, viz. the holding a post in case of extremity. It was begun on this extended plan by lord Clive immediately after the battle of Plassey. The expense attending it was supposed to amount to two millions Sterling.

Calcutta is the emporium of Bengal, and the residence of the governor-general of India. Its flourishing state may in a great measure be ascribed owing to the unlimited toleration of all religions allowed here; the Pagans being suffered to carry their idols in procession, the Mahomedans not being discommoded, and the Roman Catholics being allowed a church. At about a mile distant from the town is a plain where the natives annually undergo a very strange kind of penance on the 9th of April; some for the sins they have committed, others for those they may commit, and others in consequence of a vow made by their parents. This ceremony is performed in the following manner. Thirty bamboos, each about the height of 20 feet, are erected in the plain abovementioned. On the top of these they contrive to fix a swivel, and make two Copies of a rod of thirty feet or more crossed it, at both ends of which hangs a rope. The people pull down one end of this rope, and the devotee placing himself under it, the Brahmin pinches up a large piece of skin under both the shoulder blades, sometimes in the breasts, and thrusts a strong iron hook through each. These hooks have lines of Indian brass hanging to them, which the priest makes fast to the rope at the end of the cros fame, and at the same time puts a fast round the body of the devotee, laying it loosely in the hollow of the hooks, left by the skin's giving way, when the rope is pulled. When this is done, the people haul down the other end of the bamboo; by which means the devotee is immediately lifted up 30 feet or more from the ground, and they run round as fast as their legs can carry them. Thus the devotee is thrown out the whole length of the rope, where, as he swings, he plays a thousand antics tricks; being painted and dressed in a very particular manner, on purpose to make him look more ridiculous. Some of them continue swinging half an hour, others less. The devotees undergo a preparation of four days for this ceremony. On the first and third they abstain from all kinds of food; but eat fruit on the other two. During this time of preparation they walk about the streets in their fantastic dresses, dancing to the sound of drums and horns; and some, to express the greater amount of devotion, run a rod of iron quite through their tongues, and sometimes through their cheeks also.

Before the war of 1755, Calcutta was commonly garrisoned by 300 Europeans, who were frequently employed in conveying the company's veesels from Patna, loaded with salt-petre, piece-goods, opium, and raw silk. The trade of Bengal alone supplied rich cargoes for 50 or 60 ships annually, besides what was carried on in small vessels to the adjacent countries. It was this flourishing state of Calcutta that probably was one motive for the Nabob Surajah Dowlah to attack it in the year 1756. Having had the fort of Cooimbazar delivered up to him, he marched against Calcutta with all his forces, amounting to 70,000 horse and foot,
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with 400 elephants, and invested the place on the 15th of June. Previous to any hostilities, however he wrote a letter to Mr Drake the governor, offering to withdraw his troops, on condition that he would pay him his duty on the trade for 15 years past, defray the expense of his army, and deliver up the black merchants who were in the fort. This being refused, he attacked one of the redoubts at the entrance of the town; but was repulsed with great slaughter. On the 16th he attacked another advanced post, but was likewise repulsed with great loss. Withstanding this disappointment, however, the attack was renewed on the 18th, when the troops abandoned these posts, and retreated into the fort; on which the Nabob's troops entered the town, and plundered it for 24 hours. An order was then given to attacking the fort; for which purpose a small breast-work was thrown up, and two twelve pounders mounted upon it; but without firing oftener than two or three times an hour. The governor then called a council of war, when the captain of the train informed them, that there was not ammunition in the fort to serve three days; in consequence of which the principal ladies were sent on board the ships lying before the fort. They were followed by the governor, who declared himself a quaker, and left the place to be defended by Mr Holwell the second in council. Besides the governor, four of the council, eight gentlemen in the company's service, four officers, and 100 soldiers, with 52 free merchants, captains of ships, and other gentlemen, escaped on board the ships, where were also 59 ladies, with 53 of their children. The whole number left in the fort were about 250, effective men, with Mr Holwell, four captains, five lieutenants, six ensigns, and five fergeants; as also 14 fers-captains, and 20 gentlemen of the factory. Mr Holwell then having held a council of war, divided three chests of treasure among the discontented soldiers; making them large promises also, if they behaved with courage and fidelity; after which he boldly fixed on the business of the place, and advancing the immense force which opposed him. The attack was very vigorous; the enemy having got possession of the houfes, called the English from thence, and drove them from the battlements; but they themselves were several times dislodged by the fire from the fort, which killed upwards of 12,000 men, with the loss of only five English folders the first day. The attack, however, was continued till the afternoon of the 20th; when many of the garrifon being killed and wounded, and their ammunition almost exhausted, a flag of truce was hung out. Mr Holwell intended to have availed himself of this opportunity to make his escape on board the ships, but they had fallen several miles down from the fort, without leaving even a single boat to facilitate the escape of those who remained. In the mean time, however, the back-gate was betrayed by the Dutch guard, and the enemy, entering the fort, killed all they first met, and took the rest prisoners.

The fort was taken before fix in the evening; and, in an hour after, Mr Holwell had three audiences of the Nabob, the last being in the darbar or council. In all the governor had the most positive assurances that no harm should happen to any of the prisoners; but he was surprized and enraged at finding only 5000l. in the fort, instead of the immense treasures he expected; and to this, as well as perhaps to the resentment of the jemmidades or officers, of whom many were killed in the siege, we may impute the catastrophe that followed.

As soon as it was dark, the English prisoners, to the number of 146, were directed by the jemmidades who guarded them, to collect themselves into one body, and set down quietly under the arched veranda, or piazza, to the westward of the black-hole prison. Besides the guard over them, another was placed at the fourth-end of this veranda, to prevent the escape of any of them. About 500 gunmen, with lighted matches, were drawn up on the parade; and soon after the factory was in flames to the right and left of the prisoners, who had various conjectures on this appearance. The fire advanced with rapidity on both sides; and it was the prevailing opinion of the English, that they were to be suffocated between the two fires. On this they soon came to a resolution of rushing on the guard, seizing their scymitars, and attacking the troops upon the parade, rather than be thus tamely roasted to death: but Mr Holwell advanced, and found the Moors were only searching for a place to confine them in. At that time Mr Holwell might have made his escape, by the assistance of Mr Leech, the company's smith, who had escaped when the Moors entered the fort, and returned just as it was dark, to tell Mr Holwell he had provided a boat, and would ensure his escape, if he would follow him through a passage few were acquainted with, and by which he then entered. This might easily have been accomplished, as the guard took little notice of it: but Mr Holwell told Mr Leech, he was resolved to share the fate of the gentlemen and the garrifon; to which Mr Leech gallantly replied, that "then he was resolved to share Mr Holwell's fate, and would not leave him."

The guard on the parade advanced, and ordered them all to rise and go into the barracks. Then, with their muskets prefented, they ordered them to go into the black-hole prison; while others with clubs and scymitars, pressed upon them so strong, that there was no resisting it; but, like one agitated wave impelling another, they were obliged to give way and enter; the rest following like a torrent. Few among them, the soldiers excepted, had the least idea of the dimensions or nature of a place they had never seen; for if they had, they should at all events have rushed upon the guard, and been cut to pieces by their own choice as the leffer evil.

It was about eight o'clock when these 146 unhappy persons, exhausted by continual action and fatigue, were thus plunged into a dungeon about eighteen feet square, in a close, fufy night in Bengal; shut up to the east and south, the only quarters from whence air could reach them, by dead walls, and by a wall and door to the north; open only to the west by two windows, strongly barred with iron, from which they could receive scarce any circulation of fresh air.

They had been but few minutes confined before every one fell into a perspiration so profuse, that no idea can be formed of it. This brought on a raging thirst, which increased in proportion as the body was drained of its moisture. Various expedients were thought
CALCUTTA, thought of to give more room and air. Every man was stripped, and every hat put in motion; they several times sat down on their hams; but at each time several of the poor creatures fell, and were instantly suffocated or trod to death.

Before nine o'clock every man's thirst grew intolerable, and respiration difficult. Efforts were again made to force the door; but still in vain. Many insults were used to the guards, to provoke them to fire in upon the prisoners, who gave outrageous, and many delirious. “Water, water,” became the general cry. Some water was brought; but these suplities, like sprinkling water on fire, only served to raise and feed the flames. The confusion became general, and horrid from the cries and ravings for water, and some were trampled to death. This scene of misery proved entertainment to the brutal wretches without, who supplied them with water, that they might have the satisfaction of seeing them fight for it, as they phrased it; and held up lights to the bars, that they might lose no part of the inhuman diversion.

Before eleven o'clock, most of the gentlemen were dead, and one third of the whole. Thirst grew intolerable: but Mr Holwell kept his mouth moist by sucking the perspiration out of his shirt-sleeves, and catching the drops as they fell, like heavy rain, from his head and face. By half an hour after eleven, most of the living were in an outrageous delirium. They found that water heightened their uneasiness; and “Air, air,” was the general cry. Every insuff that could be devised against the guard, all the opprobrious names that the victor and his officers could be loaded with, were repeated to provoke the guard to fire upon them. Every man had eager hopes of meeting the first shot. Then a general prayer to heaven, to hasten the approach of the flames to the right and left of them, and put a period to their misery. Some expired on others; while a steam arose as well from the living as the dead, which was very offensive.

About two in the morning, they crowded so much to the windows, that many died standing, unable to fall the like thieves and robbers preface round. When the day broke, the fence arising from the dead bodies was insufferable. At that juncture, the Susah, who had received an account of the havoc death had made among them, sent one of his officers to enquire if the chief survived. Mr Holwell was shown to him; and near fix an order came for their release. Thus they had remained in this infernal prison from eight at night until fix in the morning, when the poor remains of 146 souls, being only 23, came out alive, but most of them in a high putrid fever. The dead bodies were dragged out of the hole by the folder, and thrown promiscuously into the ditch of an unmingled ravine, which was afterwards filled with earth.

The injuries which Calculta, suffered at this time, however, were soon repaired. The place was retaken by Admiral Watson and Colonel Clive, early in 1757; Surajah Dowla was defeated, deposed, and put to death; and Meer Jaffier, who succeeded him in the Nabobship, engaged to pay an immense sum for the indemnification of the inhabitants. Since that time the immense acquisition of territory by the Brit-
C A L D E R W O O D.

bar presided as a commissioner; and it appears from his writings, that he looked upon every thing transacted in it as null and void. In May following, king James went to Scotland; and on the 17th of June held a parliament at Edinburgh: at that time the clergy met in one of the churches, to hear and advise with the bishops; which kind of assembly, it seems, was contrived in order to resemble the English convocation. Mr Calderwood was present at it, but declared publicly that he did not take any such meetings to resemble a council, and being opposed by that he did not take any such meetings to resemble a council, and being opposed by Dr Whitford and Mr Archibald Simson on behalf of the church of England. They protested for several reasons. This protest was presented to the king, with the advice of the archbishops, and such a number of the ministry, as his Majesty should think proper, to consider and conclude as to matters decent for the external policy of the church, not respecting reformation, it might be a pattern to others. Because their church was esteemed in order to proceed in the mean while in the dispatch of business; and Mr Calderwood, with several other ministers, being informed that a bill was depended on the states in parliament. However, though not made of copper; having a moveable iron handle, whereby to hang it on the chimney-hook. The word is formed from the French chaudron, or rather the Latin caldarium.

Boiling in CALDRON (caldarium decoque), is a capital punishment spoken of in the middle-age writers, decreed to divers sorts of criminals, but chiefly to debaters of the coin. One of the torments inflicted on the ancient Christian martyrs, was boiling in caldrons of water, oil, &c.

Caldwell (Richard), a learned English physician, born in Staffordshire about the year 1572. He studied physic in Brazen-Nose college Oxford; and was examined, admitted unto, and made censor of the college of physicians at London, all in one day. Six weeks after he was chosen one of the electors; and in the year 1570 was made president of that college. Mr Wood tells us, that he wrote several pieces in his profession; but he does not tell us what they were, only that he translated a book on the art of surgery, written by one Horatio More, a Florentine physician. We learn from Cambden, that Caldwell founded a chirurgical lecture in the college of physicians, and endowed it with a handsome salary. He died in 1585.

CALEA, in botany: A genus of the polygama equalis order, belonging to the syngenesia clasts of plants; and in the natural method ranking under the 40th order, Compofites. The receptacle is paleaceous, the pappus hairy, and calyx imbricated.

CALEB, one of the deputies sent by the Israelites to take a view of the land of Canaan. He made a good report of the country, and by this means revived the spirits of the dejected people; on which account, he and Joshua were the only persons who, after their leaving Egypt, settled in the land of Canaan. Caleb had,
had, for his share, the mountains and the city of Hebron, from which he drove three kings. Othniel his nephew having taken the city of Debir, Caleb gave him his daughter Achsah in marriage; and died, aged 114.

CALEDONIA, the ancient name of Scotland. From the testimonies of Tacitus, Dio, and Solinus, we find, that the ancient Caledonians comprehended all that country lying to the north of the rivers Forth and Clyde. In proportion as the Silures or Cimbri advanced towards the north, the Caledonians, being circumcised within narrower limits, were forced to transmigrate into the islands which crowd the western coasts of Scotland. It is in this period probably, we ought to place the first great migration of the British Gaël into Ireland; that kingdom being much nearer to the promontory of Galloway and Cantire, than many of the Scotch isles are to the continent of North Britain.

To the country which the Caledonians possessed, they gave the name of Cældo-clach; which is the only appellation the Scots, who speak the Gaelic language, know for their own division of Britain. Cældo-clach is a compound, made up of Cæld or Cael, the firstcolon of the ancient Gaels who transmigrated into Britain, and doch, a district or division of a country. The Romans, by transposing the letter l in Cael, and by foutening into a Latin termination the ch of doch, formed the well-known name of Caledonia.

When the tribes of North Britain were attacked by the Romans, they entered into associations, that, by uniting their strength, they might be more able to repel the common enemy. The particular name of that tribe, which either its superior power or military reputation placed at the head of the association, was the general name given by the Romans to all the confederates. Hence it is that the Mæata, who with other tribes inhabited the districts of Scotland lying southward of the frith, and the Caledonians, who inhabited the west and north-western parts, have engrossed all the glory which belonged in common, though in an inferior degree, to all the other nations settled of old in North Britain. It was for the same reason that the name of Mæata was entirely forgotten by foreign writers after the third century, and that of the Caledonians themselves but seldom mentioned after the fourth.

Britons, Caledonians, Mæata, Barbarians, are the names constantly given to the old inhabitants of North Britain, by Tacitus, Herodian, Dio, Spartan, Vopiscus and other ancient writers. The successors of these Britons, Caledonians, Mæata, and Barbarians, are called Picts, Scots, and Ataeats, by some Roman writers of the fourth century, the origin of the appellation Scotti and Picti, introduced by latter Roman authors, has occasioned much controversy among the antiquaries of these days. The dispute seems now to be fully decided by some learned critics of the present century, whose knowledge of the Gaelic language affixed their investigation. See Scotland, Picts, and Highlanders.

CALEDONIA, the name of a settlement made by the Scots on the west side of the gulf of Darien, in 1693; out of which they were harver at the request of the East-India company; for the English government pro-

hibited the other colonies sending them any provisions, so they were obliged to leave it in 1700.

New Caledonia, an island in the south sea, lately discovered by captain Cook, and, next to New Holland and New Zealand, is the largest island that has yet been discovered in that sea. It extends from 19. 37. to 22. 30. South Lat. and from 163. 57. to 167. 14. E. Long. Its length from north-west to south-east is about 80 leagues; but its greatest breadth does not exceed ten leagues. This island is diversified by hills and valleys of various size and extent. From the hills little abundance of rivulets, which contribute to fertilize the plains. Along its north-east shore the land is flat; and being well watered, and cultivated by the inhabitants after their manner, appeared to great advantage to captain Cook's people. Was it not, indeed, for those fertile spots on the plains, the whole country might be called a dreary waste: the mountains and higher parts of the land are in general incapable of cultivation. They consist chiefly of rocks, many of which are full of mounds; the little soil that is upon them is scorched and burnt up by the sun; it is, however, covered with coarse grass and other plants, and here and there covered with trees and shrubs. The country in general bears a great resemblance to those parts of New South Wales which lie under the same parallel of latitude. Several of its natural productions are the same, and the woods are without underwood as well as in that country. The whole coast seems to be surrounded by reefs and shoals, which render all access to it extremely dangerous; but at the same time guard the coasts against the attacks of the wind and sea; rendering it easily navigable along the coast by canoes, and causing it abound with fish. Every part of the coast seems to be inhabited; the plantations in the plains are laid out with great judgment, and cultivated with much labour. They begin their cultivation by setting fire to the grass, &c. with which the ground is covered, but have no notion of preparing its vigour by manure; they, however, recruit it by letting it lie for some years untouched. Out the beach was found a large irregular mass of rock, not less than a cube of ten feet, confisting of coarse-grained stone speckled full of granites somewhat bigger than pins heads, from whence it seems probable that some valuable minerals may be found on this island. It differs from all the other islands yet discovered in the South Sea, by being entirely destitute of volcanic productions. Several plants of a new species were found here; and a few young breadfruit trees, not then sufficiently grown to bear fruit, seemed to have come up without culture; plantains and sugar-canes are here in small-quantity, and the cocoa-nut trees are small and thinly planted. A new species of passion-flower was likewise met with, which was never known to grow wild anywhere but in America. Several Cupua (Melaleuca) trees were also found in flowers. Muscovites here are very numerous. A great variety of birds were seen of different classes, which were for the most part entirely new; particularly a beautiful species of parrot before unknown to zoologists. A new species of fish, of the genus called by Linnaeus tetradon, was caught here; and its liver, which was very large, presented at supper. Several species of this genus being reckoned poisonous, and the present species being remarkably
Caledonia. Dlarkably of its quality; eaten this identical fort of symptoms, being all feized with an extreme giddiness; and a violent langour and oppression feized them. Emetics were administrated with some success, but indorifics gave the greatest relief. Some dogs who had eaten the remainder of the liver were likewise taken.

Abundance of turtle was feen here. The natives had not even a name for any of them. What swarthy, or a dark chefnut brown. A somewhat woolly in some individuals: their colour is not the large lock to appear near one-tenth of an inch from each other; the ends, number of there, seldom exceeding.

The natives do not the least notion of goats, hogs, dogs, or cats, and not the least

The inhabitants are very short, tall, and in general well proportioned; their features mild; their beards not at all.

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They measure dark about four inches. They are remarkably courteous, not at all addicted to pilfering and theft; in which character of honesty they are singular, all the other nations in the South Sea being remarkably thievish. Some wear their hair long, and tie it up to the crown of their heads; others suffer only a large lock to grow on each side, which they tie up in clubs; many others, as well as all the women, wear it short.

The men go naked; only tying a string round their middle, and another round their neck. A little piece of a brown cloth made of the bark of a fig-tree, sometimes tucked up to the belt, and sometimes pendulous, scarcely deferves the name of a covering; nor indeed does it seem at all intended for that purpose. This piece of cloth is sometimes of such a length, that the extremity is fastened to the string round the neck; to this string they likewise hang small round beads of a pale green nephritic flone. Coarse garments were seen among them made of a sort of matting; but they seemed never to wear them, except when in their canoes and unemployed. The women seemed to be in a fervile state: they were the only persons of the family who had any employment, and several of them brought bundles of sticks and fuel on their back: those who had children carried them on their backs in a kind of puchel. The women also were seen to dig up the earth in order to plant it. They are in general of a dark chestnut, and sometimes mahogany brown; their stature middle-sized, some being rather tall, and their whole form rather stout, and somewhat clumsy. Their dress is the most disfiguring that can be imagined, and gives them a thick squat shape; it is a short petticoat or fringe, consisting of filaments or little cords, about eight inches long, which are fastened to a very long string which they have tied several times round their waist. The filaments, or little ropes, therefore, lie above each other in several layers, forming a kind of thick thatch all round the body, but which does not near cover the thigh: these filaments were sometimes dyed black; but frequently those on the outside only were of that colour, the rest being of a dirty grey. There was not a single instance, during the ship's stay in this island, of the women permitting any indecent familiarity with an European: they took pleasure in prattling the arts of a jilting coquette, but never became absolute wantons. The general ornaments of both sexes are ear-rings of tortoise shells, necklaces, or amulets, made both of shells and stones; and bracelets made of large shells, which they wear above the elbows.

The houfes, or huts, in New Caledonia, are circular, something like a bee-hive, and full as close and warm; the entrance is by a small door, or long square hole, just big enough to admit a man bent double: the sides are about four feet and a half high; but the roof is lofty, and peaked to a point at the top, above which is a port or flick of wood, which is generally ornamented either with carving or shells, or both. The framing is of small spars, reeds, &c. and both sides and roof are thick, and close covered with thatch made of coarse long grass. In the inside of the houfe are set up pots, to which crofs spars are fastened, and platforms made for the convenience of laying any thing on. Some houfes have two floors, one above another; the floor is made with dried grass, and here and there mats are spread for the principal people to sit or sleep on. In these houfes there was no paffage for the fmoke but through the door; they were intolerably smoky, and fo hot as to be infupportable to thofe unacquainted to them: probably the fmoke is intended to drive out the muguetos which warm here. They commonly erect two or three of these huts near each other under a clufter of lofty fig-trees, whose leaves are impervious to the rays of the sun. The canoes used here are very heavy clumsy vesfeis; they are made of two trees hollowed out, having a raised gunnel about two inches high, and closed at each end with a bulk head of the fame height; fo that the whole is like a long square trough about three feet shorter than the body of the canoe. Two canoes thus fitted are fanned to each other about three feet funder, by means of crofs-spars, which project about a foot over each fide. Over these is laid a deck or heavy platform made of plank and small round spars on which they have a fire-hearth, and generally a fire burning; they are navigated by one or two latteen fails, extended to a small latteen yard, the end of which is fixed in a notch or hole in the deck.

Norwithstanding the inoffensive disposition of the inhabitants of New Caledonia, they are well provided with
Caledonia with offensive weapons; as clubs, spears, darts, and slings for throwing stones. Their clubs are about two feet and an half long, and variously formed; some like a fcythe, others like a pick-axe; some have a head like a hawk, and others have round heads; but all are nearly made; many of their darts and spears are no less near, and ornamented with carvings. The slings are as simple as possible; but they take some pains to form the stones that they use into a proper shape, which is something like an egg, suspending both ends to be like the small one. They drive the dart by the assistance of flint cords knotted at one end and looped at the other, called by the savages hookets. These contain a quantity of red wool taken from the vambrile, or great Indian bat. Bows and arrows are wholly ripen and disperse their seeds. For particulars on one or two more, excepted. This is the more zealand. They bury their dead in the ground.

Their language bears no affinity to that spoken in the other South-sea islands, the word arrokee, and one or two more, excepted. This is the more extraordinary, as different dialects of one language were spoken not only in the catterly islands, but at New Zealand.

A musical instrument, a kind of whistle, was procured here. It was a little polished piece of brown wood about two inches long, shaped like a kind of bell, tho' apparently solid, with a rope fixed at the small end; two holes were made in it near the base, and another near the extremity of the rope, all which communicated with each other; and by blowing in the uppermost, a shrill sound like whistling was produced; no other instrument was seen among them that had the least relation to music.

Many of the New Caledonians were seen with prodigiously thick legs and arms, which seemed to be affected with a kind of leprosy; the swelling was so great as to be extremely hard, but the skin was not alike hard and scaly in all those who were afflicted with the disorder. The preternatural expansion of the arm or leg did not appear to be a great inconvenience to those who suffered it; and they seem not to intimate that they very rarely felt any pain in it; but in some the disorder began to form blotches, which are marks of a great degree of virulence.

Here they bury their dead in the ground. The grave of a chief who had been slain in battle here resembled a large mole-hill, and was decorated with spears, daggers, paddles, &c. All flesh was made in the ground round about it. Lieutenant Pickering was shewed a chief whom they named Tea-booma, and gave their arrekee or king; but nothing further is known of their government, and nothing at all of their religion.

CALEFACTIO, the production of heat in a body from the action of fire, or that impulse impressed by a hot body on others around it. This word is used in pharmacy, by way of distinction from cælition, which implies boiling; whereas calefaction is only heating a thing.

CALENBERG, a castle of Germany, in the duchy of Brunswic and principality of Calenberg. It is seated on the river Leine, and is 15 miles south of Hanover. It is subject to the duke of Brunswic Lunenburg, elector of Hanover, and king of Great Britain. E. Long. 9. 43. N. Lat. 52. 20.

CALENBERG, a principality of Lower Saxony, and one of the three parts of the duchy of Brunswic, is bounded on the north by the duchy of Verden, on the east by the principality of Zell, on the south by the principality of Grubenhagen and Wolfenbuttel, and on the west by Westphalia. It belongs to the elector of Hanover.

CALENDAR, in astronomy and chronology. See Kalender.

CALENDAR of prisoners, in law, a list of all the prisoners names in the custody of each respective sheriff. See the Calendarium Floris. In botany, a calendar containing an exact register of the respective times in which the plants of any given province or climate germinate, expand, and shed their leaves and flowers, or ripen and disperse their seeds. For particulars on this curious subject, see the articles Defoliation, Efflorescentia, Frondescentia, Fructescentia, and Germinatio.

CALENDER, a machine used in manufactories to press certain woollen and silk fluffs and linens, to make them smooth, even, and glossy, or to give them waves, or water them, as may be seen in mohairs and taffies. This instrument is composed of two thick cylinders or rollers, of very hard and well polished wood, round which the fluffs to be calendared are wound: these rollers are placed cross-wise between two very thick boards, the lower serving as a fixed base, and the upper moveable by means of a thick screw with a rope fastened to a spindle which makes its axis: the uppermost board is loaded with large stones weighing 20,000 lb. or more. At Paris they have an extraordinary machine of this kind, called the royal calendar, made by order of M. Colbert. The lower table or plank is made of a block of smooth marble, and the upper is lined with a plate of polished copper.—The alternate motion of the upper board sometimes one way and sometimes another, together with the prodigious weight laid upon it, gives the fluffs their gloss and smoothness; or gives them the waves, by making the cylinders on which they are put roll over the undermoft board. When they put a roller under the calendar, they only incline the undermoft board of the machine. The dressing alone, with the many turns they make the fluffs and linens undergo in the calender, gives the waves, or waters them, as the workmen call it. It is a mistake to think, as some have affected, and Mr Chambers among others, that they use rollers with a shallow indenture or engraving cut into them.

CALENDAR of MONTPEL, a district in the south-west corner of Perthshire in Scotland, from which a branch of the ancient family of Livingston had the title of Earl. The chief seat of the family near Fallkirk is also called Calender. Both estate and title were forfeited for being engaged in the rebellion 1715.

CALENDERS, a sort of Mahometan friars, so called from Santon Calendari their founder. This Santon went bare-headed, without a shirt, and with the skin of a wild beast thrown over his shoulders. He wore a kind of apron before, the figures of which were adornned with counterfeit precious stones. His disciples are rather a fect of Epicureans than a sect of religious. They honour a tavern as much as they do a mosque; and think they pay as acceptable worship to God by the
the free use of his creatures, as others do by the greatest authority and acts of devotion. They are called, in Persia and Arabia, Abdals, or Abdallat, i.e. persons consecrated to the honour and service of God. Their garment is a single coat, made up of a variety of pieces, and quilted like a rug. They preach in the market-places, and live upon what their auditors bestow on them. They are generally very vicious persons; for which reason they are not admitted into any houses.

CALENDSUPER, the Marigold: A genus of the polygama necessaria order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, Compositae. The receptacle is naked, there is no pappus, the calyx is polyphyllous except the frutieofa, which hath lately been augmented by Paffierat and others.

CALES (anc. geog.), a municipal city of some note in Campania, at no great distance from Calabria. The epithet Calenius is by Horace and Juvenal applied to a generous wine which the territory produced.

CALETES (anc. geog.), a people of Gallia Celtica, on the confines of Belgica, situated between the sea and the Sequana. Now called le Pays de Caux, in Normandy.

CALETURE, a fort on the island of Ceylon, at the mouth of a river of the same name. The Dutch became masters of it in 1655; but were afterwards obliged to leave it. E. Long. 80. 51. N. Lat 6. 38.

CAMEI, in zoology, the young of the ox kind.

There are two ways of breeding calves that are intended to be reared. The one is to let the calf run about with its dam all the year round; which is the method in the cheap breeding countries, and is generally allowed to make the best cattle. The other is to take them from the dam after they have sucked about a fortnight: they are then to be taught to drink flat milk, which is to be made but just warm for them, it being very dangerous to give it them too hot. The best time of weaning calves is from January to May: they should have milk for 12 weeks after; and a fortnight before that is left off, water should be mixed with the milk in larger and larger quantities. When the calf has been fed on milk for about a month, little whips of hay should be placed all about him in little ficks to induce him to eat. In the beginning of April they should be turned out to grafs; only for a few days they should be taken in for the night, and have milk and water given them: the same may also be given them in a pail sometimes in the field, till they are so able to feed themselves that they do not regard it. The grafs they are turned into must not be too rank, but short and sweet, that they may like it, and yet get it with some labour. Calves should always be weaned at grafs; for if it be done with hay and water, they often grow big-belly'd on it, and are apt to rot. When those among the males are selected which are to be kept as bulls, the rest should be kept for oxen: the fomer the better. Between 10 and 20 days is a proper age. About London almost all the calves are fattened for the butcher. The reason of this is, that there is a good market for them; and the lands there are not so profitable to breed upon as in cheaper countries. The way to make calves fat and fine is, the keeping them very clean; giving them fresh litter every day; and the hanging a large chalk-stone in some corner where they can easily get at it to lick it, but where it is out of the way of being fouled by their dung and urine. The scoops are to be placed so as not to have too much fun upon them, and to high above the ground that the urine may run off. They also bleed them once when they are a month old, and a second time before they kill
CAL, a town of Popayan in South America, situated in a valley of the same name on the river Cauca. The governor of the province usually resides there. W. Long. 78°. S. Lat. 3° 15’.

CALIBER, or CALIPER, properly denotes the diameter of any body; thus we say, two columns of the same caliber, the caliber of the bore of a gun, the caliber of a bullet, &c.

CALIBER-COMPAISES, a sort of compasses made with arched legs to take the diameter of round or swelling bodies. See COMPASSES.

Caliber-compasses, are chiefly used by gunners, for taking the diameters of the several parts of a piece of ordnance, or of bombs, bullets, &c. Their legs are therefore circular; and move on a arch of brahs, whereon is marked the inches and half inches, to show how far the points of the compasses are opened and shut.

Some are also made for taking the diameter of the bore of a gun or mortar.

The gaugers also sometimes use calibers, to embrace the two heads of any calfs, in order to find its length.

The calibers used by carpenters and joiners, is a piece of board notched triangular-wise in the middle for the taking of measure.

CALIBER-RULE, or GUNNER’S CALLIPERS, is an instrument wherein a right line is so divided as that the first part being equal to the diameter of an iron or leaden ball of one pound weight, the other parts are to the first as the diameters of balls of two, three, four, &c. pounds are to the diameter of a ball of one pound. The caliber is used by engineers, from the weight of the ball given, to determine its diameter or caliber, or vice versa.

The gunner’s callipers consist of two thin plates of brass joined by a rivet, so as to move quite round each other: its length from the centre of the joint is between six inches and a foot, and its breadth from one to two inches; that of the most convenient size is about nine inches long. Many scales, tables, and proportions, &c. may be introduced on this instrument; but none are essential to it, except those for taking the caliber of shot and cannon, and for measuring the magnitude of faftant and entering angles. The most complete callipers is exhibited Plate CXII. the furniture and use of which we shall now briefly describe. Let the four faces of this instrument be distinguished by the letters A, B, C, D: A and D consist of a circular head and leg; B and C consist only of a leg.

On the circular head adjoining to the head of the face A are divisions denominated ‘shot diameters; which show the distance in inches and tenths of an inch of the points of the callipers when they are opened; so that if a ball not exceeding ten inches be introduced between them, the bevil edge E marks its diameter among these divisions.

On the circular bevil part E of the face B is a scale of divisions distinguished by lb. weight of iron shot. When the diameter of any shot is taken between the points of the callipers, the inner edge of the leg A shows its weight in avoidupois pounds, provided it be lb. 1, 2, 3, 3, 4, 5; 6, 8, 9, 10, 18, 12, 16, 18, 24, 26, 32, 36, or 42; the figures nearest the bevil edge answering to the short lines in the scale, and those behind them to the longer stroke. This scale is constructed
CAL

C A L

1. CALIBER.

Drafted on the following geometrical theorem, viz. that the weights of spheres are as the cubes of their diameters.

On the lower part of the circular head of the face A is a scale of divisions marked bore of guns; for the use of which, the legs of the callipers are flipped across each other, till the steel points touch the concave surface of the gun in its greatest breadth; then the bevel edge F of the face B will cut a division in the scale showing the diameter of the bore in inches and tenths. Within the scales of first and bore diameters on the circular part of A are divisions marked pounds; the inner figures 1, 2, 3, 4, 5, 6, 7, 8, 12, 18, 26, 36, correspond to the longest lines; and the figures 1, 2, 4, 6, 9, 16, 24, 32, 42, to the short strokes. When the bore of a gun is taken between the points of the callipers, the bevel edge F will either cut or be near one of these divisions, and show the weight of iron-flot proper for that gun.

On the upper half of the circular head of the face A are three concentric scales of degrees; the outer scale consisting of 180 degrees numbered from right to left, 10, 20, &c. the middle numbered the contrary way, and the outer scale beginning at the middle with 0, and numbered on each side to 90 degrees. These scales serve to take the quantity of an angle, either entering or failing. For an entering or external angle, apply the legs of the callipers so that its outward edges coincide with the legs of the given angle, the degree cut by the bevel edge F in the outer scale shows the measure of the angle sought: for a failing or external angle, slip the edges of the callipers across each other, so that their outward edges may coincide with the legs forming the angle, and the degree marked on the middle scale by the bevel edge E will show the measure of the angle required. The inner scale will serve to determine the elevation of cannon and mortars, or of any oblique plane. Let one end of a thread be fixed into the notch on the plate B, and any weight tied to the other end; apply the straight side of the plate A to the side of the body whose inclination is sought; hold it in this position, and move the plate B, till the thread falls upon the line near the centre marked Term. Then with the bevel edge F cut the degrees on the inner scale, showing the inclination of that body to the horizon.

On the face C near the point of the callipers is a little table showing the proportion of Troy and avoidupois weights, by which one kind of weight may be easily reduced into another.

Near the extreme of the face D of the callipers are two tables showing the proportion between the pounds weight of London and Paris, and also between the lengths of the foot measure of England and France.

Near the extreme on the face A is a table containing four rules of the circle and sphere; and geometrical figures with numbers annexed to them: the first is a circle including the proportion in round numbers of the diameter to its circumference; the second is a circle inscribed in a square, and a square within that circle, and another circle in the inner square: the numbers 28, 22, above this figure exhibit the proportion of the outward square to the area of the inscribed circle, and the numbers 4, 11, below it show the proportion between the area of the inscribed square and the area of its inscribed circle. The third is a cube inscribed in a sphere; and the number 89 shows the proportion between the weights of spheres as the cubes of their diameters.

CALICUT, a kingdom of India, on this side the Ganges, where the Dutch have a factory. E. Long. 75. 27. N. Lat. 9. 5.

CALICULAN, or Quillon, a town of Asia, in the East-Indies, on the coast of Malabar, and in the peninsula on this side the Ganges, where the Dutch have a factory.
CALIBER Rule.

Plate CXII.

To make Water Power P from C to B to B to A.

Rules for Shooting.

The distance T is in feet.

Height is the height of the object above the level line.

Angle of Elevation is the angle of the line from the horizontal to the line of sight.

To determine the range, multiply the range of the object by the tangent of the angle of elevation.

Example:

If the distance is 1000 feet and the angle of elevation is 45 degrees, the range is 1000 

To find the height, multiply the range by the tangent of the angle of elevation.

Example:

If the range is 1000 feet and the angle of elevation is 45 degrees, the height is 1000 

To find the angle of elevation, divide the height by the range.

Example:

If the height is 1000 feet and the range is 1000 feet, the angle of elevation is 45 degrees.
Callicut, a town of Asa, in the kingdom of that name on the coast of Malabar. It contains a great number of mean low houses, each of which has a garden. The English had a factory here, but it is removed to Ticherry. E. Long. 76. 4. N. Lat. 11. 21.

CALIFORNIA. PLANTS (from calor heat); plants that are natives of warm climates. Such are those of the East Indies, South America, Egypt, and the Canary Islands. These plants, says Linnæus, will bear a degree of heat which is as 40 on a scale in which the freezing point is 0, and 100 the heat of boiling water. In the 10th degree of cold they cease to grow, lose their leaves, become barren, are suffocated, and perish.

CALIDUCT, in antiquity, a kind of pipes or canal disposed along the walls of houses or apartments, used by the ancients for conveying heat to several remote parts of the house from one common furnace.

CALIFORNIA, the most northerly of all the Spanish dominions on the continent of America, is sometimes distinguished by the name of New Albion, and the Illas Caribbeas; but the most ancient appellation is California; a word probably owing to some accident, or to some words spoken by the Indians and misunderstood by the Spaniards. For a long time California was thought to be an island; but Father Caimo, a German Jesuit, discovered it to be a peninsula joining to the coast of New Mexico and the southern parts of America. This peninsula extends from Cape St. Sebastian, lying in north latitude 43. 30. to Cape St. Lucar which lies in north latitude 22. 32. It is divided from New Mexico by the gulph, or as some call it the lake, of California, or Vermilion Sea, on the east; on the north, California, by that part of the continent of North America which is least known; and on the west and south, by the Pacific Ocean or great South Sea. The coasts, especially towards the Vermilion Sea, are covered with inhabited islands, on some of which the Jesuits have established settlements, such as St. Clement, Puxaros, St. Anne, Cedars (so called from the great number of these trees it produces), St. Joseph, and a multitude of others. But the islands best known are three lying off Cape St. Lucar, towards the Mexican coast. These are called Les Trois Maries, "the three Maries." They are but small, have good wood and water, salt pits, and abundance of game; therefore the English and French pirates have sometimes wintered there, when bound on cruizes in the South Seas.

As California lies altogether within the temperate zone, the natives are neither chilled with cold nor scorched with heat; and indeed the improvements in agriculture made by the Jesuits afford strong proofs of the excellency of the climate. In some places the air is extremely hot and dry; and the earth wild, rugged, and barren. In a country stretching about 800 miles in length, there must be considerable variations of soil and climate; and indeed, we find from good authority, that California produces some of the most beautiful lawns, as well as many of the most inhospitable deserts, in the universe. Upon the whole, although California is rather rough and craggy, we are assured by the Jesuits Vinages, and other good writers, that with due culture it furnishes every necessary and conveniency of life; and that, even where the atmosphere is hot, vaper, rising from the sea, and dispersed by pleasant breezes, render it of a moderate temperature.

The peninsula of California is now stocked with all sorts of domestic animals known in Spain and Mexico. Horses, mules, ass, oxen, sheep, hogs, goats, and all other quadrupeds imported, thrive and increase in this country. Among the native animals is a species of deer of the size of a young heifer, and greatly resembling it in shape; the head is like that of a deer, and the horns thick and crooked like those of a ram. The hoofs of the animal are large, round, and cloven, the skin spotted, but the hair thinner and the tail shorter than that of a deer. Its flesh is greatly esteemed. There is another animal peculiar to this country, larger and more bulky than a sheep, but greatly resembling it in figure, and, like it, covered with a fine black or white wool. The flesh of this animal is nourishing and delicious; and, happily for the natives, it is so abundant, that nothing more is required than the trouble of hunting, as these animals wander about in droves in the forests and on the mountains. Father Torquemado describes a creature which he calls a species of large bear, something like a buffalo, of the size of a steer, and nearly of the figure of a flag. Its hair is a quarter of a yard in length, its neck long and awkward, and on its forehead are horns branched like those of a flag. The tail is a yard in length, and half a yard in breadth, and the hoofs cloven like those of an ox. With regard to birds, we have but an imperfect account; only, in general, Father Vinegas tells us that the coast is plentifully stowed with peacocks, buffards, geese, cranes, and molt of the birds common in other parts of the world. The quantity of fish which refer to these coasts
C A L

California. Coasts are incredible. Salmon, turbot, barbel, skate, mackarel, &c. are caught here with very little trouble; together with pearl oysters, common oysters, lobsters, and a variety of exquisite shell-fish. Plenty of turtle are also caught on the coasts. On the South Sea coasts are some fish peculiar to it, and perhaps the most beautiful in the world; their lustrous parapathing of the finest pearl, and darting their rays through a transparent varnish of an elegant vivid blue, like the lapis lazuli. The fame of California for pearls soon drew forth great numbers of adventurers, who searched every part of the gulph, and are still employed in that work, notwithstanding fashion has greatly diminished the value of this elegant natural production. Father Torquimado observes that the tea of California affords very rich pearl fisheries; and that the hoxias, or beds of oysters, may be seen in three or four fathom water, almost as plain as if they were on the surface.

The extremity of the peninsula towards Cape St. Lucar is more level, temperate, and fertile, than the other parts, and consequently more woody. In the more distant parts, even to the farthest millions on the east coast, no large timber hath yet been discovered. A species of manna is found in this country, which, according to the accounts of the Jesuits, has all the sweetness of refined sugar without its whiteness. The natives firmly believe that this juice drops from heaven.

The Californians are well made, and very strong. They are extremely pulinianous, inconstant, fapid, and even inoffensive, and seem extremely deserving of the character given to the Indians in general, under the article America. Before the Europeans penetrated into California, the natives had no form of religion. The miffionaries indeed tell us many tales concerning them, but they do evidently bear the marks of forgery as not to be worth repeating. Each nation was then an assemblage of several cottages more or less numerous, that were all mutually confederated by alliances, but without any chief. They were strangers even to filial obedience. No kind of drudgery was used by the men; but the women made use of some coverings, and were even fond of ornamenting themselves with pearls and such other trinkets as the country afforded. What mostly displayed their ingenuity was the construction of their fishing nets, which are paid by the Jesuits to have even exceeded in neatness those made in Europe. They were made by the women, of a coarse kind of flax procured from some plants which grow there. Their houses were built of branches and leaves of trees; and, many of them, were only inclosures of earth and stone, raised half a yard high, without any covering; and even these were so small, that they could not stretch themselves at length in them. In winter, they dwelt under ground in caves either natural or artificial.

In 1526, Ferdinand Cortez having reduced and settled Mexico, attempted the conquest of California; but was obliged to return, without even taking a survey of the country, a report of his own having tipped the Mexicans to a general insurrection. Some other attempts were made by the officers of Cortez, but these were also unsuccessful; and this valuable coast was long neglected by the Spaniards, who, to this day, have but one settlement upon it. In 1595, a galleon was sent to make discoveries on the Californian shore; California, but the vessel was unfortunately lost. Seven years after the count de Monterey, then viceroy of New Spain, sent Sebastian Bifayno on the same design with two ships and a tender; but he made no discovery of importance. In 1684, the marquis de Legauza, also viceroy of New Spain, despatched two ships with a tender to make discoveries on the lake of California. He returned with an indifferent account, but was the first that ascertained that California was not an island; which was afterwards confirmed by Father Caino, as already related. In 1697, the Spaniards being discouraged by their losses and disappointments, the Jesuits solicited and obtained permission to undertake the conquest of California. They arrived among the savages with curiosities that might amuse them, corn for their food, and clothes for which they could not but perceive the necessity. The hatred these people bore the Spanish name could not support itself against their demonstration of benevolence. They testified their acknowledgments as much as their self-defensibility and their incoணnacy would permit them. These faults were partly overcome by the religious inti­mitators, who purified their project with a degree of warmth and resolution peculiar to the society. They made themselves carpenters, masons, weavers, and huf­bandmen; and by these means succeeded in imparting knowledge, and in some measure a taste for the useful arts, to this savage people, who had been all successively formed into one body. In 1745, they composed 43 villages separated from each other by the bar­renness of the foil and the want of water. The in­habitants of these small villages labored principally on corn and pulse, which they cultivate; and on the fruits and domestic animals of Europe, the breeding of which is an object of continual attention. The Indians have each their field, and the property of what they reap; but such is their want of forethought, that they would squander in a day what they had gathered, if the missionar­y did not take upon himself to distribute it to them as they stand in need of it. They manufacture some coarse fluffs; and the necessaries they are in want of are purchased with pearls, and with wine nearly resembling that of Madeira, which they sold to the Mexicians and to the galleons, and which experience hath shown the necessity of prohibiting in California. A few laws, which are very simple, are sufficient to regulate this rising state. In order to enforce them, the missionary chooses the most intelligent person of the village; who is empowered to whip and imprison; the only punishments of which they have any knowledge. In all California there are only two gar­rifons, each consisting of 30 men and a soldier with every missionary. These troops were chosen by the leg­islators, though they are paid by the government. Were the court of Madrid to push their interest with half the zeal of the Jesuits, California might become one of the most valuable of their acquisitions, on account of the pearls and other valuable articles of com­merce which it contains. At present, the little Spanish town near Cape St. Lucar is made use of for no other purpose than as a place of refreshment for the Manila ships, and the head residence of the missionar­ies.

CALIGA, in Roman antiquity, was the proper fol-
Caligati, or Caligato, in Medicine, an opacity, or cloudiness of the anterior surface of the crystalline, causing a dimness or futilition of sight.

Caligula, the Roman emperor and tyrant, A. D. 37, began his reign with every promising appearance of becoming the real father of his people; but at the end of eight months he was feized with a fever, which, as it is thought, left a frenzy on his mind: for his disposion totally changed, and he commited the most atrocious acts of impiy, cruelty, and folly: such as proclaiming his horfe conful, feeding it at his table, introducing it to the temple in the veHments of the priees of Jupiter, &c. and causitng a dimnifh or futfullfion of his, as if by mounting the horfe. After this, however, there were perfons who claimed the caliphate, as pretending to be of the family of the Absfides, and to whom the futans of Egypt rendered great honours at Cairo, as the true successors of Mahomet: but this honour was merely titular, and the rights allowed them only in matters relating to religion: and though they bore the sovereign title of caliphs, they were nevertheless subjefts and dependents of the futans. In the year of the Hegira 361, a kind of caliphate was erected by the Fatemites in Africa, and lafted till it was fupprefsed by Saladdin. Historians alfo speak of a third caliphate in Gemen or Arabia Felix, erected by some princes of the family of the Jobites. The emperors of Morocco almue the title of grand defairs; and pretend to be the true caliphs, or successors of Mahomet, though under another name.

Calippic period, in chronology, a series of seventy-six years, perpetually recurring; which elapsed, the middle of the new and full moons, as its inventor, Calippus, an Athenian, imagined, return to the fame day of the solar year, Meton, an hundred years before, had invented the period, or cycle, of nineteen years: assuming the quantity of the solar year 365.25 d. 6h. 19' 56" 50' " 31' 34'; and the lunar month, 29 d. 12 h. 45' 47" 26' 48' 30'; but Calippus, considering that the Metonic quantity of the solar year was not exact, multiplied Meton's period by 4, and thence arose a period of 76 years, called the Calippic. The Calippic period, therefore, contains 2,7759 days; and since the lunar cycle contains 235 lunations, and the Calippic period is quadruple of this, it contains 940 lunations. This period began in the third year of the 112th Olympiad, or the 438th of the Julian period. It is demonstrated, however, that the Calippic period itself is not accurate; that it does not bring the new and full moons precisely to their places: 8 h. 5' 59" 60"", being the excess of 940 lunations above 76 solar years; but brings them too late, by a whole day in 235 years.

Calista, in fabulous history, the daughter of Lycaon king of Arcadia, and one of the nymphs of Diana.
Diana. Being beloved by Jupiter, that god affirmed the form of the goddess of chastity, by which means he debouched her; but her disgrace being revealed, as she was bathing with her patroness, the incensed deity turned her and the son with which she was pregnant into bears; when Jupiter, in compassion to her sufferings, took them up into the heavens, and made them the constellations Ursâ Major and Ursâ Minor.

**CALIX.** See CALYX.

**CALIXTINS,** a name given to those, among the Lutherans, who follow the sentiments of George Calixtus, a celebrated divine, and professor at Helmâldt, in the duchy of Brunswick, who died in 1656: he opposed the opinion of St. Augufin, on predestination, grace, and free-will, and endeavored to form an union among the various members of the Romish, Lutheran, and reformed churches; or, rather, to join them in the bonds of mutual forbearance and charity.

**CALIXTINS also denote a fig in Bohemia, derived from the Hiffites, about the middle of the 15th century, who affected the use of the cup, as essential to the eucharist. And hence their name; which is formed from the Latin calix, a cup.

The Calixtins are not ranked by Romanists in the lift of heretics, since in the main they still adhered to the doctrine of Rome. The reformation they aimed at terminated in the four following articles. 1. In requiring the cup to the laity. 2. In subjeéting the criminal clerks to the punishment of the civil magistrate. 3. In stripping the clergy of their lands, lordships, and all temporal jurisdiction. 4. In granting liberty to all capable priests to preach the word of God.

**CALKA,** a kingdom of Tartary, in Asia, to the east of Siberia.

**CALKING.** See CAULKING.

Calkins, the prominent parts at the extremities of a horse's hoof, bent downwards, and forged to a sort of point.

Calkins are apt to make horses trip; they also occasion blèmes, and ruin the back sinews. If fashioned in form of a hare's ear, and the horn of a horse's heel be pared a little low, they do little damage; whereas, the great square calkins quite spoil the foot.

Calkins are either single or double, that is, at one end of the hoof, or at both; but the damed legs hurtful, as the horses can tread more even.

**CALL,** among hunters, a signal call, to engage one of the drum to march, retreat, rally, charge, &c. is obeyed by soldiers.

**CALL,** among fowlers, the noise or cry of a bird, especially to its young, or to its mate in coupling-time. One method of catching partridges is by the natural call of a hen trained for the purpose, which drawing the cocks to her, they are entangled in a net.

Different birds require different sorts of calls; but they are most of them compos'd of a pipe or reed, with a little leathern bag or purse, somewhat in form of a bellows; which, by the motion given thereto, yields a noise like that of the species of bird to be taken. The call for partridges is formed like a boat bored through, and fitted with a pipe or fawn's quill, &c. to be blown with the mouth, to make the noise of the cock partridge, which is very different from the call of the hen. Calls for quails, &c. are made of a leathern purse in shape like a pear, stuffed with horse-hair, and fitted at the end with the bone of a cat's, hare's, or coney's leg, formed like a flagolet. They are played, by squeezing the purse in the palm of the hand, at the same time striking on the flagolet part with the thumb, to counterfeit the call of the hen-quail.

**CALL of the House.** See CALLING.

**CALLA,** a name given to those, among the Lutherans, who follow the sentiments of George Calixtus, a celebrated divine, and professor at Helmâldt, in the duchy of Brunswick, who died in 1656: he opposed the opinion of St. Augufin, on predestination, grace, and free-will, and endeavored to form an union among the various members of the Romish, Lutheran, and reformed churches; or, rather, to join them in the bonds of mutual forbearance and charity.

**CALLAWARE-Robin,** or Ethiopian Arum: A genus of the Polyandria order, belonging to the Gynandra class of plants; and in the natural method ranking under the 2d order, Pipiperita. The fpatha is plain; the spadix covered with florets; there is no calyx; no petals; and the berries are monopetalous. Of this there is but one species. It hath thick, fleshy, tuberous roots, which are covered with a thin brown skin, and strike down many strong fleshy fibres into the ground. The leaves have footstalks more than a foot long, which are green and succulent. The leaves are shaped like the point of an arrow; they are eight or nine inches in length, ending in a sharp point, which turns backward; between the leaves arise the footstalk of the flower, which is thick, smooth, of the same colour as the leaves, rises above them, and is terminated by a single flower, shaped like thoe of the arum, the hood or fpatha being twisted at bottom, but spreads open at the top, and is of a pure white colour. When the flowers fade, they are succeeded by roundish fleshy berries, compreessed on two sides, each containing two or three seeds. This plant grows naturally at the Cape of Good Hope. It propagates very fast by offsets, which should be taken off in the latter end of August, at which time the old leaves decay; for at this time the roots are in their most inactive state. They are so hardy as to live without any cover in the winter. If planted in a warm border and dry soil; but with a little shelter in hard frost, they may be preferred in full growth very well.

**CALLA-Suifung,** a town of Asia, in the island of Bouson in the East Indies. It is seated about a mile from the sea, on the top of a small hill surrounded with cocoa nut-trees. See Bouson.

**CALLAO,** a strong town of South America, in Peru. It is the port of Lima, from which it is distant about five miles. The town is built on a low flat point of land on the sea-shore. It is fortified; but the fortifications were much damaged by the last great earthquake, and have not since been repaired. The town is not above nine or ten feet above the level of high-water mark; but the tide does not commonly rise or fall above five feet. The streets are drawn in a line; but are full of duff, which is very troublesome. In a square near the sea-side are the governor's house, the viceroy's palace, the parish-church, and a battery of three pieces of cannon. On the north side are the
warehouses for the merchandise brought from Chili, Mexico, and other parts of Peru. The other churches are built with reeds, and covered with timber or clay, but they look tolerably neat. There are five monasteries and a hospital, though the number of families does not exceed 400. The trade of Callao is considerable. From Chili they bring cordage, leather, tallow, dried fish, and corn; from Chiloe, cedar-planks, woollen manufactures, and carpets; from Peru, figs, wines, brandy, mafts, cordage, timber for shipping, cacao, tobacco, and molasses; from Mexico, pitch, tar, woods for dyeing, sulphur, balsa of Peru, both white and brown, as well as commodities from China. At the port of Callao the watering is easy, but the wood is a mile or two distant. Earthquakes are very frequent in these parts, which have done vahmischief of a great many. The name is compounded of *CALLICRATES*, an ancient sculptor, who engraved some of Homer's verses on a grain of millet, and another in two lines, and the like, all included under the general denomination of *callicoes*. Some of them are painted with various flowers of different colours; others are not framed, but have a stripe of gold and silver quite through the piece, and at each end is fixed a tiffie of gold, silver, and silk, intermixed with flowers. The printing of callicoes was first set on foot in London about the year 1676.

CALLICRATES, an ancient sculptor, who engraved some of Homer's verses on a grain of millet, made an ivory chariot that might be concealed under the general denomination of *callicoes*. Some of them are painted with various flowers of different colours: others are not framed, but have a stripe of gold and silver quite through the piece, and at each end is fixed a tiffie of gold, silver, and silk, intermixed with flowers. The printing of callicoes was first set on foot in London about the year 1676.

CALLICRATES is said to have written an elegant ditich on a papyrus by which means the name of the man was made as the Greeks called them, were enabled to keep pace with a speaker or person who dictated. These notes, being underfoot by few, were copied over fair, and at length, by persons who had a good hand, for sale, &c. These persons were called *calligraphi*, a name frequently met with in the ancient writers.

CALLICRATES, an ancient sculptor, who engraved some of Homer's verses on a grain of millet, and another in two lines, and the like, all included under the general denomination of *callicoes*. Some of them are painted with various flowers of different colours: others are not framed, but have a stripe of gold and silver quite through the piece, and at each end is fixed a tiffie of gold, silver, and silk, intermixed with flowers. The printing of callicoes was first set on foot in London about the year 1676.

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far forth as the Mediterranean sea, and is not unfrequent on the Scarborough coast, where it is taken by the book in 30 or 40 fathoms water. It is often found in the stomach of the cod-fish. 2. The dracenocclus, with the first bone of the back-fin shorter than its body, which is of a spotted yellow colour. It frequents the shores of Genoa and Rome. 3. The indicus has a smooth head, with longitudinal wrinkles; the lower jaw is a little longer than the upper one; the tongue is obtuse and emarginated; the apertures of the gills are large: it is of a livid colour, and the anus is in the middle of the body. It is a native of Asia.

CALLIOPE, in the Pagan mythology, the muse who presides over eloquence and heroic poetry. She was thus called from the sweetness of her voice, and was reckoned the first of the nine sibyls. Her divining-office was to record the worthy actions of the living; and accordingly she is represented with tablets in her hand.

CALLIPÆDIA, the art of getting up or breeding fine and beautiful children. We find divers rules and practices relating to this art, in ancient and modern writers. Among the magi, a sort of medicine called ermeja was administered to pregnant women, as a means of producing a beautiful issue. Of this kind were the kernels of pine-nuts ground with honey, myrrh, saffron, palm-wine, and milk. The Jews are said to have been so officious about the beauty of their children, that care was taken to have some very beautiful child placed at the door of the public baths, that the women going out being struck with his appearance, and being anxious to prevent uncouth writers. Among the magi, a sort of medicine was employed to strike their imagination. Among the Spaniards in 1638. E. Long.

CALLISTRATUS, an excellent Athenian orator, was banished for having obtained too great an authority in the government. Demosthenes was so struck with the force of his eloquence, and the glory it procured him, that he abandoned Plato, and resolved from henceforward to apply himself to oratory.

CALLITRICHE, or star-grass, in botany: A genus of the digynia order, belonging to the monandria class of plants, and in the natural method ranking under the 12th order, Holarrhena. There is no calyx, but two petals, and the capsule is bilocular and tetraspermous.

CALLOO, a fortress in the Netherlands, in the territory of Waes, on the river Scheld, subject to the house of Austria. The Dutch were defeated here by the Spaniards in 1638. E. Long. 4. 10. N. Lat. 51° 15'.

CALLOSUM CORPUS, in anatomy, a whitish hard substance, joining the two hemispheres of the brain, and appearing in view when the two hemispheres are drawn back. See Anatomy, No. 732.

CALLOT (James), a celebrated engraver born at Nancy in 1593. In his youth he travelled to Rome to learn designing and engraving; and from thence went to Florence, where he met the great Titian, took him into his service. After the death of that prince, Callot returned to his native country; when he was very favourably received by Henry duke of Lorrain, who settled a considerable pension upon him. His reputation being from henceforward spread all over Europe, the infanta of the Netherlands drew him to Brussel, where he engraved the siege of Breda. Louis XIII. made him design the siege of Rochelle, and that of the Isle of Rhe. The French king having taken Nancy in 1632, made Callot the proposal of representing that new conquest, as he had already done the taking of Rochelle; but Callot begged to be excused; and some courtiers resolving to oblige him to do it, he answered, that he would sooner cut off his thumb than do any thing against the honour of his prince and country. This excuse the king accepted; and said, that the duke of Lorrain was happy in having such faithful and affectionate subjects. Callot followed his business so closely, that, though he died at 43 years of age, he is said to have left of his own
own execution about 1500 pieces. The following are a few of the principal. 1. The murder of the innocent, a small oval plate, engraved at Florence. Callot engraved the same subject at Nancy, with some difference in the figures on the back-ground. The former is the most rare: a fine impression of it is very difficult to be found. 2. The marriage of Cana in Galilee, from Paolo Veronese, a middling-sized plate length wise. 3. The passion of Christ, on twelve very small upright plates: first impressions very scarce. 4. St John in the island of Patmos, a small plate, nearly square. 5. The temptation of St Anthony, a middling-sized plate, length wise. He also engraved the same subject larger; which, though not the best, is notwithstanding the finest print. There is a considerable difference in the treatment of the subject in the two prints. 6. The punishment, wherein is seen the execution of several criminals. The marks of the best impressions of this plate are, a small square tower which appears above the houses, towards the left, and a very small image of the Virgin placed in an angle of the wall, near the middle of the print. 7. The miseries of war, eighteen small plates, length wise. There is another set on the same subject, consisting of seven plates less than the former. 8. The great fair of Florence, so called because it was engraved at Florence. As several parts of this plate were not equally bitten by the aquafortis, it is difficult to meet with a fine impression. Callot, on his return to Nancy, re-engraved this plate without any alteration. The copy, however, is by no means equal to the original. The first is distinguished from the second by the words in Firenza, which appear below at the right-hand corner of the plate. The second has these words in the same place, Fe Florentius, or executit Nancii. There is also a large copy of this print, reversed, published by Savery; but the difference is easily distinguished between it and the true print. 9. The little fair, otherwise called the players at bowls; where also some peasants are represented dancing. This is one of the rarest of Callot's prints; and it is very difficult to meet with a fine impression of it, for the divergences and other parts of the plate fail in the biting with the aquafortis. 10. The pillory, or the new street at Nancy, a middling-sized plate, length wise. 11. The Garden of Nancy, where young men are playing with a ballon, the same. 12. View of the Port Neuf, a small plate, length wise. 13. View of the Louvre, the same. 14. Four landscape, small plates, length wise. CALLUS, or Callosity, in a general sense, any cutaneous, corneous, or osseous hardnesse, whether natural or preternatural; but most frequently it means the callus generated about the edges of a fracture, provided by nature to preserve the fractured bones, or divided parts, in the situation in which they are replaced by the surgeon. A callus, in this last sense, is a sort of jelly, which is a liquid vicious matter, that sweats out from the small arteries and bone fibres of the divided parts, and fills up the chinks or cavities between them. It first appears of a cartilaginous sub stance; but at length becomes quite bony, and joins the fractured part so firmly together, that the limb will often make greater resistance to any external violence with this part than with those which were never broken.

CALLUS is also a hard, dense, inoffensive knob, rising on the hands, feet, &c. by much friction and pressure against hard bodies.

CALM, the state of rest which appears in the air and sea when there is no wind stirring. A calm is more dreaded by a sea-faring man than a storm if he has a strong ship and a sea-room enough; for under the line excessive heat sometimes produces such dead calms, that ships are obliged to stay two or three months without being able to stir one way or other. Two opposite winds will sometimes make a calm. This is frequently observed in the gulf of Mexico, at no great distance from the shore, where some gulf or land-wind will poise the general calmer wind, as to produce a perfect calm.

Calm is never so great on the ocean as on the Mediterranean, by reason the flux and reflux of the former keep the water in a continual agitation, even where there is no wind; whereas there being no tides in the latter, the calm is sometimes so dead, that the face of the water is as clear as a looking-glass; but such calms are almost constant preludes of an approaching storm. On the coasts about Smyrna, a long calm is reputed a prognostic of an earthquake.

It is not uncommon for the vessels to be calmed, or becalmed, as the sailors express it, in the road of the confant Levantines winds, in places where they ride near the land. Thus between the two capes of Carteche toward the main, and cape Antonio in Cuba, the sea is narrow, and there is often a calm produced by some gulf of a land-wind, that poises the Levantine wind, and renders the whole perfectly still for two or three days. In this case, the current that runs here is of use to the vessels, if it sets right; when it sets easterly, a ship will have a passage in three or four days to the Havana; but if otherwise, it is often a fortnight or three weeks fails, the ship being embayed in the gulf of Mexico.

When the weather is perfectly calm, no wind at all stirring, the sailors try which way the current sets, by means of a boat which they send out, and which will ride at anchor though there is no bottom to be found, as regularly and well as if fastened by the strongest anchor to the bottom. The method is this: they row the boat to a little distance from the ship, and then throw over their plummet, which is about forty pounds weight; they let this sink to about two hundred fathom; and then, though it never reaches the bottom, the boat will turn head against the current, and ride as firmly as can be.

CALM Latitudes, in sea language, are situated in the Atlantic ocean, between the tropic of Cancer and the latitude of 29° N. or they denote the space that lies between the trade and variable winds, because it is frequently subject to calms of long duration.

CALMAR, a strong sea-port of Sweden, in the province of Smaland, divided into two towns, the old and the new; but of the former there remains only the church and a few houses. The new town is built a little way from the other, and has large handsome houses. E. Long. 16. 15. N. Lat. 56. 48.

CALMET (Augustine), one of the most learned, and laborious writers of the 18th century, was born at Mersin le Horgne, a village in the diocese of Toul in France, in the year 1672, and took the habit of the Bene-
Wiltshire in England, featured
used
llntf; an ecclesial ornament in
of India.
ollS; a globe plum. There are two species, both natives
they live on the alms sent them by the neighbouring
form their devotions anhe next
of the
out of, abandoning
from midnight to sunset; they
calling,
wi;
three genuflexions at the door of the choir, and,
landing
and sends two
that for some time it was the capital city of the
thians.
which carried on a trade with Tyre.
ve been situated in Mesoopotamia, since these
phets join it with Haran, Eden, Assyria, and Chilmad,
N. Lat. 59. N. Lat. 51. 30.
CALNEH, (anc. geog.) a city in the land of Shinar, built by Nimrod, and the last city mentioned (Gen. x. 10.) as belonging to his kingdom. It is believed to be the same with Calno mentioned in Haia (x. 9.), and with Canneh in Ezekiel (xxvi. 23.) with still greater variation. It is observed, that it must have been situated in Mesoopotamia, since these prophets join it with Haran, Eden, Assyria, and Chilmad, which carried on a trade with Tyre. It is said by the Chaldee interpreters, as also by Eusebius and Jerome, to be the same with Ctesiphon, standing upon the Tigris, about three miles distant from Seleucia, and that for some time it was the capital city of the Parthians.
CALOGERI, in church-history, monks of the Greek church, divided into three degrees: the novices, called archeri; the ordinary professed; called microbatis; and the more perfect, called megalocheni: they are likewise divided into caenobites, anchorites, and recluse. The caenobites are employed in reciting their offices from midnight to sunset; they are obliged to make three genuflexions at the door of the choir, and, returning, go down to the right and to the left, to their brethren. The anchorites retire from the conversation of the world, and live in hermitages in the neighbourhood of the monasteries; they cultivate a little plot of ground, and never go out but on Sundays and holidays to perform their devotions at the next monastery. As for the recluse, they shut themselves up in grots and caverns on the tops of mountains, which they never go out of, abandoning themselves entirely to Providence: they live on the alms sent them by the neighbouring monasteries.
CALOMEL, or dulcedized sublimate of mercury. See Pharmacy, Index.
CALOPHYLLUM, in botany: A genus of the monocotyledons order belonging to the polyandria class of plants: and in the natural method classed under those called doublefyll by Linnaeus. The corolla is tetra-petalous; the calyx tetracyphylous and coloured; the fruit a globe plum. There are two species, both natives of India.
CALOTTE, a cap or coif of hair, fatting, or other stuff; an ecclesial ornament in most Popish countries. See Cap.
CALOTTE, in architecture, a round cavity or deep flufure, in form of a cap or cup, lathed and plastered, used to diminish the rise or elevation of a moderate chai-
pep, cabinet, slove, &c. which, without such an expedi-
tent, would be too high for other pieces of the apartment.

CALPE, a mountain of Andalusia in Spain; at
the foot of which, towards the sea, stands the town of Gibraltar. It is half a league in height towards the land, and so steep that there is no approaching it on that side.

CALPURNIUS, (Titus), a Latin Sicilian poet, lived under the emperor Carus and his son. We have seven of his eclogues remaining.

CALQUING, or CALKING, a term used in painting, &c. where the back-side of any thing is covered over with a black or red colour, and the strokes or lines traced through on a waxed plate, wall, or other matter, by pufing lightly over each stroke of the design with a point, which leaves an impression of the colour on the plate or wall.

CALTHA, in botany: A genus of the monocotyledons order belonging to the polyandria class of plants; and in the natural method ranking under the 26th order, Monotyllia: There is no calyx; there are five petals; no nectaria; the capsules are many, and polyporous. There is only one species known, which grows naturally in mold bogggy lands in many parts of England and Scotland. There is a variety, various double flowers, which for its beauty is preferred in gardens. It is propagated by parting the roots in autumn. It should be planted in a mottle foil and shady situation; and as there are often such places in gardens where few other plants will thrive, so these may be allowed room, and during their season of flowering will afford an agreeable variety. The flowers gathered before they expand, and preferred in falted vinegar, are a good substitute for capers. The juice of the petals, boiled with a little allum, stains paper yellow. The remarkable yellowness of the butter in spring is supposed to be caused by this plant: but cows will not eat it, unless compelled by extreme hunger; and then, Boerhaave says, it occasions such an inflammation, that they generally die. Upon May-day, the country people frow the flowers upon the pavement before their doors. Goats and sheep eat this plant; horses, cows, and swine refuse it.

CALTROP, in botany. See Tribulus.

CALTROP, in military affairs, an instrument with four iron points, disposed in a triangular form, so that three of them are always on the ground, and the fourth in the air. They are scattered over the ground where the enemy's cavalry is to pass, in order to embarrass them.

CALVARY, in anatomy, the hairy scalp or upper part of the head, which, either by disease or age, grows bald first.

CALVART (Denis), a celebrated painter, was born at Antwerp in 1552; and had for his masters Prospero Fontana and Lorenzo Sabbatini. He opened a school at Bologna, which became celebrated; and from which proceeded Guido, Albani, and other great masters. Calvart was well skilled in architecture, perspective, and anatomy, which he considered as necessary to a painter, and taught them to his pupils. His principal works are at Bologna, Rome, and Reggio.

CALVARY, a term used in Catholic countries for a
a kind of chapel of devotion raised on a hillock near a city, in memory of the place where Jesus Christ was crucified near the city of Jerusalem. The word comes from the Latin calvarium; and that from calvar, bald; in regard to the top of that hillock was bare and defilute of verdure: which is also signified by the Hebrew word geogotha. Such is the Calvary of St Valerian near Paris, which is accompanied with several little chapels, in each of which is represented in sculpture one of the mysteries of the passion.

Calvary, in heraldry, a croos so called, because it resembles the croos on which our Saviour suffered. It is always set upon steps.

Calvert, (George) afterwards lord Baltimore, was born at Kipling in Yorkshire about the year 1582, and educated at Oxford, where he took the degree of bachelor of arts, and afterwards travelled. At his return, he was made secretary to Sir Robert Cecil: he was afterwards knighted, and in 1618 appointed one of the principal secretaries of state. But after he had enjoyed that post about five years, he willingly resigned it, in order to apply himself more to his studies, that he might become a Roman-catholic, so that he might either be wanting to his trauh, or violate his conscience in discharging his office. This ingenuous confession so affected King James, that he continued him privy-councillor all his reign, and the same year created him baron of Baltimore in the kingdom of Ireland. He had before obtained a patent for him and his heirs, for the revenues of his see. It was, however, filled up to his son Cecil Calvert, lord Baltimore; and bears date June 20th, 1632.

It is held from the crown as part of the manor of Windfor, on one very singular condition, viz. to separate him entirely from the Romish church. The persecution against the Protestants in France (with whom he was now associated) obliged him to retire to Basle in Switzerland, where he published his famous Institutes of the Christian religion in 1535. The following year, he was chosen professor of divinity, and one of the ministers of the church, at Geneva. The next year, viz. 1537, he made all the people solemnly swear to a body of doctrines; but finding that religion had not yet had any great influence on the morals of the people, he, assisted by other ministers, declared, that since all their admonitions and warnings had proved unsuccessful, they could not celebrate the holy sacrament as long as these disorders reigned; he also declared, that he could not submit to some regulations made by the synod of Berne. Upon which the Synods having summoned the people, it was ordered that Calvin and two other ministers should leave the city within two days. Upon this Calvin retired to Strassburg, where he established a French church, of which he was the first minister, and was also chosen professor of divinity there. Two years after he was chosen to officiate at the diet appointed by the emperor to meet at Worms and at Ratlifon in order to appease the troubles occasioned by the difference of religion. He went with Bucer, and entered into a conference with Melaciteton. The people of Geneva now entreated him to return: to which he consented, and arrived at Geneva, September 13th 1541. He began with establishing a form of ecclesiastical discipline, and a confiitutory jurisdiction, with the power of inflicting all kinds of canonical punishments. This was greatly disliked by many persons, who imagined that the papal tyranny would soon be revived. Calvin, however, afferted on all occasions the rights of his conclave and inflexible strictness; and he caused Michael Servetus to be burnt at the stake for writing against the doctrine of the Trinity. But though the rigour of his proceedings sometimes occasioned great tumults in the city, yet nothing could shake his steadfastness and inflexibility. Amongst all the disturbances of the commonwealth, he took care of the foreign churches in England, France, Germany, and in Poland; and did more by his pen than his presence, sending his advice and instructions by letter, and writing a great number of books. This great reformer died on the 27th of May 1564, aged 55. His works were printed together at Amsterdamin 1671, in nine volumes folio: the principal of which are his Institutes, in Latin, the best edition of which is that of Robert Stephens in 1553, in folio; and his Commentaries on the Holy Scriptures. Calvin is universally allowed to have had great talents, an excellent genius, and profound learning. His style is grave and polite. Independent of his spiritual pride, his morals were exemplary; for he was pious, sober, chaste, laborious, and disinterested. But his memory can never be purified from the stain of burning Servetus: it became a reformer to adopt the most odious practice of the corrupt church of Rome.

Calvinism, the doctrine and sentiments of Calvin and his followers. Calvinism subsists in its greatest purity in the city of Geneva; and from thence it was first propagated into Germany, France, the United Provinces, and England. In France it was abolished by the revocation of the edict of Nantes in 1685.
It has been the prevailing religion in the United Provinces ever since the year 1571. The theological system of Calvin was adopted, and made the public rule of faith in England, under the reign of Edward VI, and the church of Scotland was modelled by John Knox, the disciple of Calvin, agreeably to the doctrine, rites, and form of ecclesiastical government established at Geneva. In England it has declined since the time of Queen Elizabeth; though it still subsists, some say in a little alloyed, in the articles of the established church; and in its rigour in Scotland.

The distinguishing theological tenets of Calvinism, as the term is now generally applied, respect the doctrines of Predestination, or particular Election and Reproduction, original Sin, particular Redemption, effectual, or, as some have called it, irresistible Grace in regeneration, Justification by faith, Perseverance, and the Trinity. See each of these articles.

Besides the doctrinal part of Calvin's system, which, so far as it differs from that of other reformers of the same period, principally regarded the absolute decree of God, whereby the future and eternal condition of the human race was determined out of mere sovereign pleasure and free-will; it extended likewise to the discipline and government of the Christian Church, the nature of the Eucharist, and the qualification of those who were entitled to the participation of it. Calvin considered every church as a separate and independent body, invested with the power of legislation for itself. He proposed that it should be governed by presbyters and synods composed of clergy and laity, without bishops, or any clerical subordination; and maintained, that the province of the civil magistrate extended only to its protection and outward accommodation. In order to facilitate an union with the Lutheran church, he acknowledged a real, though spiritual, presence of Christ, in the Eucharist, that true Christians were united to the man Christ in this ordinance, and that divine grace was conferred upon them, and sealed to them, in the celebration of it; and he confined the privilege of communion to pious and regenerate believers. In France the Calvinists are distinguished by the name of Huguenots; and, among the common people, by that of Puritans. In Germany they are confounded with the Lutherans, under the general title Protestants; only sometimes distinguished by the name Reformed.

CALVINISTS, in church-history, those who follow the opinions of Calvin. See the two preceding articles.

Crypto-Calvinists, a name given to the favourers of Calvinism in Saxony, on account of their secret attachment to the Genevan doctrine and discipline. Many of them suffered by the decrees of the convocation of Torgau, held in 1576. The Calvinists in their progres have divided into various branches, or jifer sects.

CALVISIUS, (Seth) a celebrated German chronicler in the beginning of the 17th century. He wrote Elucidus calendaris Gregoriani, et duplex calendarii, reformatus; and other learned works, together with some excellent treatises on music. He died in 1617, aged 61.

CALVITIES, or CALVITIUM, in medicine, balnei, or a want of hair, particularly on the scalp,...
C O N T E N T S

C A L

The word is formed from \( \text{calumna} \), tect, I couet; whence \( \text{calumnia} \), a little cot.—The Roman church commemorates St John the calybites on the 15th of December.

C A L Y C A N T H E M Æ, in botany, an order of plants in the 

### Excerpt

- **CALUMNY**, the crime of accusing another falsely, and knowingly so, of some heinous offence.

  **Oath of CALUMNY**; **Juramentum** (or rather *Judicandum*) **Calumnii**, among civilians and canons, was an oath which both parties in a cause were obliged to take: the plaintiff that he did not bring his charge, and the defendant that he did not deny it, with a design to abuse each other, but because they believed their cause was just and good; that they would not deny the truth, nor create unnecessary delays, nor offer the judge or evidence any gifts or bribes. If the plaintiff refuted this oath, the complaint or libel was dismissed.

- **CALVUS** (Cornelius Licinius), a celebrated Roman orator, was the friend of Catullus; and flourished 64 B.C. Catullus, Ovid, and Horace, speak of him.

- **CALX** properly signifies *limes*, but is also used by chemists and physicians for a fine powder remaining after the calcination or corrosion of metals and other mineral substances. All metallic calcis, at least all those made by fire, are found to weigh more than the metal from which they were originally produced. See the article Fire.

- **CALX Viva**, or *quick-lime*, that whereon no water has been cast, in contradistinction to lime which has been flaked by pouring water on it.

- **CALYBITES**, the inhabitants of a cottage, an appellation given to divers fainets on account of their long residence in some hut, by way of mortification.
CALYCIRO, in botany, the 16th order in Linnaeus's *Fragmenta methodi naturalis*, consisting of plants which, as the title imports, have the stamina (the flower) inferted into the calyx. This order contains the following genera, viz. cleamnus, hippophae, olphys, and trophis. See Botany, sect. vi. 16.

CALYCLITÆ (from *calyx* the flower-cup), a phylematic botanist, so termed by Linnaeus, who has arranged all vegetables from different species, structure, and other circumstances, of the calyx or flower-cup. The only systems of this kind are the *Character plantarum novus*, a posthumous work of Magnolius, professor of botany at Montpellier, published in 1720; and Linnaeus's *Methodus calycina*, published in his *Classis plantarum*, at Leyden, in 1738. See Botany, p. 425.

CALYDON, (anc. geog.), a town of Leolia, situated seven miles and a half from the sea, and divided from the Easte Indies. The word comes from *calypso*, a fabulous history, a goddesse, who was the daughter of Oceanus and Tethys; or, as others say, of Atlas. She was queen of the island of Ogygia, from which her name was called the island of *Calypso*. According to Homer, Ulyses suffered shipwreck on her coast, and laid with her several years.

CALYPTRA, among botanists, a thin membraneous involucrum, usually of a conic figure, which covers the parts of fruitification. The capsules of most of the mosses have *calyptrae*.

CALYX, among botanists, a general term expressing the cup of a flower, or that part of a plant which surrounds and supports the other parts of the flower. The cups of flowers are very various in their structure, and on that account distinguished by several names, as perianthium, involucrum, *lathia, gluma*, &c. See Botany, p. 439.

CALZADA, a town of Old Castile in Spain, seated on the river Leglera. W. Long 2° 47'. N. Lat. 42° 12'.

CAMÆA, in natural history, a genus of the femipellucid gems approaching to the onyx structure, being composed of zones, and formed on a chryaffine ball; but having their zones very broad and thick, and laid alternately one on another, with no common matter between; usually less transparent, and more debased with earth, than the onyxes. 1. One species of the camæa is the dull-looking onyx, with broad black and white zones; and in the *camæa* of the moderns, and the Arabian onyx. This species is found in Egypt, Arabia, Persia, and the East Indies. 2. Another species of the *camæa* is the dull broad zoned, green and white *camæa*, or the *jaspicamea* of the Italians; it is found in the East Indies, and in some parts of America. 3. The third is the hard *camæa*, with broad white and chefnut coloured veins. 4. The hard *camæa*, with bluish, white, and stell-coloured broad veins, being the fardonyx of Pliny's time, only brought from the East Indies.

CAMALÆU, or CAMÆU, a word used to express a peculiar sort of onyx: also by some to express a stone, whereon are found various figures, and representations of landscapes, &c. formed by a kind of *lusus nature*; so as to exhibit pictures without painting. The word comes from *calambula*, a name the Orientals give to the onyx, when they find, in preparing it, another colour; as who should say, a second stone. It is of these *camalæus* Pliny is to be understood when he speaks of the manifold picture of gems, and the party-coloured spots of precious stones: *Comit. pictura tam multiplex, lapidumque tam diversores maculae*.

CAMALÆUS is also applied by others to those precious stones, as onyxes, cornels, and others, whereon the lapidaries employ their art to aid nature, and perfect those representations. See CAMÆA.

CAMALÆUS is also frequently applied to any kind of gem, whereon figures may be engraved either indently or in relieve. In this sense the lapidaries of Paris are called in their statutes, cutters of camalæus.

A society of learned men at Florence undertook to procure all the *cameos* or *calamæus*, and intaglios in the great duke's gallery to be engraved; and began to draw the heads of divers emperors in *cameo*.

CAMALDIANS, CAMALDIANS, or CAMALDOLITES, an order of religious, founded by Romuald, an Italian fanatic, in 1023, in the horrible defart of Camaldoli, otherwise called Campo-Malduli, situate in the state of Florence, on the Apennines. Their rule is that of St Benedict; and their houses, by the statutes, are never to be less than five leagues from cities. The *Camaldalians* have not borne that title from the beginning of their order; till the clofe of the eleventh century they were called Romualdines, from the name of their founder. Till that time, Camaldulian was a particular name for those of the defart Camaldoli; and D. Grandi oberves, was not given to the whole order, in regard it was in this monastery that the order commenced, but because the regulation was best maintained here.

Guido Grandi, mathematician of the great duke of Tuscany, and a monk of this order, has published *Camaldalian Differences*, on the origin and establishment of it. The *Camaldolites* were distinguished into two classes, of which the one were COENOBITES, and the other PERMITES.

CAMALDOLUNUM (anc. geog.), a town of the Trinobantes, the first Roman colony in Britain, of veterans, under the emperor. From the itineraries it appears to have flood where now Malden stands. It continued to be an open place under the Romans; a place of pleasure rather than strength; yet not unadorned with splendid works, as a theatre and a temple of Claudius: which the Britons considered as badges of favery, and which gave rife to several seditions and commotions. It stands on a bay of the sea, at the mouth of the Chelmer, in the county of Essex; the modern name is curtailed from the ancient.

CAMARANA, an island of Arabia, in the Red Sea, whose inhabitants are little and black. It is the belle
CAMMISSEI, or CAMAG (Andreas), painter of history and landscape, was born at Bevagna, and at first learned the principles of design and colouring from Domenichino; but afterwards he studied in the school of Cesare Sacchi, and proved a very great painter. He was employed in St Peter's at Rome, as also at John Lateran; and his works are extremely admired, for the sweetness of his colouring, the elegance of his landscape, and the perfection of his pencil. Sandrart testifies that the world was deprived of so promising a genius, in the very bloom of life, when his reputation was daily advancing. He died in 1657. At St John Lateran are to be seen, the Battle of Constantine and Maxentius; and the Triumph of Constantine, which are noble and grand compositions; and his reputation was daily advancing. He died in 1657. At St John Lateran are to be seen, the Battle of Constantine and Maxentius; and the Triumph of Constantine, which are noble and grand compositions; and they afford sufficient proofs of the happiness of his invention and the correctness of his execution. Also at Wilton, the seat of the Earl of Wilton, is a picture of Venus with the Graces, said to be by the hand of Camaggi. CAMARECUM, (anc. geog.), the capital of the Nervii, a people of Gallia Belgica, (Antonine, Peutinger) before whose time no mention was made of it. Now Cambray, capital of the Cambresis, in French Flanders. E. Long. 3.

CAMARINA, (anc. geog.) a city of Sicily, built by the Syracusans on an eminence near the sea, in the south of Sicily, to the west of the promontory Pachynum, between two rivers, the Hippariss and Oanus. Of so famous a city nothing now remains but its name and ancient walls, a mile and a half in compass, with the flight remains of houses: now called Cambrama. CAMARINA Palus, a marsh or lake, near the city Camarina, and from which it took its name. In time of drought, the fench of the lake produced peffidium; upon which the inhabitants consulted the oracle, whether they should not quite drain it. The oracle diffued them; they notwithstanding drained it, and opened a way for their enemies to come and plunder their city: hence the proverb, Ne novet Camarina, that is, not to remove one evil to bring upon a greater. Now Lago di Camarina, situate in a beautiful plain, under the very walls of Camarina, and of a triangular form.

CAMAYEU. See CAMAYEU.

CAMBAIA, or CAMBA, a town of Asia, in India, and in the peninsula on this side the Ganges; capital of a province of the same name; but more commonly called Guzarat. It is seated at the bottom of a gulph of the same name, on a small river; is a large place with high walls, and has a pretty good trade. The produce and manufactures are inferior to few towns in India; for it abounds in corn, cattle, and silk; and cornelian and agate stones are found in its rivers. The inhabitants are noted for embroidery; and some of their quilts have been valued at 401. It is subject to the Great Mogul. E. Long. 72. 15. N. Lat. 22. 30.

CAMBAYES, in commerce, cotton cloths made at Bengal, Madras, and some other places on the coast of Coromandel. They are proper for the trade of Marsellese, whether the English at Madras send great numbers of them. Many are also imported into Holland.

CAMBER, according to monkish historians, one of the three sons of Brutus, who, upon his father's death, had that part of Britain assigned him for his share, called from him Cambria, now Wales.

CAMBER-BEAM, among builders, a piece of timber in an edifice cut arch-wise, or with an obtuse angle in the middle, commonly used in platforms, as church-leads, and on other occasions where long and strong beams are required.

CAMBERED-DECKS, among ship-builders. The deck or flooring of a ship is said to be cambered, or to lie cambering, when it is higher in the middle of the ship's length, and droops toward the stem and stern, or the two ends. Also when it lies irregular; a circumstance which renders the ship very unfit for war.

CAMBERT, a French musician in the 17th century, was at first admired for the manner in which he touched the organ, and became superintendant of the music to Anne of Austria the queen-mother. The abbe Perrin associated him in the privilege he obtained of his majesty, of setting up an opera in 1669. Cambert set to music two pastorals, one entitled Pomona, the other Ariadne, which were the first operas given in France. He also wrote a piece entitled The pains and pleasures of love. These pieces pleased the public; yet in 1672, Lully obtaining the privilege of the opera, Cambert was obliged to go to England, where he became superintendant of the music to King Charles II., and died there in 1677.

CAMBIO, an Italian word which signifies exchange; commonly used at Provence, and in some other countries, particularly Holland.

CAMBIST, a name given in France to those who trade in notes and bills of exchange. The word cambist, though a term of antiquity, is even now a technical word, of some use among merchants, traders, and bankers. Some derive it from the Latin cambium, or rather cambio.

CAMBLET, or CHAMBLET, a stuff sometimes of wool, sometimes silk, and sometimes hair, especially that of goats, with wool or silk: in some, the warp is silk and wool twisted together, and the wool hair.

The true or oriental camblet is made of the pure hair of the fort of goats, frequent about Angora, and which makes the riches of that city, all the inhabitants whereof are employed in the manufacture and commerce of camblets. It is certain we find mentioned in middle-age writers of stuffs made of camel's hair, under the denominations of camelium and camesium, whence probably the origin of the term; but these are represented as strangely coarse, rough, and prickly, and seem to have been chiefly used among the monks by way of mortification, as the hair-shirt of later times.

We have no camblets made in Europe of the goats' hair alone; even at Brussels, they find it necessary to add a mixture of woollen thread.

England, France, Holland, and Flanders, are the chief places of this manufacture. Brussels exceeds them all in the beauty and quality of its camblets: those of England are reputed the second.

Figured camblets, are those of one colour, whereon are stamped various figures, flowers, foliage, &c. by means of hot irons, which are a kind of moulds, pasted together with the stuff, under a press. These are chiefly
Camlets buy brought from Amiens and Flanders: the commerce of these was anciently much more considerable than at present.

Watered-Camlets, those which, after weaving, receive a certain preparation with water; and are afterwards passed under a hot-press, which gives them a smoothness and luster.

Waxed-Camlets, are those whereon waves are impressed, as on tabbies; by means of a calender under which they are passed and repassed several times.

The manufacturers, &c. of camlets are to take care they do not acquire any Falte and needleflafs: it being almost impossible to get them out again. This is notorious, even to a proverb: we say, a person is like camlet, he has taken his plain.

CAMBODIA, a kingdom of Asia, in the East-Indies, bounded on the north by the kingdom of Laos, on the east by Cochin-China and Chiapa, and on the south and west by the gulf and kingdom of Siam; divided by a large river called Mecon. The capital town is of the same name, seated on the western shore of the said river, about 150 miles north of its mouth. This country is annually overflowed in the rainy season, between June and October; and its productions and fruits are much the same with those usually found between the tropics. E. Long. 104. 15. Lat. 12. 40.

CAMBODUNUM, (Itinerary;) a town of the Brigantes, in Britain; now in ruins, near Almonbury, in Yorkshire. Weishefter, (Telbot.) Also a town of Vendicilia, on the Cambus: now Kampen, in Susbia.

CAMBOGIA, in botany: A genus of the monogynia order, belonging to the polyanidia class of plants; and in the natural method ranked under the 28th order, Trilocae. The corolla is tetrapetalous; the calyx tetraphyllous; and the fruit is a pome with eight cells, and solitary feeds. There is but one species, the gamboge, which they are native of India, which yields the gamboge.

CAMBRIA, a name for the principality of Wales.

CAMBRIC, in commerce, a species of linen made of flax, very fine and white; the name of which was originally derived from the city of Cambray, where they were first manufactured. They are now made at other places in France.

The manufacture of cambrics hath long since proved of extraordinary advantage to France. For many years it appeared that England did not in this article contribute less than 200,000l. per annum to the interest of France. This proved motive sufficient to induce the parliament of Great Britain to enact many salutary laws to prevent this great loss of wealth. See 18 Geo. II. c. 36. and 21 Geo. II. c. 26. See also Stat. 32 Geo. II. c. 32 and 4 Geo. III. c. 27, which regulates the cambric manufacture, not long since introduced into Winclesea in Suffolk; but very soon abolished. The cambrics now allowed in Britain are manufactured in Scotland and Ireland. Any persons convicted of wearing, selling (except for exportation), or making up for hire any cambric or French lawn, are liable to a penalty of 5l. by the two first statutes cited above.

CAMBRIDGE, a town of England, and capital of the county of that name. It takes the name of Cambridge from the bridge over the Cam, which divides the town into two parts. Either it or a place in the neighborhood was styled Camboritum in the time of the Romans. It suffered much during the wars with the Danes. Here was a castle built by William the Conqueror, of which the gatehouse yet remains, and is now the county goal. By Doomsday-book it appears, that it then had ten wards, containing 367 houses. In William Rufus's reign it was quite destroyed by Roger de Montgomery, but Henry II. bestowed many privileges upon it, particularly an exemption from the power of the sheriffs, on condition of its paying...
The university enjoys great privileges. It is governed by the chancellor, who is always some nobleman, and may be changed every three years, and has a commissary under him; the high steward, chosen by the faculty; the vice-chancellor chosen by the whole body of the university, out of two named by the heads of the colleges; two provosts chosen every year; two taxers, who, with the proctors, regulate the weights and measures. The other officers are, a regifter, or keeper of the archives, three esquire beadle, one yeoman beadle, and a library keeper. Each college has its schools and library, as at Oxford, of which those of Trinity and St John are the most considerable. King George I. purchased for 1000l. the library of Dr Moor bishop of Ely, consisting of 30,000 volumes, and made a present of it to the university; which, out of a good part of it, erected, in 1739, a fine marble statue of that prince in the senate-hall of King’s-college. A present of modern languages and history was also made here the same year by the Rev. Mr. Waterhouse, two for himself and two to teach under him, by king George I. in 1724. In 1728, a professorship for natural philosophy was erected by Dr Woodward, a professor at Gresham college, London, with a salary of 150l. a year. The same gentleman left them also his collection of fossils, and a part of his library. The master and fellows of Catherine-hall are trustees of an hospital for the cure of poor diseased people gratis; for the building and furnishing of which, Dr Addenbrooke left 4000l. Each college has its chapel for worship; but public sermons are preached at St Mary’s church. The following are the most remarkable structures: 1. The chapel of king’s-college, which for its contrivance and extent, fine carved work in wood and stone, and painted windows, is hardly to be equalled in the world. It is entirely of free stone, roof and all, without one pillar to support it. 2. Trinity-college and library, wonderful both for the design and execution. We must not omit to observe, that a fellowship was founded at Magdalen-college, called the travelling Norfolk fellowship, because it is appropriated to gentlemen of that country. E. Long. o. 7. N. Lat. 52. 15.

CAMBRIDGESHIRE, a county of England, bounded on the east by Norfolk, on the south by Essex and Hertsfordshire, on the west by Bedfordshire and Huntingdonshire, and on the north by Lincolnshire. It is about 40 miles long, 25 broad, and 150 in circumference. It lies in the diocese of Ely; and sends six members to parliament, two for the county, two for the university, and two for the town of Cambridge. The air is very different in different parts of the county. In the fens it is moist and foggy, and therefore not so wholesome; but in the south and east parts it is very good, these being much drier than the other: but both, by late improvements, having been rendered very fruitful, the former by draining, and the latter by cinque-foil: so that it produces plenty of corn, especially barley, saffron, and hemp, and affords the richest pastures. The rivers abound with fish, and the fens with wild fowl. The principal manufactures of the county are malt, paper, and bakets. The chief rivers are the Oule, which divides the county into two parts, and is navigable from Cambridge to Lynn in Norfolk; the Cam, which in the British signifies crooked, to denote its winding; the Welland, the Glene, the Witham, and that called Peterborough river, which is navigable to that city from Wiltzmbtch. The fens called Bedford level consist of about 300,000 acres of marshy ground, lying in Cambridge, Norfolk, Suffolk, Huntingdonshire, Northamptonshire, and Lincolnshire, and surrounded on all hands, except towards the sea, with high lands. As it appears to have been dry land formerly, the great change it has undergone must have been owing either to a violent breach and inundation of the sea, or to earthquakes. As the towns in and about the fens were great sufferers by the stagnation of the waters in summer, and want of provisions in winter, many attempts were made to drain them, but without success, until the time of Charles I. in which, and that of his son, the work was happily completed. In these fens are a great many decoys, in which incredible numbers of ducks, and other wild fowl, are caught during the season.

CAMBRIDGE, in New-England, a pleasant village, Mary’s and other fens of Boston, famous for its university, consisting of four elegant brick edifices, viz. Harvard Hall, Massachusetts Hall, Hollis Hall, and Holden chapel, handomely inclofed. Harvard Hall is divided into six apartments; one of which is appropriated for the library, one for the museum, two for the philosophical apparatus, one is used for a chapel, and the other for a dining hall. The library in 1737, consistit of 12,000 volumes; and will be continually increasing from the interest of permanent funds, as well as from casual benefactions. The philosophical apparatus belonging to this university, cost between 1400 and 15000 lawful money, and is the most elegant and complete of any in America.

Agreeably to the present constitution of Massachusetts, his excellency the governor, the council and senate, the president of the university, and the ministers of the congregational churches in the towns of Boston, Charlestown, Cambridge, Watertown, Roxbury, and Dorchester, are ex officiis, overseers of the university.

The corporation is a distinct body, consisting of seven members, in whom is vested the property of the university.

The instructors in the university, are a president, Hollisian professor of divinity, Hollisian professor of the mathematics and natural philosophy, Hancock professor of oriental languages, professor of anatomy and surgery; professor of the theory and practice of physic; professor of chemistry and materia medica, and four tutors.

This university as to its library, philosophical apparatus and professorships, is at present the first literary institution on this continent. It has generally from 120 to 1500 students.

CAMBRIDGE, in Maryland, a pleasant village on Choptank river, about ten miles from its entrance into Chesapeake Bay, a place of considerable trade. N. Lat. 38° 35’. W. Lat. W. Long. 76° 20’.

CAMBRIDGE Manuscript, a copy of the Gospels and Acts of the Apostles in Greek and Latin. Beza founded it in the monastery of Irenæus at Lyons, in the year 1562, and gave it to the university of Cambridge in 1582. It is a quarto size, and written on vellum; sixty-six leaves of it are much torn and mutilated.
Cambyses of which are supplied by a later transcriber. Beza
conjectures, that this manuscript might have existed so
ekely as the time of Irenaeus: Weitstein apprehended
that it either returned or was first brought from Egypt
into France; that it is the same copy which Druth-
mar, an ancient expeditor, who lived about the year
840, had seen, and which, he oberves, was ascribed to
St Hilary; and that R. Stephens had given a parti-
cular account of it in his edition of the New Testa-
ment in 1550. It is usually called *Stephens's second
manuscript*. Mill agrees with F. Simon in opinion,
that it was written in the western part of the world by
a Latin scribe, and that it is to a great degree inter-
polated and corrupted: he observes, that it agrees so
much with the Latin Vulgate, as to afford reason for
concluding, that it was corrected or formed upon a
corrupt and faulty copy of that translation. From
this and the Clermont copy of St Paul's Epistles, Beza
published his larger Annotations in 1582.

CAMBYES. See *(History of)* PERSIA.
CAMCHATKA. See KAMCHATKA.

Camden (William), the great antiquarian, was
born in London in the year 1551. His father was a
native of Lichfield in Staffordshire, who feudalising
in London, became a member of the company of painter-
trainers, and lived in the Old Bailey. His mother was
of the ancient family of Carven, of Wirkington, in
Cumberland. He was educated first at Christ's hospi-
 tal, and afterwards at St Paul's school; from thence
he was sent in 1566 to Oxford, and entered servant of
Magdalen college; but being disappointed of a de-
my's place, he removed to Broad-gate hall, and some-
what more than two years' after, to Christ-church,
where he was supported by his kind friend and patron
Dr Thornton. About this time he was a candidate for
a fellowship of All-Souls college, but lost it by the in-
terest of the Popish party. In 1570, he supplicated
the regents of the university to be admitted bachelor of
arts; but in this also he miscarried. The following
year Mr Camden came to London, where he prosecu-
et his favourite study of antiquity, under the patron-
age of Dr Goodman, dean of Westminster, by whose
interest he was made second master of Westminster
school in 1575. From the time of his leaving the uni-
versity to this period, he took several journeys to dif-
ter parts of England, with a view to make observa-
tions and collect materials for his *Britannia*, in which
he was now deeply engaged. In 1581 he became inti-
mately acquainted with the learned president Briffon,
who was then in England; and in 1586 he published
the first edition of his *Britannia*. In 1593 he succeed-
et to the headmanship of Westminster school on
the resignation of Dr Grant. In 1597 he published his
Greek grammar, and the same year was made Clarence-
ux king at arms. In the year 1600 Mr Camden
made a tour to the north, as far as Carlisle, accompa-
nied by his friend Mr (afterwards Sir Robert) Cotton.
In 1606 he began his correspondence with the celebrated
president de Thou, which continued to the death of
that faithful historian. In the following year he pub-
lished his last edition of the *Britannia*, which is that
from which the several English translations have been
made; and in 1608 he began to digest his materials
for a history of the reign of queen Elizabeth. In
1609, after recovering from a dangerous illness, he
retired to Chislehurst in Kent, where he continued to
spend the summer-months during the remainder of
his life. The first part of his annals of the queen did not
appear till the year 1615, and he determined that the
second volume should not appear till after his death (A).

The work was entirely finished in 1617; and from
that time he was principally employed in collecting
more materials for the further improvement of his
*Britannia*. In 1622, being now upwards of 70, and
finding his health decline apace, he determined to lose
no time in executing his design of founding a history-
library in the university of Oxford. His deed of gift
was accordingly transmitted by his friend Mr Heather,
to Mr Gregory Wheare, who was, by himself, ap-
pointed his first professor. He died at Chislehurst, in
1625, in the 73d year of his age; and was buried
with great solemnity in Westminster-abbey in the foot
aile, where a monument of white marble was erected to his memory. Camden was a man of sin-
gular modesty and integrity; profoundly learned in the
history and antiquities of Britain, and a judicious and
conscientious historian. He was revered and
esteemed by the literati of all nations, and will be ever
remembered as an honour to the age and country
wherein he lived. Besides the works already men-
tioned, he was author of an excellent Greek grammar,
and of several tracts in Hearne's collection.

CAMEL, in zoology. See *CAMELUS*.

CAMEL. In mechanics, a kind of machine used in
Holland for raising or lifting ships, in order to bring
them over the Pampas, which is at the mouth of the
river Y, where the shallowness of the water hinders large
ships from passing. It is also used in other places, parti-
cularly at the dock of Peterburg, the vessels built here
being in their passage to Cronstadt lifted over the bar by
means of camels. These machines were originally in-
vented by the celebrated De Wit, for the purpose a-
bovementioned; and were introduced into Russia by
Peter the Great, who obtained the model of them
when he worked in Holland; as a common shipwright.

A camel is composed of two separate parts, whose
outfides are perpendicular, and whose inides are concave,
shaped so as to embrace the hull of a ship on both sides.
Each part has a small cabin with sixeen pumps and
ten plgs, and contain twenty men. They are armed to
a ship underneath by means of cables, and entirely
enclose its sides and bottom; being then towed to the
bar,

(A) The reign of queen Elizabeth was so recent when the first volume of the annals was published, that
many of the persons concerned, or their dependents, were still living. It is no wonder, therefore, that
the honest historian should offend those whose actions would not bear inquiry. Some of his enemies were clam-
orous and troublesome; which determined him not to publish the second volume during his life, but that po-
terity might be in no danger of disappointment, he deposited one copy in the Cotton library, and transmitted
another to his friend Dupuy at Paris. It was first printed at Leyden in 1625.
Camelus
African Camel or Dromedary

Plate CXLII

Bactrian Camel

[Images of a dromedary and a bactrian camel]
CAMELIA, in botany: A genus of the family Magnoliaceae, consisting of about 200 species of plants, native to the Orient, and in the natural method ranking under the 37th order, Columniferae. The calyx is imbricated and polyphyllous, with the interior leaves larger than the exterior ones. Of this genus there is but one species, native both of China and Japan. Thunberg, in his Flora Japonica, describes its growing every where in the groves and gardens of Japan, where it becomes a prodigiously large and tall tree, highly esteemed by the natives for the elegance of its large and very variable blossoms, and its evergreen leaves; it is there found with fingle and double flowers, which also are white, red, and purple, and produced from April to October. Representations of this flower are frequently met with in Chinese paintings. In Britain, the Camellia is generally treated as a flower plant, and propagated by layers; it is sometimes placed in the greenhouse; but it appears to be one of the properest plants imaginable for the conservatory. At some future time it may, perhaps, not be uncommon to treat it as a Lauriflora or Magnolia; the price at which it has hitherto been sold, may have prevented its being hazarded in this way. The blossoms are of a firm texture, but apt to fall off long before they have lost their brilliancy; it therefore is a practice with some to stick such deciduous blossoms on some fresh bud, where they continue to look well for a considerable time. Petiver considered this plant as a species of tea-tree; and future observations will probably confirm his conjecture.

CAMELODUM. See Camellodunum.

CAMELOPARDALIS, in zoology, the trivial name of a species of Cervus.

CAMELUS, in zoology, a genus of quadrupeds belonging to the order of pecora. The characters of the camel are these: It has no horns; it has five fore-teeth in the under jaw; the laniaries are wide set, three in the upper, and two in the lower jaw; and there is a fissure in the upper lip, resembling a cleft in the lip of a hare. The species are:

1. The dromedarius, or Arabian camel, with one bunch of protuberance on the back. It has four callous protuberances on the fore-legs, and two on the hind ones. This species is common in Africa, and the warmer parts of Asia; not that it is spread over either of the continents. It is a common beast of burden in Egypt, and along the countries which border on the Mediterranean Sea; in the kingdom of Morocco, Sora, or the Defer; and in Ethiopia; but no where south of those kingdoms. In Asia, it is equally common in Turkey and Arabia; but is scarcely seen farther north than Persia, being too tender to bear a more severe climate.

2. The Bactrianus, or Bactrian camel, has two bunches on the back, but is in all other respects like the preceding, of which it seems to be a mere variety, rather than a different species; and is equally adapted for riding or carrying loads. It is still found wild in the deserts of the temperate parts of Asia, particularly in those between China and India. There are larger and more generous than the domesticated race. The Bactrian camel, which is very common in Asia, is extremely hardy, and in great use among the Tartars and Mongols, as a beast of burden, from the Caspian Sea to the empire of China. It bears even so severe a climate as that of Siberia, being found about the lake Baikal, where the Burais and Mongols keep great numbers. They are far less than those which inhabit Western Tartary. Here they live during winter on willows and other trees, and are by this diet reduced very lean. They lose their hair in April, and go naked all May, amidst the forests of that severe climate, to thrive, they must have dry ground and salt marishes. There are several varieties among the camels. The Turkman is the largest and strongest. The Arabian is hardy. What is called the Dromedary, Mahary, and Ragnahl, is very swift. The common fort travel about 30 miles a day. The latter, which has a less bunch, and more delicate shape, and also as much inferior in size, never carries burdens; but is used to ride on. In Arabia, they are trained for running-matches: and in many places for carrying couriers, who can go above 100 miles a day on them; and that for nine days together, over burning deserts, uninhabitable by any living creature. The African camels are the most hardy, having more durable and more dreadful deferts to pass over than any of the others, from Numidia to the kingdom of Ethiopia. In Western Tartary there is a white variety, very scarce, and sacred to the idols and priests. The Chinese have a fivt variety, which they call by the expressive name of Fong Kyo Fo, or camels with feet of the wind. Fat of camels, or, as those people call it, oil of bunches, being drawn from them, is esteemed in many disorders, such as ulcers, numbness, and consumptions. This species of camel is rare in Arabia, being an exotic, and only kept by the great men.

Camels have constituted the riches of Arabia from the time of Job to the present day. The patriarch reckoned 660 camels among his pastoral treasures, and the modern Arabs estimate their wealth by the number of these useful animals. Without them great part of Africa would be wretched; by them the whole commerce is carried through arid and burning tracts, imperious but by beasts which Providence formed expressly for the scorched deserts. Their foles are adapted to the sands they are to pass over, their toughnefs and spungy softnefs preventing them from cracking. Their great powers of sustaining abstinence from drinking, enables them to pass over unwatered tracts for many days, without requiring the least liquid; and their patience under hunger is such, that they will travel many days fed only with a few dates, or some small balls of bean or barley-meal, or on the miserable thorny plants they meet with in the deserts.

The Arabs regard the camel as a present from heaven, a sacred animal, without whose assistance they could neither subsist, carry on trade, nor travel. Ca-
Camel's milk is their common food. They also eat its flesh, that of the young camel being reckoned highly favourable. Of the hair of those animals, which is fine and soft, and which is completely favoury. of Arabs. Hence they armi of the world would perish in pursuit of a troop of Arabs. Hence they never submit, unless from choice, to any power. With a view to his predatory expeditions, the Arab inflicts, rears, and exercises his camels. A few days after their birth, he folds their limbs under their belly, forces them to remain on the ground, and, in this situation, loads them with a pretty heavy weight, which is never removed but for the purpose of replacing a greater. Instead of allowing them to feed at pleasure, and to drink when they are dry, he begins with regulating their meals, and makes them gradually travel long journeys, diminishing the quantity of their aliment. When they acquire some strength, they are trained to the course. He excites their emulation by the example of motion and fatigue, his camels are perpetually regulated. He excites their emulation by the example of motion and fatigue, his camels are perpetually the purpose of replacing a greater. Instead of allowing, at the same time, the quantity of their aliment. His course. He excites their emulation by the example of motion and fatigue, his camels are perpetually regulating their meals, and makes them gradually travel long journeys, diminishing the quantity of their aliment. When they acquire some strength, they are trained to the course. He excites their emulation by the example of motion and fatigue, his camels are perpetually regulated. He excites their emulation by the example of motion and fatigue, his camels are perpetually

Fatigue, hunger, thirst, and meagreness, are not the only inconveniences to which these animals are subjected: To all these evils they are prepared by mortification. One male is only left for eight or ten females; and the labouring camels are generally geldings. They are unquestionably weaker than unmated males; but they are more tractable, and at all seasons ready for service. While the former are not only unmanageable, but almost furious during the rutting season, which lasts forty days, and returns annually in the spring. It is then said, that they foam...
The camel is the genuine treasure of Asia. He is more valuable than the elephant; for he may be had to perform an equal quantity of labour at a twentieth part of the expense. Besides, the whole species are under subjection to man, who propagates and multiplies them at pleasure. But he has no fitch dominion over the elephants, whom he cannot multiply, and the individuals of whom he conquers with great labour and difficulty. The camel is not only more valuable than the elephant, but is perhaps equal in utility to the horse, the ass, and the ox, when their powers are united. He carries as much as two mules, though he eats as little, and feeds upon herbs equally coarse as the asfs. The female furnishes milk longer than the cow. The flesh of a young camel is as good and wholesome as veal: The Africans and Arabs fill their pots and tubs with it, which is tried with great ease, and preferred in this manner during the whole year for their ordinary repasts: The hair is finer and more in request than the best wool. Even their excrements are useful: for sal ammoniac is made of their urine; and their dung, dried in the sun and pulverized, serves for litter to themselves, as well as to horses, with which people frequently travel in countries where no hay or straw can be had. In fine, their dung makes excellent fuel, which burns freely, and gives as clear and nearly as hot a flame as dry wood, which is of great use in the deserts, where not a tree is to be found, and where, for want of combustible materials, fire is as scarce as water.

2. The Glama, Llama, or South-American camel-sheep, has an almost even back, small head, fine black eyes, and very long neck, bending much, and very protuberant near the junction with the body: in a tame state, with smooth short hair; in a wild state, with long coarse hair, white, grey, and russet, discolored in spots; with a black line from the head along the top of the back to the tail, and belly white. The spotted may possibly be the tame, the last the wild, llamas. The tail is short; the height from four to four and a half; the length from the neck to the tail, six feet. The carcase divided of skin and offals, according to the editor of Mr Byron's voyage, weighed 200 lb. They are under the service of man. They are very useful in the deserts, and for want of combustible materials, fire is as scarce as water.
inhabit that vast chain of mountains their whole length to the straits of Magellan; but except where these hills approach the sea, as in Patagonia, never appear on the coasts. Like the camel, they have powers of abating long from drink, sometimes for four or five days: like that animal, their food is coarse and trifling.

—In a wild state, they keep in great herds in the highest and steepest parts of the hills; and while they are feeding, one keeps censory on the pinnacle of some rock: if it perceives the approach of any one, it neighs; the herd takes the alarm, and goes off with incredible speed. They outrun all dogs, for there is no other way of killing them but with the gun. They are killed for the sake of their flesh and hair; for the Indians weave the last into cloth. From the form of the parts of generation in both sexes, no animal copulates with such difficulty. It is often the labour of a day, antequam annum ipsum venereum inceptum, et absolvant.

4. The Pecos, or sheep of Chili, has no bench on the back. It is covered with a fine valuable wool, which is of a rote red colour on the back of the animal, and white on the belly. They are of the same nature with the preceding; inhabit the same places, but are more capable of supporting the rigour of frost and snow: they live in vast herds; are very timid, and exceedingly swift. The Indians take the pecos in a strange manner: they tie cords with bits of cloth or wool hanging to them, above three or four feet from the ground, cross the narrow pusses of the mountains, then drive those animals towards them, which are so terrified by the shiver of the rags, as not to dare to pass, but, huddling together, give the hunters an opportunity to kill them with their flings as many as they please. The tame ones will carry from 50 to 75 lb. but are kept principally for the sake of the wool and the flesh, which is exceedingly well tasted.

CAMERA EOLIÆ, a contrivance for blowing the fire, for the fusion of ores, without bellows; by means of water falling through a funnel into a close vessel, which sends from it so much air or vapour as continually blows the fire: if there be the space of another vessel for it to expatiate in by the way, it there lessens its humidity, which otherwise might hinder the work. This contrivance was named camera Eolia by Kircher.

CAMERA Lucida, a contrivance of Dr Hook for making the image of any thing appear on a wall in a light room, either by day or night. Opposite to the place or wall where the appearance is to be, make a hole of at least a foot in diameter, or if there be a high window with a cement of this dimension in it, this will do much better without such hole or cement opened. At a convenient distance, to prevent its being perceived by the company in the room, place the object or picture intended to be represented, but in an inverted situation. If the object be a flat, or a living creature, it must be much enlightened by casting the sun's rays on it, either by reflection, refraction, or both. Between this object and the place of representation put a broad convex glass, ground to such a convexity as that it may represent the object distinctly in such place. The nearer this is situated to the object, the more will the image be magnified on the wall, and the further the less; such diversity depending on the difference of the sphere of the glasses. If the object cannot be conveniently inverted, there must be two large glasses of proper spheres, situated at suitable distances, easily found by trial, to make the representation erect. This whole apparatus of object, glasses, &c. with the perfections employed in the management of them, are to be placed without the window or hole, so that they may not be perceived by the spectators in the room, and the operation itself will be easily performed. Phil. Trans. No. 38. p. 714, seq.

CAMERA Obcura, or Dark Chamber, in Optics, a machine, or apparatus, representing an artificial eye; wherein the images of external objects, received through a double convex glass, are exhibited distinctly, and in their native colours, on a white sheet placed within the machine, in the focus of the glass.

The first invention of this instrument is ascribed to Baptista Porta. See his Magia Naturalis, lib. xvii. cap. 6. first published at Franffort about the year 1580 or 1591; the first four books of this work were published at Antwerp in 1560.

The camera obcura affords very diverting spectacles; both by exhibiting images perfectly like their objects, and each clothed in their native colours; and by experiencing, at the same time, all their motions; which latter no other art can imitate. By means of this instrument, a person unacquainted with designing will be able to delineate objects with the greatest accuracy, and judicious, and another well versed in painting will find many things herein to perfect his art. See the construction under DIOPTRICS.

CAMERARIA, in botany: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 30th order, Centorta. There are two horizontal folicles at the base of the seed-case. The seeds are inserted in a proper membrane. Of this there are two species: the latifolia, and the angustifolia. The first is a native of the islands of Cuba, and Martinique. By means of this instrument, a person unacquainted with designing will be able to delineate objects with the greatest accuracy, and judicious, and another well versed in painting will find many things herein to perfect his art. See the construction under DIOPTRICS.
Cam•er•a•ri•us [61]

Cam•er•a•ri•us

ed writers of his time, was born in 1500, at Bamberg, a city of Franconia: and obtained great reputation by his writings. He translated into Latin Herodotus, Demosthenes, Xenophon, Euclid, Homer, Theocritus, Sophocles, Lucian, Theodoret Nicephorus, &c. He published a catalogue of the bishops of the principal sees; Greek epistles; Accounts of his journeys, in Latin verse; a Commentary on Plautus; the Lives of Helius Eobanus, Heffus, and Philip Melanthon, &c. He died in 1574.

Cam•er•a•ri•us (Joachim), son of the former, and a learned physician, was born at Nuremberg in 1534. After having finished his studies in Germany, he went into Italy, where he obtained the eleeum of the learned. At his return he was courted by several princes to live with them; but he was too much devoted to books, and the study of chemistry and botany, to comply. He wrote an hourts medicus, and several other works. He died in 1598.

Cam•er•a•te•d

Cam•er•a•te•d, among builders the fame with vaulted or arched.

Cam•er•et•bay

Cam•er•et•bay, in the province of Brittany in France, forms the harbour of Brest. See Brest.

Cam•er•i•no

Cam•er•i•no, a town of the ecclesiastical state in Italy, situated in E. Long. 15° 7'. N. Lat. 45° 5'.

Cam•er•li•ng•o

Cam•er•li•ng•o, according to Ducauce, signified formerly the pope's or emperor's tresfare: at present, camerlingo is no where used but at Rome, where it denotes the cardinal who governs the ecclesiastical state and administrators justice. It is the most eminent office at the court of Rome, because he is at the head of the treasury. During a vacation of the papal chair, the cardinal camerlingo publishes edicts, coins money, and executes every other prerogative of a sovereign prince; he has under him a treasurer-general, auditor-general, and 12 prelates called clerks of the chamber.

Cam•eron

Cam•eron (John), one of the most famous divines among the Protestants of France in the 17th century, was born at Glasgow in Scotland, where he taught the Greek tongue; and having read lectures upon that language for about a year, travelled, and became professor at several universities, and minister at Brougham. He published theological lectures; 2. Icon Johannis Camerontis; and some miscellaneous pieces. He died in 1625, aged 60.

Cam•eroni•ans

Cam•eronians, a sect or party in Scotland, who separated from the Presbyterians in 1666, and continued to hold their religious assemblies in the fields.

The Cameronians took their denomination from Richard Cameron, a famous field-preacher, who, refusing to accept the indulgence to tender confessions, granted by King Charles II. as such an acceptance seemed an acknowledgment of the king's supremacy, and that he had before a right to silence them, made a defension from his brethren, and even headed a rebellion in which he was killed. His followers were never entirely reduced till the Revolution, when they voluntarily submitted to king William.

The Cameronians adhered rigidly to the form of government established in 1648.

Cam•eroni•ans

Cam•eronians, or Cameronites, is also the denomination of a party of Calvinists in France, who asserted that the will of man is only determined by the practical judgment of the mind; that the cause of men doing good or evil proceeds from the knowledge which God infuses into them; and that God does not move the will physically, but only morally, in virtue of its dependence on the judgment of the mind. They had this name from John Cameron, a famous professor, first at Glasgow, where he was born, in 1580, and afterwards at Bordeaux, Sedan and Saumur; at which place he broached his new doctrine of grace and free-will, which was formed by Amyrand, Cappell, Bochart, Daille, and others of the more learned among the reformed ministers, who judged Calvin's doctrines on these points too harsh. The Cameronians are a fort of mitigated Calvinists, and approach to the opinion of the Armenians. They are also called Universalists, as holding the universality of Christ's death; and sometimes Amyraldists. The rigid adherents to the synod of Dort accused them of Pelagianism, and even of Manicheism. The controversy between the parties was carried on with a zeal and subtility scarcely conceivable; yet all the question between them was only, Whether the will of man is determined by the immediate action of God upon it, or by the intervention of a knowledge which God impresses into the mind? The synod of Dort had defined that God not only illuminates the understanding, but gives motion to the will by making an internal change therein. Cameron only admitted the illumination, whereby the mind is morally moved, and explained the sentiment of the synod of Dort so as to make the two opinions consistent.

Cam•es

Cam•es, a name given to the small slender rods of cast-lead, of which the glaziers make their turned lead.

Their lead being cast into slender rods of twelve or fourteen inches long each, is called the cane; sometimes also they call each of these rods a cane, which being afterwards drawn through their vice, makes their turned lead.

Cam•il•lus

Cam•il•lus (Marcus Furius), was the first who rendered the family of Furius illustrious. He triumphed four times, was five times dictator, and was honoured with the title of the second founder of Rome. In a word, he acquired all the glory a man can gain in his own country. Lucius Auleius, one of the tribunes, prosecuted him to make him give an account of the spoils taken at Veii. Camillus anticipated judgment, and banished himself voluntarily. During his banishment, instead of rejoicing at the devastation of Rome by the Gauls, he exerted all his wisdom and bravery to drive away the enemy; and yet kept with the utmost firmness the sacred law of Rome, in refusing to accept the command which several private persons offered him. The Romans, who were beleaguered in the capitol, created him dictator in the year 363; in which office he acted with so much bravery and conduct, that he entirely drove the army of the Gauls out of the territories of the commonwealth. He died in the 81st year of his age, 365 years before the Christian era.

Cam•ill•i

Cam•ill•i and Cam•ill•i, in antiquity, boys and girls of ingenious birth, who ministered in the sacrifices of the gods; and especially those who attended the flamen dialis, or priest of Jupiter. The word seems borrowed from the language of the ancient Hetrurians, where
CAMINHA

where it signified minister, and was changed from caf-
millitus. The Tuilcans also give the appellation Camil-
lur to Mercury in quality of minister of the gods.

CAMINHA, a maritime town of Portugal, in the
province of Entre-Douro-e-Minho, with the title of a
diocese. It is situated at the mouth of the river Min-
ho, in W. Long. 9. 15. N. Lat. 41. 44.

CAMIS or KAMS, in the Japanese theology, de-
note deified souls of ancient heroes, who are supposed
still to interest themselves in the welfare of the people
over whom they anciently commanded.

The camis answer to the heroes in the ancient Greek
and Roman theology, and are venerated like the fants
in the modern Romith church.

Besides the heroes or camis beatified by the confess
of antiquity, the mikaddis, or pontiffs have deified
many others, and continue still to grant the apotheoses
to new worthies, so that they swarm with camis: the
principal one is Tengu Dai Sin, the common father of
Japan, to whom are paid devotions and pilgrimages
extraordinary.

CAMISADE, in the art of war, an attack by fur-
prize in the night, or at the break of day, when the
enemy is supposed to be a-bed. The word is said to
have taken its rise from an attack of this kind: where-
in, as a badge or signal to know one another by, they
bore a staff, in French called chemise, or camise, over
their arms.

CAMISARDS, a name given by the French to
the Calvinists of the Cevennes, who formed a league,
and took up arms in their own defence, in 1688.

CAMELEINE, a slight fluff, made of hair and
coarse silk, in the manner of camlet. It is now out of
fashion.

CAMMA, and GOBBI, two provinces of the king-
dom of Loango in Africa. The inhabitants are con-
tinually at war with each other. The weapons they
formerly used in their wars were the short pike, bows
and arrows, sword and dagger; but since the Europe-
ans have become acquainted with that coast, they
have supplied them with fire-arms. The chief town of
Gobbi lies about a day's journey from the sea. Their
rivers abound with a variety of fish; but are infected
with sea-horces, which do great mischief both by land
and water. The principal commodity with the natives
is in logwood, elephant's teeth, and tails, the hair of
which is highly valued, and used for several curious
purposes.

CAMMIN, a maritime town of Germany, in Brau-
denburg Pomerania, situated in E. Long. 15° N. Lat.
54°.

CAMOENS (Louis de), a famous Portuguese poet,
the honour of whose birth is claimed by different cities.
But according to N. Antonio, and Manuel Correa, his
intimate friend, this event happened at Lisbon in 1527.
His family was of considerable note, and originally
Spanish. In 1570, Vazco Perez de Camoens, disilcil-
ed at the court of Castile, fled to that of Lisbon, where
king Ferdinand immediately admitted him into his
council, and gave him the lordships of Sardoal, Pun-
nete, Marasso, Amendos, and other considerable lands;
the certain proof of the eminence of his rank and abili-
ties. In the war of the succession, which broke out
on the death of Ferdinand, Camoens sided with the
king of Castile, and was killed in the battle of Alja-
barota. But though John I. the victor, seized a great
part of his estate, his widow, the daughter of Gonfalo,
Tereya, grand mother of the order of Christ, and ge-
eral of the Portuguese army, was not reduced beneath
her rank. She had three sons who took the name of
Camoens. The family of the eldest intermarried with
the first nobility of Portugal; and even, according to
Castera, with the blood royal. But the family of the
second brother, whose fortune was flender, had the su-
perior honour to produce the author of the Lusiad.

Early in his life the misfortunes of the poet began.
In his infancy, Simon Vaz de Camoens, his father,
commander of a vessel, was shipwrecked at Goa, where,
with his life, the greatest part of his fortune was lost.
His mother, however, Anne de Macedo de Santarem,
provided for the education of her son Louis at the uni-
versity of Coimbra. What he acquired there, his
works discover; an intimacy with the classics, equal to
that of a Scaliger, but directed by the taste of a Mil-
ton or a Pope.

When he left the university, he appeared at court.
He was handsome; had speaking eyes, it is said; and
the finest complexion. Certain it is, however, he was
a polished scholar, which, added to the natural arour
and gay vivacity of his disposition, rendered him an
accomplished gentleman. Courts are the scenes of
intrigue; and intrigue was fashionable at Lisbon. But
the particulars of the amours of Camoens rest unknown.
This only appears: he had aspired above his rank, for
he was banished from the court; and in several of his
sonnets he describes this misfortune to love.

He now retired to his mother's friends at Santarem.
Here he renewed his studies, and began his poem on
the discovery of India. John III. at this time prepared
an armament against Africa. Camoens, tired of his in-
avtive obscure life, went to Cenza in this expedition,
and greatly distinguished his valour in several encoun-
ters. In a naval engagement with the Moors in the
straits of Gibraltar, in the conflict of boarding, he was
among the foremost, and lost his right eye. Yet nei-
er hurry of actual service nor the dissipation of the
camp could disable his genius. He continued his Liv-
edas, and several of his most beautiful sonnets were
written in Africa; while as he expected to return.

One hand the pen, and one the sword, employed.
The fame of his valour had now reached the court,
and he obtained permission to return to Lisbon. But,
while he solicited an establishment which he had meri-
ced in the ranks of battle, the malignity of evil tongues,
as he calls it in one of his letters, was injuriously pur-
ed upon him. Though the bloom of his early youth
was effaced by several years residence under the scorch-
ning heavens of Africa, and though altered by the loss
of an eye, his presence gave uneasiness to the gentle-
men of some families of the first rank where he had
formerly visited. Jealousy is the characteristic of the
Spanish and Portuguese; its resentment knows no
bounds, and Camoens now found it prudent to banish
himself from his native country. Accordingly in
1553, he failed for India, with a resolution never to
return. As the ship left the Tagus, he exclaimed, in
the words of the sepulchral monument of Scipio Af-
ricanus: "Ungrateful patria, non posse debis officia met " "Ungrate-
ful
C A M [ 63 ]

When Camoens arrived in India, an expedition was ready to fail to revenge the king of Cochin on the king of Pimenta. Without any rest on shore after his long voyage he joined this armament, and in the encounter of the Alagada islands displayed his usual bravery.

In the year following, he attended Manuel de Vaz concello in an expedition to the Red Sea. Here, says Faria, as Camoens had no use for his sword, he employed his pen. Nor was his activity confined in the fleet or camp. He visited Mount Felix and the adjacent inhospitable regions of Africa, which he so strongly pictures in the Lusiad, and in one of his little pieces where he laments the absence of his missives.

When he returned to Goa, he enjoyed a tranquillity which enabled him to bestow his attention on his Epic Poem. But this facility was interrupted, perhaps by his own imprudence. He wrote some satires which gave offence; and by order of the viceroy Francisco Barreto, he was banished to China.

The accomplishments and manners of Camoens soon found him friends, though under the disguise of banishment. He was appointed commissary of the defunct in the island of Macao, a Portuguese settlement in the bay of Canton. Here he continued his Lusit; and here also, after five years residence, he acquired a fortune, though small, yet equal to his wishes. Don Constantine de Braganza was now viceroy of India; and Camoens, desirous to return to Goa, resigned his charge. In a ship, freighted by himself, he set sail; but was shipwrecked in the gulf near the mouth of the river Mebon on the coast of China. All he had acquired was lost in the waves; his poems, which he held in one hand, while he swammed with the other, were lost himself possessed of when he stood friendless on the unknown shore. But the natives gave him a most humane reception: this he has immortalised in the prologue in the tenth Lusit; and in the seventh he tells us, that here he lost the wealth which satisfied his wishes.

*Agua da esperança ja adquirida.*

*Now blest with all the wealth fond hope could crave,
Soon I behold that wealth beneath the wave*

*Foretold—*

*My life, like Judah's heaven-doom'd king of yore,
By miracle prolong'd—*

On the banks of the Mebon, he wrote his beautiful paraphrase of the psalm, where the Jews, in the finest strain of poetry, are represented as hanging their harps on the willows by the rivers of Babylon, and weeping their exile from their native country. Here Camoens continued some time till an opportunity offered to carry him to Goa. When he arrived at that city, Don Constantine de Braganza, the viceroy, whose characteristic was politeness, admitted him into intimate friendship, and Camoens was happy till he came Redondo assumed the government. Those who had formerly procured the banishment of the fatirist, were silent while Constantine was in power; but now they exerted all their arts against him. Redondo, when he entered on office, pretended to be the friend of Camoens; yet, with all that unfeeling indifferency with which he made his most horrible witticisms on the Zamorim, he suffered the innocent man to be thrown into the common prison. After all the delay in bringing witnesses, Camoens, in a public trial, fully refuted every accusation of his conduct while commissary at Macao, and his enemies were loaded with ignominy and reproach. But Camoens had some creditors; and these detained him in prison a considerable time, till the gentlemen of Goa began to be ashamed that a man of his singular merit should experience such treatment among them. He was set at liberty; and again he assumed the profession of arms, and received the allowance of a gentleman volunteer, a character at this time common in Portuguese India. Soon after, Pedro Barreto, appointed governor of the fort at Sofala, by high promises, allureid the poet to attend him thither. The governor of a distant fort, in a barbarous country, shares in some measure the fate of an exile. Yet, though the only motive of Barreto was, in this unpleasant situation, to retain the conversation of Camoens at his table, it was his chief care to render the life of his guest agreeable. Chagrined with his treatment, and a considerable time having elapsed in vain dependence upon Barreto, Camoens resolved to return to his native country. A ship, on the homeward voyage, at this time touched at Sofala, and several gentlemen who were on board were desirous that Camoens should accompany them. But this the governor ungenerously endeavoured to prevent, and charged him with a debt for board. Anthony de Cabrera, however, and Hector de Sylveira, paid the demand; and Camoens, says Faria, and the honour of Barreto, were fold together.

After an absence of 16 years, Camoens, in 1569, returned to Lisbon, unhappy even in his arrival, for the petition then raged in that city, and prevented his publication for three years. At last, in 1572, he printed his Lusitad, which in the opening of the first book, in a most elegant turn of compliment, he addressed to his prince, king Sebastian then in his 18th year. The king, says the French translator, was so pleased with his merit, that he gave the author a pension of 4000 reals, on condition that he should reside at court. But this salary, says the same writer, was withdrawn by cardinal Henry, who succeeded to the crown of Portugal, lost by Sebastian at the battle of Alcazar.

Though the great patron of one species of literature, a species the revere of that of Camoens, certain it is, that the author of the Lusitad was utterly neglected by Henry, under whose inglorious reign he died in all the misery of poverty. By some, it is said, he died in an alms-house. It appears, however, that he had not even the certainty of subsistence which these hobbes provide. He had a black servant, who had grown old with him, and who had long experienced his master's humanity. This grateful Indian, a native of Java, who, according to some writers gave his master's life in the unhappy shipwreck where he lost his effects, begged in the streets of Lisbon for the only man in Portugal on whom God had bestowed those talents which have a tendency to direct the spirit of a downward age. To the eye of a careful observer, the fate of Camoens throws great light on that of his country, and will appear strictly connected with it. The same ignorance, the same degeneracy in spirit, which suffer Camoens to depend on his share of the alms begged in the streets by his old hoary fer-
Camomile, want, the same spirit which caused this, sunk the kingdom of Portugal into the most abject vassalage ever experienced by a conquered nation. While the grandees of Portugal were blind to the ruin which impending over them, Camoens beheld it with a pungency of grief which hastened his exit. In one of his letters he has these remarkable words: Em fim accertava a vida, / Cansada ao fim, / E passou o campo a nume prospéfitico, / I'm ending the course of my life, the world will winnow how I have loved my country. I have returned, not only to die in her bosom, but to die with her."

In this unhappy situation, in 1579, in his 62d year, the year after the fatal defeat of Don Sebastian, died Louis de Camoens, the greatest literary genius ever produced by Portugal; in martial courage and spirit of honour, nothing inferior to her greatest heroes. And in a manner suitable to the poverty in which he died, he was buried.

CAMOMILE, in botany. See Antherem. CAMP, the ground on which an army pitch their tents. It is marked out by the quarter master general, who appoints every regiment their ground.

The chief advantages to be minded in choosing a camp are considered, as marshes, woods, rivers, and inclosures; and if the camp be near the enemy, with no river or marsh to cover it, the army ought to be intrenched. An army always encamps fronting the enemy; and generally in two lines, running parallel about 500 yards distance; the horse and dragoons on the wings, and the foot in the centre; sometimes a body of two, three, or four brigades is encamped behind the two lines, and is called the body of reserve. The artillery and baggage waggons are generally encamped in the rear of the two lines. A battalion of foot is allowed 80 or 100 paces for its camp; and 30 or 40 for an interval between one battalion and another. A squadron of horse is allowed 30 for its camp, and 30 for an interval, and more if the ground will allow it.

Where the grounds are equally dry, those camps are always the most healthful that are pitched on the banks of large rivers; because, in the hot season, situations of this kind have a stream of fresh air from the water, serving to carry off the moist and putrid exhalations. On the other hand, next to marshes, the worst encampments are on low grounds close befet with trees; for then the air is not only moist and hurtful in itself, but by stagnating becomes more susceptible of corruption. However, let the situation of camps be ever so good, they are frequently rendered infectious by the putrid effluvia of rotten straw, and the privies of the army; more especially if the bloody flux prevails, in which case the bell method of preventing a general infection, is to leave the ground with the privies, foil straw, and other filth of the camp, behind. This method is frequently done if circumstances or the military operations; but when these render it improper to change the ground often, the privies should be made deeper than usual, and once a-day a thick layer of earth thrown into them till the pits are near full; and then they are to be well covered, and supplied by others. It may also be a proper caution to order the pits to be made either in the front or the rear, as the then stationary winds may befal carry off the effluvia from the camp. Moreover, it will be necessary to change the straw frequently, as being not only apt to rot, but to retain the infections streams of the sick. But if fresh straw cannot be procured, more care must be taken in airing the tents, as well as the old straw.

The disposition of the Hebrew encampment was at first laid out by God himself. Their camp was of a quadrangular form, surrounded with an inclosure of the height of 10 hands-breadth. It made a square of 10 miles in compass about the tabernacle; and within this was another, called the Levites camp. The Greeks had also their camps fortified with gates and ditches. The Lacedemonians made their camp of a round figure, looking upon that as the most perfect and defensible of any form: we are not, however, to estimate, that they thought of the form of their camp, as never to be dispensed with when the circumstances of the place require it. Of the rest of the Greek camps, it may be observed, that the most valiant of the soldiers were placed at the extremities, the rest in the middle. Thus we learn from Homer, that Achilles and Ajax were posted at the ends of the camp before Troy, as bulwarks on each side of the rest of the princes.

The figure of the Roman camp was a square divided into two principal parts: in the upper parts were the general's pavilion, or praetorium, and the tent of the chief officers; in the lower, those of inferior degree were placed. On one side of the praetorium stood the quartermaster, or apartment of the treasurer of the army; and near this the forum, both for a market place and the assembling of councils. On the other side of the praetorium were lodged the legati; and below it the tribunes had their quarters, opposite to their respective legions. Aside of the tribunes were the quarters of the foreign troops, over against their respective wings; and behind these were the lodgments of the evocati, then those of the extraordinaries and abletei equites, which concluded the higher part of the camp. Between the two partitions was a spot of ground called principia, for the altars and images of the gods, and probably also for the chief ensigns. The middle of the lower partition was assigned to the Roman horse; next to them were quartered the triarii; then the principes, and close by them the hactati; afterwards the foreign horse, and lastly the foreign foot. They fortified their camp with a ditch and parapet, which they termed fossa and vallum; in the latter some distinguished two parts, viz. the agger or earth, and the fides or wooden stakes driven in to secure it. The camps were sometimes surrounded by walls made of hewn stone; and the tents themselves formed of the same matter.

In the front of the Turkish camp are quartered the janizaries and other foot, whose tents encompass their aga; in the rear are the quarters of the sables and their horsemen. The body of the camp is pitted by the lately tents or pavilions of the vizier or general, rais effendior chancellor, kahja or steward, the telletdar bailiaw or lord treasurer, and kapilar kahfa or master.
master of the ceremonies. In the middle of these tents is a spacious field, wherein are erected a building for the divan, and a hafna or treasury. When the ground is marked out for a camp, all wait for the pitching of the tent taliâ, the place where the courts of justice are held; it being the disposition of this that is to regulate all the rest.

The Arabs still live in camps, as the ancient Scythes did. The camp of the Affyrm Emir, or king of the country about Tadmor, is described by a traveller who viewed it, as spread over a very large plain, and possessing no vast a space, that though he had the advantage of a rising ground he could not see the utmost extent of it. His own tent was near the middle; scarce distinguishable from the rest, except that it was bigger, being made, like the others, of a sort of hair-cloth.

Camp, is also used by the Siamese, and some other nations in the East Indies, as the name of the quarters which they assign to foreigners who come to trade with them. In these camps, every nation forms, as it were, a particular town, where they carry on all their trade, not only keeping all their warehous and shops there, but also to live in these camps with their whole families. The Europeans, however, are so far indulged, that at Siæn, and almost everywhere else, they may live either in the cities or suburbs, as they shall judge most convenient.

Camp fight, or Kamp fight, in law writers, denotes the trial of a cause by duel, or a legal combat of two champions in the field, for decision of some controversy.

In the trial by camp fight, the accuser was, with the peril of his own body, to prove the accused guilty; and by offering him his glove, to challenge him to this trial, which the other must either accept of, or acknowledge himself guilty of the crime whereof he was accused.

If it were a crime deserving death, the camp fight was for life and death: if the offence deserved only imprisonment, the camp fight was accomplished when one combatant had fudated the other, so as either to make him yield or take him prisoner. The accused had liberty to choose another to fight in his stead, but the accuser was obliged to perform it in his own person, and with equality of weapons. No women were permitted to be spectators, nor men under the age of thirteen. The priests and the people who looked on, were engaged freely in prayer, that the victory might fall to him who had right. None might cry, shriek, or give the least sign; which in some places was executed with so much strictness, that the executioner stood ready with an axe to cut off the right hand or foot of the party that should offend herein.

He that, being wounded, yielded himself, was at the other's mercy either to be killed or suffered to live. But if life were granted him, he was declared infamous by the judge, and disabled from ever bearing arms, or riding on horseback.

Camp. See Campagna.

Campaign, in the art of war, denotes the space of time that an army keeps the field, or is encamped. The beginning of every campaign is considerably more unhealthy than if the men were to remain in quarters. After the first fortnight or three weeks encampment, the sickness decreases daily; the most infirm being by the time in the hospitals, and the weather daily growing warmer. This healthy rate continues throughout the summer, unless the men get wet clothes, or wet beds; in which case, a greater or less degree of the dysentery will appear in proportion to the preceding heats. But the most sickly part of the campaign begins about the middle or end of August, whilst the days are still hot, but the nights cool and damp, with fogs and dewes; then, and not sooner, the dysentery prevails; and though its violence is over by the beginning of October, yet the remitting fever gaining ground, continues throughout the rest of the campaign, and never entirely ceases, even in winter-quarters, till the frosts begin. At the beginning of a campaign the sickness is so uniform, that the number may be nearly predicted; but for the rest of the season, as the dicea, are then of a contagious nature, and depend so much upon the heats of summer, it is impossible to foresee how many may fall sick from the beginning to the end of autumn. It is also observed, that the last fortnight of a campaign, if protracted till the beginning of a new campaign, is attended with more sickness than the first two months encampment: so that it is better to take the field a fortnight sooner, in order to return into winter-quarters, as much the earlier. As to winter expeditions, though severe in appearance, they are attended with little sickness, if the men have strong shoes, quarters, fuel, and provisions. Long marches in summer are not without danger, unless made in the night, or so early in the morning as to be over before the heat of the day.

Campagna, in botany, an order of plants in the Frangulae methodi naturalis of Linæus, in which are the following genera, viz. convolvulus, ipomæa, polemonium, campanula, roella, viola, &c.

See Broca.

Campanella, (Thomas) a famous Italian philosopher, born at Silo in Calabria, in 1568. He distinguished himself by his steady proficiency in learning; for at the age of 13 he was a perfect master of the ancient orators and poets. His peculiar inclination was to philosophy, to which he at last confined his whole time and study. In order to arrive at truth, he shook off the yoke of authority: by which means the novelty of some of his opinions exposed him to many inconveniences; for at Naples he was thrown into prison, in which he remained 27 years, and during this confinement wrote his famous work entitled Abbeium triumphant. Being at length set at liberty, he went to Paris, where he was graciously received by Louis XIII. and cardinal Richelieu; the latter procured him a pension of 2000 livres, and often consulted him on the affairs of Italy. Campanella passed the remainder of his days in a monastery of Dominicans at Paris, and died in 1639.

Campagnè (Matthew) of Spoletto, curate at Rome, wrote a curious treatise on the art of cutting glasses for spectacles, and made several improvements in optics, allisted by his brother and pupil Joseph. He died after 1678.

Campagna, a town of Italy, in the kingdom of Naples, and in the farther principato, with a bishop's see. E. Long. 15. 30. N. Lat. 40. 40.

Campana, or Campagna di Roma, ancintly Latium, a province of Italy, bounded on the west by the
Campania. Tiber and the sea, on the south-west by the sea, on the south by Terra di Lavoro, on the east by Abruzzo, and on the north by Sabina. Though the soil is good, it produces little or nothing, on account of the heavy duties on corn; and though the waters are good the air is unwholesome. It is subject to the Pope, and is about 60 miles in length on the Mediterranean sea.

It baths been generally thought of this country, that something in it peculiarly noxious during the summer-time; but Mr Condamine is of opinion that it is not more unhealthy than any other marily country. His account follows. "It was after the invasion of the Goths in the sixth and seventh centuries that this corruption of the air began to manifest itself. The bed of the Tiber being covered by the accumulated ruins of the edifices of ancient Rome, could not but fail itself considerably. But what permits us not to doubt of this fact is, that the ancient and well-preferred pavement of the pantheon and its poricio is overflowed every winter; that the water even rises there sometimes to the height of eight or ten feet; and that it is not possible to suppose that the ancient Romans have ever built a temple in a place so low as to be covered with the waters of the Tiber on the feast inundation. It is evident, then, that the level of the bed of this river is raised several feet, which could not have happened without forming there a kind of dikes or bars. The choking up of its canal necessarily occasioned the overflow and reflux of its waters in such places as till then had not suffered inundations: to these overflows of the Tiber were added all the waters that escaped out of the ancient aqueducts, the ruins of which are still to be seen, and which were entirely broken and destroyed by Tullia. What need, therefore, of any thing more to infect the air, in a hot climate, than the exhalations of such a mass of stagnating waters, deprived of any discharge, and become the receptacle of a thousand impurities, as well as the grave of several millions both of men and animals? The evil could not but increase from the same causes while Rome was exposed to the incursions and devastations of the Lombards, the Normans, and the Saracens, which lasted for several centuries. The air was become so infectious there at the beginning of the 13th century, that Pope Innocent III. wrote, that few people at Rome arrived to the age of forty years, and that nothing was more uncommon there than to see a peron of sixty. A very short time after, the popes transferred the seat of their residence to Avignon; during the seventy-two years they remained there, Rome became a desert; it was not till the beginning of the 18th century that Leo X. under whom Rome began to resume her wonted splendor, gave himself some trouble about re-establishing the salubrity of the air; but the city being burnt after beleaguered by the tyrant Charles V. saw itself plunged again into all its old calamities; and from 85,000 inhabitants, which it contained under Leo X. it was reduced under Clement VIII. to 32,000. In short, it is only since the time of Pius V. and Sixtius V. at the end of the 16th century, that the popes have constantly employed the necessary methods for purifying the air of Rome and its environs, by procuring proper discharges for the waters, drying up humid and marshy grounds, and covering the banks of the Tiber and other places required uninhabitable with fourfold effusiveness. Since that time a person may dwell at Rome, and go in or out of it at all seasons of the year. At the beginning, however, of the present century, they were still afraid to lie out of the city in summer, when they had resided there; as they were also to return to it, when once they had quitted it. They never ventured to sleep at Rome, even in broad day, in any other house than their own. They are greatly relaxed at present from the ancient servitudes: I have seen cardinals, in the months of July and August, go from Rome to lie at Praeneste, Albano, &c. and return the next or the following days to the city, without any detriment to their health. I have myself tried all these experiments, without suffering the least inconvenience from them. I have even seen, in the last war in Italy, two armies encamped under the walls of Rome at the time when the heats were most violent. Yet, notwithstanding all this, the greatest part of the country people dare not still venture to lie during that season of the year, nor even as much as sleep in a carriage, in any part of the territory comprehended under the name of the Campagna of Rome."

CAMPANIFORM, or CAMPANULATED, an appellation given to flowers resembling a bell.

CAMPANINI, a name given to an Italian marble dug out of the mountains of Carrara, because, when it is worked, it sounds like a bell.

CAMPANULA, or BELL-FLOWER; a genus of the monogynia order, belonging to the pentandria clafs of plants; and in the natural method ranking under the 29th order, Campanaeae. The corolla is campanulated, with its funiculus closed up by the valves that support the stamens; the stigma is trisid; the capsula inferior, or below the receptacles of the flower, opening and emitting the seeds by lateral pores.

Species. Of this genus there are no fewer than 41 species enumerated by botanical writers; but the following are the most worthy of attention. 1. The pyramidalis hath thick tuberous roots filled with a milky juice; it sends out strong, smooth, upright stalks, which rise to the height of four feet, garnished with smooth oblong leaves a little indented at the edges. The flowers are produced from the side of the stalks, and are regularly set on for more than half their length, forming a sort of pyramid; these are large, open, and shaped like a bell. The most common colour of the flowers is blue, though some are white, but the former are most esteemed. 2. The decurrens, or peach-leaved bell-flower, is a native of the northern parts of Europe; of this there are some with white, and some with blue flowers, and some with double flowers of both colours. These last have of late been propagated in such abundance as to have almost banished from the gardens those with single flowers by the medium, commonly called Canterbury bell-flower, a biennial plant, which perishes soon after it has ripened its seeds. It grows naturally in the woods of Italy and Austria; but is cul-
Campanula cultivated in the British gardens for the beauty of its flowers, which are blue, purple, white, and striped, with double flowers of all the colours. This species hath oblong, rough, hairy leaves, serrated on their edges; from the centre of these rises a fliff, hairy, fowery stalk, about two feet high, sending off several lateral branches, garnifled with long, narrow, hairy leaves fowed on their edges. From the setting on of these leaves proceed the footstalks of the flower; tho' which are of a fmall part of the flallk and branches, diminishing gradually in their length upward, and thereby forming a fort of pyramid. The flowers of this kind are very large, so make a fine apparence. The feeds ripen in September, and the plants decay foon after.

4. The trachelium, with nettle leaves, hath a peren- nial root, which feeds up several fflf hairy stalks having two ribs or angles. These put out a few feve-rate branches, garnifled with oblong hairy leaves deeply fawed on their edges. Toward the upper part of the stalks, the flowers come out alternately upon short trijrid foot-stalks having hairy emplacements.

The colours of the flowers are a deep and a pale blue and white, with double flowers of the fame; the double flored kind only merit a place in gardens. 5. The latifolia, or greatfeil bell-flower, hath a perennial root, composed of many fevy fibres that abound with a milky juice. From these arife feveral strong, round fngle stalks, which never put out branches, but are garnifled with oval spear-shaped leaves slightly indented on their edges. Towards the upper part of the flalk the flowers come out fingly upon short foot-stalks; their colours are blue, purple, and white. 6. The rapunculus, or rampion, hath roundifh feivy roots, which are eatable, and much cultivated in France for fallads; fome years fince it was cultivated in the Eng- liffh gardens for the fame purpofe, but is now generally neglected. It is a native of Britain: but the roots of the wild flalk never grow to half the flize of thofe which are cultivated. 7. The specular, with yellow eye-fright leaves, is an annual plant with fnder flalks rising a foot high, branching out on every fide, and garnifled with oblong leaves a little curled on their edges; from the wings of the leaves come out the flowers fitting clofe to the flalks, which are of a beautifh purple inclining to a violet colour. In the evening, they contract and fold into a pentagonal figure; from whence it is by fome called viola pandonius, or five-cornered violet. 8. The hybrida, or common Venus looking-glas. This feldom rises more than fix inches high, with a flalk branching from the bottom upward, and garnifled with oval leaves fitting clofe to the flalks, from the base of which the branches are produced, which are terminated by flowers very like the former flalk. This was formerly cultivated in the gardens: but fince the former kind hath been introduced, it hath almoft fupplantfed this; for the other is a much taller plant, and the flowers larger, though of a lefs beautiful colour. 9. The canariensis, with an orach leaf and tuberous root, is a native of the Canary iflands. It hath a thick feivy root of an irregular form; fometimes running downward like a paripin, at other times dividing into feveral knobs near the top; and when any part of the root is broken, there fliws out a milky juice at the wound. From the head or crown of the root arise one, two, three, or more stalls, in proportion to the flze of the root: but that in the centre is generally larger and rises higher, than the others. These stalls are very tender, round, and of a pale green; their joints are far diftant from each other; and when the roots are strong, the stalls will rise to ten feet high, sending out feveral lateral branches. At each joint they are garnifled with two, three or four spear-shaped leaves, with a sharp pointed beard on each fide. They are of a fia-green; and, when they firft come out, are covered fightly with an fh-coloured pounce. From the joints of the flalk the flowers are produced, which are of the perfect bell-flape, and hang downward; they are of a flame-colour, marked with ftripes of a brownih red: the flower is divided into five parts; at the bottom of each is feated a nectarium, covered with a white transparent skin, much refeembling thofe of the crown imperial, but smaller. The flowers begin to open in the beginning of October, and there is often a fecafeeion of them till March. The stalls decay to the root in June, and new ones spring up in August.

Culture, &c. The firft fort is cultivated to adorn halls, and to place before chimneys in the summer when it is in flower, for which purpose there is a fuitable place; for when the roots are flrong, they will fend out four or five stalks which will rise as many feet high, and are adored with flower all great part of their length. When the flowers begin to open, the pots are removed into the rooms, where, being shaded from the fun and rain, the flowers will continue long in beauty; and if the pots are every night removed into a more airy situation, but not exposed to heavy rains, the flowers will be fairer, and continue much longer in beauty. Thofe plants which are thus treated, are feldom fit for the purpose the following fseason; therefore a fupply of young ones must be annually raised. The plant may be propofed either by dividing the roots or by feed, but the latter produces the moft vigorous and beft flowering plants. The feed must be fown in autumn in boxes or pots filled with light undunged earth, and placed in the open air till the froot or hard rains come on; then they must be placed under a hotbed frame, where they may be sheltered from both; but in mild weather the glaffes fhould be drawn off every day, that they may enjoy the free air: with this management the plants will come up early in the spring, and then they must be removed out of the frame, placing them firft in a warm situation; but, when the feafon becomes warm, they fhould be fo placed as to have the morning fun only. In September the leaves of the plants will begin to decay, at which time they fhould be transplanted; therefore there must be one or two beds prepared, in proportion to the number of plants. Thofe beds must be in a warm situation, and the earth light, fandy, and without any mixture of dung. The plants must then be taken out of the pots or cafes very carefully, fo as not to bruife their roots; for they are very tender, and on being broken the milky juice will flow out plentifully, which will greatly weaken them. Thofe fhould be planted at about fix inches distance each way, with the head or crown of the root half an inch below the surface. If the feafon proves dry, they must be gently watered three or four days after they are planted; the beds fhould also be covered with mats in the day time, but
which should be taken off at night, to let the dew fall on the plants. Towards the end of November the beds should be covered over with some old tanners bark to keep out the frost; and where there is not conveniency for covering them with frames, they should be arched over with hoops, that in severer weather they may be covered with mats. In the spring the mats must be removed, and, the following summer, the plants kept free from weeds. In autumn, the earth should be stirred between them, some fresh earth spread over the beds, and the plants covered in winter as before. In these beds the plants may remain two years, during which time they are to be treated-in the manner before directed. The roots will now be strong enough to flower; so, in September they should be carefully taken up, and some of the most promising carefully planted in pots; the others may be planted in warm borders, or in a fresh bed, at a greater distance than before, to allow them room to grow. Those plants which are potted should be sheltered in winter from great rains and hard frosts, otherwise they will be in danger of rotting, or at least will be too weakened as not to flower with any strength the following summer; and those which are planted in the full ground, should have some old tanners bark laid round them to prevent the frost from getting at the roots. The second, third, fourth, and fifth sorts are easily propagated by parting the roots, or by seeds, that no particular directions for their culture need be given. The sixth sort, which is cultivated for its excellent roots, may be propagated by seeds, which are to be sown in a shady border; and when the plants are about an inch high, the ground shall be hoed as is practised for onions, to cut up the weeds, and thin the plants, to the distance of three or four inches; and when the weeds come up again they must be hoed over to destroy them: this, if well performed in dry weather, will make the ground clean for a long time; so that, being three times repeated, it will keep the plants clean till winter, which is the season for eating the roots, when they may be taken up for use as wanted. They will continue good till April, at which time, if they are fed with manure, their stalks will become hard and fit for use.—The seventh and eighth sorts are easily propagated by seeds, which they produce in plenty. If these, and the Venus naevolens, dwarf lychnis, candy-tuft, and other low annual flowers, are properly mixed in the border of the flower-garden, and sown at two or three different seasons, so as to have a succession of them in flower, they will make an agreeable variety. If these seeds are sown in autumn, the plants will flower early in the spring; but if sown in the spring, they will not flower till the middle of June; and if a third sowing is performed about the middle of May, the plants will flower in August; but from these, good seeds must not be expected.—The ninth sort is propagated by cutting the roots, which must be done with caution: for if they are broken or wounded, the milky juice will flow out plentifully; and if planted before the wounds are flinned over, it occasions their rott:ing; therefore when any of them are broken, they should be laid in the green-house a few days to heal. These roots must not be too often parted, if they are expected to flower well; for by this means they are weakened. The best time for transplanting and parting their roots is in July, soon after the stalks are de-
Campbell.

der Middleton he obstinately perverted to haras and infelt the victorious Engilta; and it was not till he received orders from that general, that he would submit to accept of a capitulation. Such jealousy of his loyal attachments was entertained by the commonwealth and protector, that a pretence was soon after taken upon to commit him to prison; and his confinement was rigorously continued till the restoration. The king, sensible of his services, had remitted to him his father's forfeiture, and created him earl of Argyle; and when a most unjust sentence was passed upon him by the Scots parliament, Charles had anew remitted it. In the subsequent part of this reign Argyle behaved himself dutifully; and though he seemed not disposed to go all lengths with the court, he always appeared, even in his opposition, a man of mild dispositions and peaceable deportment.

A parliament was summoned at Edinburgh in summer 1661, and the duke was appointed commissioner. Besides granting money to the king, and voting the indefitiable right of succession, this parliament enacted a telt, which all persons poifplled of offices, civil, military, or ecclesiastical, were bound to take. In this telt the king's supremacy was ascertained, the covenant renounced, pultive obedience afforded to, and all obligations disclaimed of endeavouring any alteration in civil or ecclesiastical establishments. This was the frame of the telt as proposed by the courtiers; but the country party proposed also a clause of adherence to the Protestant religion, which could not with decency be rejected. The whole was of an enormous length, considered as an oath; and, what was worse, a confession of faith was there ratified which had been imposed a little after the reformation, and which contained many articles altogether forged by the parliament and nation. Among others, the doctrine of reformation was inculcated; so that the telt being voted in a hurry, was found upon examination to be a medley of absurdity and contradiction. Though the courtiers could not reject the clause of adhering to the Protestant religion, they proposed, as a requisite mark of respect, that all princes of the blood should be exempted from taking that oath. This exception was jealously opposed by Argyle; who observed that the sole danger to be dreaded for the Protestant religion must proceed from the perversion of the royal family. By insisting on such topics, he drew on himself the secret indignation of the duke of York, of which he soon felt the fatal consequences.

When Argyle took the telt as a privy counsellor, he subjoined, in the duke's presence, an explanation which he had before hand communicated to that prince, and which he believed to have been approved by him. It was in these words: "I have considered the telt, and am very defirous of giving obedience as far as I can. I am confident that the parliament never intended to impose contradictory oaths: therefore I think no man can explain it but for himself. Accordingly I take it as far as it is consistent with itself and the Protestant religion. And I do declare that I mean not to bind myself, in my station, and in a lawful way, from wilfully and endeaVouring any alteration, which I think to the advantage of church or state, and not repugnant to the Protestant religion and my loyalty: and this I understand as a part of my oath." The duke, as was natural, heard it with great tranquillity: no one took the least offence: Argyle was admitted to sit that day in council: and it was impossible to imagine that a capital offence had been committed, where occasion seemed not to have been given so much as for a crown or reprimand.

Argyle was much surpried a few days after, to find that a warrant was issued for committing him to prison: that he was indicted for high treason, leaft-making, and perjury; and that from the innocent words abovementioned an accusation was extracted, by which he was to forfeit life, honours, and fortune. It is needless to enter into particulars, where the iniquity of the whole is so evidently apparent. Though the sword of justice was displayed, even her semblance was not put on; and the forms of law were preferred to fuldify, or rather aggravate, the opprobrium. Of five judges, three did not scruple to find the guilt of treason and leaft-making to be incurred by the prisoner: a jury of 15 noblemen gave verdict against him; and the king, being consulted, ordered the sentence to be pronounced, but the execution of it to be suspended till further orders. Argyle, however, saw no reason to trust to the justice or mercy of such enemies: He made his ecape from prison, and till he could find a ship for Holland he concealed himself during some time in London. The king heard of his lurking-place, but would not suffer him to be arrested. All the parts, however, of his sentence, so far as the government in Scotland had power, were rigorously executed; his estate confiscated, his arms reversed and torn. Having got over to Holland, he remained there during the remaining part of the reign of Charles II. But thinking himself at liberty, before the coronation of James II. to exert himself in order to recover the constitution by force of arms, he concerted measures with the duke of Monmouth, and went into Scotland, to assemble his friends: but not meeting with the success he expected, he was taken prisoner; and being carried to Edinburgh, was beheaded upon his former unjust sentence, June 30, 1675. He showed great constancy and courage under his misfortunes: on the day of his death he ate his dinner very cheerfully; and, according to custom, slept after it a quarter of an hour or more, very soundly. At the place of execution, he made a short, grave, and religious speech; and, after solemnly declaring that he for­gave all his enemies, submitted to death with great firmness.

Campbell, (Archibald) first duke of Argyle, son to the preceding, was an active promoter of the revolution. He came over with the Prince of Orange; was admitted into the convention as Earl of Argyle, tho' his father's attainder was not reversed; and in the claim of rights the sentence against him was declared to be, what most certainly it was, a reapproach upon the nation. The establishment of the crown upon the Prince and Princesses of Orange being carried by a great majority in the Scottish convention, the earl was sent from the nobility with Sir James Montgomery and Sir John Dalrymple from the barons and boronlgs, to offer the crown, in the name of the convention, to their Majesties, and tendered them the coronation oath; for which, and many other eminent services, he was admitted a member of the privy council, and, in 1690, made one of the Lords of the Treasury. He was af­
Campbell, who succeeded his father as Duke of Argyll, Marquis of Kintyre and Lorn, Earl of Campbell and Cowell, Viscount of Lochow and Glengla, Lord Inverary, Mull, Morvern, and Terrey, by letters-patent, bearing date at Kennington the 23rd of June 1701. He sent over a regiment to Flanders for King William's service, the officers of which were chiefly of his own name and family, who bravely distinguished themselves through the whole course of the war. He married Elizabeth, daughter of Sir Lionel Tollemah of Helmingham in the county of Suffolk, by Elizabeth duchess of Lauderdale his wife, daughter and heir of William Murray earl of Dyraf, by whom he left issue two sons and a daughter; namely, John duke of Argyll, the subject of the next article; Archibald, who succeeded his brother as Duke of Argyll; and Lady Anne, married to James Stuart, second earl of Bute, by whom she had the present earl.

Campbell, (John) second duke of Argyll, and also duke of Greenwich and baron of Chatham, son to the subject of the preceding article, was born on the 10th of October 1680; and, on the very day when his grandfather suffered at Edinburgh, fell out of a window three years earl of Dysart, by whom he left issue of subject. Duke of Greenwich and baron of Chatham, son to the present duke of Argyll; and Lady Anne, married to James Stuart, second earl of Bute, by whom she had the present earl.

In 1704, her Majesty reviving the Scottish order of the thistle, his grace was installed one of the knights of that order, and was soon after appointed high-commissioner to the Scotch parliament; where, being of great service in promoting the intended union, he was on his return created a peer of England, by the titles of baron of Chatham and duke of Greenwich, and was in all respects treated with the greatest respect. His grace first distinguished himself in his military capacity at the battle of Oudenarde; where he commanded as brigadier-general, with all the bravery of youth and the conduct of a veteran officer. He was present under the duke of Marlborough at the siege of Ghent, and took possession of the town. He had also a considerable share in the victory obtained over the French at the battle of Malplaquet, by dislodging them from the wood of Pult, and gaining a portion of great consequence. In this sharp engagement, several market-balls passed through the duke's clothes, hat, and periok. Soon after this action, he was sent to take the command in Spain; and after the reduction of Port Mahon, he returned to England. His grace having now a seat in the house of lords, he centered the measures of the ministry with such freedom, that all his places were disposed of to other noblemen: but at the accession of George I, he recovered his influence. At the breaking out of the rebellion in 1715, he was made commander in chief of his majesty's forces in North Britain; and was the principal means and cause of the total extinction, at that time, of the rebellion in Scotland, without much bloodshed. In direct opposition to him, or that part of the army he commanded, at the head of all his Campbells, was placed Campbell earl of Braidalbin, of the same family and kindred, by some fatal error that ever misguided and misled that unhappy family of the Stuarts and all its adherents. The consequence was, that both sets of Campbells, from family affection, refused to strike a stroke, and retired out of the battle. He arrived at London March 6th 1716, and was in high favour; but, to the surprise of people of all ranks, he was in a few months divested of all his employments: and from this period to the year 1718, he signalized himself in a civil capacity, by his uncorrupted patriotism and manly eloquence. In the beginning of the year 1719, he was again admitted into favour, appointed lord-steward of the household, and in April following was created duke of Greenwich. He continued in the administration during all the remaining part of that reign; and, after his late majesty's accession, till April 1740; when he delivered a speech with such warmth, that the ministry being highly offended, he was again divested from his employments. To thee, however, on the change of the ministry, he was soon restored; but not approving of the measures of the new ministry more than those of the old, he gave up all his posts for the last time, and never after engaged in affairs of state. He now enjoyed privacy and retirement; and died of a paralytic disorder on the 4th of October 1743. To the memory of his grace a very noble monument was erected in Westminster-Abbey, executed by the ingenious Roulliac.

The duke of Argyll, though never first minister, was a very able statesman and politician, most steadfastly fixed in those principles he believed to be right, and not to be shaken or changed. His delicacy and honour were so great, that it hurt him to be even suspected; witnesses that application fald to be made to him by one of the adherents of the Stuart family before the last rebellion in order to gain his interest, which was considerable both in Scotland and England. He immediately sent his letter to the secretary of state; and it vexed him much even to have an application made him, lest any person should think him capable of acting a double part. When he thought measures wrong or corrupt, he cared not who was the author, however great or powerful he might be; witnesses his boldly attacking the great duke of Marlborough in the house of lords, about his forage and army contracts in Flanders, in the very zenith of his power and popularity, though in all other respects he was the most able general of his time. The duke of Argyll, on all occasions, spoke well, with a firm, manly, and noble eloquence; and seems to deserve the character given of him by Pope:

Argyle the state's whole thunder born to weild, And shake alike the senate and the field.

In private life, the duke's conduct was highly exemplary. He was an affectionate husband and an indulgent master. He seldom parted with his servants till age had rendered them incapable of their employments; and then he made provision for their subsistence. He was liberal to the poor, and particularly to perfons of merit in difficult cases: but though he was ready to patronize deserving persons, he was extremely caution-
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Campbell. tious not to deceive any by lavish promises, or leading them to form vain expectations. He was a strict economid, and paid his tradesmen punctually every month; and though he maintained the dignity of his rank, he took care that no part of his income should be wasted in empty pomp or unnecessary expenses. He was twice married, and left five daughters, but no male issue. The titles of duke and earl of Greenwich and baron of Chatham became extinct at his death; but in his other titles he was succeeded by his brother Archibald earl of Ia, the subject of the next article.

Campbell, (Archibald) third Duke of Argyile, brother, to the subject of the preceding article, was born at Hamhoulfe, in England, in June 1682, and was educated at the University of Glasgow. He afterwards applied himself to the study of the law at Utrecht; but upon his father's being created a Duke he betook himself to a military life, and served some time under the duke of Marlborough. Upon quitting the army, in which he did not long remain, he applied to the acquisition of that knowledge which would enable him to make a figure in the political world. In 1705, he was constituted transferor of Scotland, and made a considerable figure in Parliament, though he was not more than twenty-three years of age. In 1706, he was appointed one of the commissioners for treating of the Union; and the same year was created Lord Ormflay, Dunoon, and Arrois, Vicount and Earl of Ilay. In 1708, he was made an extraordinary Lord of Seilion; and when the Union was effected, he was chosen one of the Sixteen Peers for Scotland, in the first Parliament of Great-Britain; and was constantly elected to every future Parliament till his death, except the fourth. In 1710, he was made Justice-General of Scotland. In 1711, he was called to the privy council; and upon the accession of George I. he was nominated lord regifter of Scotland. When the rebellion broke out in 1715, he again betook himself to arms, in defence of the house of Hanover, and by his prudent conduct in the West Highlands, he prevented General Gordon, at the head of three thousand men, from penetrating into the country, and raising levies. He afterwards joined his brother at Stirling, and was wounded at the battle of Dumbldin. In 1725, he was appointed keeper of the privy seal; and, from this time, he was entrusted with the management of Scotch affairs. In 1734, upon his resigning the privy seal, he was made keeper of the great seal, which office he enjoyed till his death. Upon the decease of his brother, he became duke of Argyile, hereditary justice general, lieutenant, sheriff, and commissary of Argyleshire and the Western isles, hereditary great master of the household, hereditary keeper of Dunstaffnage, Carrick, and several other castles. He was also chancellor of the University of Aberdeen; and laboured to promote the interest of that, as well as of the other universities of Scotland. He particularly encouraged the school of phyfic at Edinburgh, which has now acquired so high a reputation. Having the chief management of Scotch affairs, he was also extremely attentive to promote the trade, manufactures, and improvements of his country. It was by his advice that, after the rebellion in 1745, the Highlanders were employed in the royal army. He was a man of great endowments both natural and acquired, well versed in the laws of his country, and pos-

fessed considerable parliamentary abilities. He was likewise eminent for his skill in human nature, had great talents for conversation, and had collected one of the most valuable private libraries in Great-Britain. He built himself a very magnificent seat at Inverary. The faculties of his mind continued sound and vigorous till his death, which happened suddenly on the 15th of April 1761, in the 79th year of his age. He was married, but had no issue; and was succeeded in his titles and the estates of his family by John Campbell, fourth duke of Argyile, son of the honourable John Campbell of Mammuore, who was the second son of Archibald the ninth earl of Argyile.

The family of Argyile was heritable justice-general for Scotland till abolished by the jurisdiction act. They are still heritable masters of the king's houhold in Scotland, and keepers of Dunstaffnage and Carrick.

Campbell, (John) an eminent historical, biographical, and political writer, was born at Edinburgh, March 6, 1707-8. His father, Robert Campbell of Glemlyon, Esq; was captain of horse in a regiment commanded by the then earl of Hyndford, and his mother Elizabeth, daughter of --- Smith, Esq; of Windfor in Berkshire, had the honour of claiming a descent from the poet Waller. Our author, their fourth son, was at the age of five years brought from Scotland to Windsor, where he received the first principles of his education; and at a proper age, he was placed out as a clerk to an attorney, being intended for the law. This profession, however, he never followed; but by a close application to the acquisition of knowledge of various kinds, became qualified to appear in the literary world. In 1736, before he had completed his 30th year, he gave to the public, in two volumes folio, "The Military History of Prince Eugene and the Duke of Marlborough," enriched with maps, plans, and cuts. The reputation hence acquired, occasioned him soon after to be solicited to take a part in the "Ancient Universal History." Whilst employed in this capital work Mr Campbell found leisure to entertain the world with other productions. In 1739, he published the "Travels and Adventures of Edward Brown," 8vo. In the same year appeared his, "Memoirs of the Balhaw Duke de Ripperdu," 8vo, reprinted with improvements, 1740. These memoirs were followed, in 1741, by the "Concise History of Spanish America," 8vo. In 1742, he was the author of "A Letter to a Friend in the Country, on the Publication of Thurloe's State Papers," giving an account of their discovery, importance and utility. The same year was distinguished by the appearance of the 1st and 2d volumes of his "Lives of the English Admirals, and other eminent British Seamen." The two remaining volumes were completed in 1744; and the whole, not long after, was translated into German. This was the first of Mr Campbell's works to which he prefixed his name; and it is a performance of great and acknowledged merit. In 1743, he published "Hermippus revived," a second edition of which, much improved and enlarged, came out in 1749, under the following title: "Hermippus Redivivus: or the Sage's Triumph over Old Age and the Grave. Wherein a method is laid down for prolonging the life and vigour of man. Including a commentary upon an ancient inscription, in which this great secret is revealed; sup-
Dr Campbell in 1736 married Elizabeth, daughter of Benjamin Vobe, of Leominster, in the county of Hereford, gentleman, with whom he lived nearly 40 years in the greatest conjugal harmony and happiness. So wholly did he dedicate his time to books, that he seldom went abroad: but to relieve himself as much as possible from the inconveniences incident to a sedentary life, it was his custom, when the weather would admit, to walk in his garden; or otherwise in some room of his house, by way of exercise. By this method, united with the strictest temperance in eating, and an equal abstinence in drinking, he enjoyed a good state of health, though his constitution was delicate. His domestic manner of living did not preclude him from a very extensive and honourable acquaintance. His house, especially on a Sunday evening, was the resort of the most distinguished persons of all ranks, in particular of such as had rendered themselves eminent by their knowledge or love of literature. He received foreigners, who were fond of learning, with an affability and kindness which excited in them the highest respect and veneration; and his instructive and cheerful conversation made him the delight of his friends in general. He was during the latter part of his life, agent for the province of Georgia in North America; and died at the close of the year 1775, in the 67th year of his age. The doctor's literary knowledge was by no means confined to the subjects on which he more particularly treated as an author; he was well acquainted with the mathematics, and had read much in medicine. It hath been with great reason believed, that if he had dedicated his studies to the last science, he would have made a very conspicuous figure in the physical profession. He was eminently versed in the different parts of sacred literature; and his acquaintance with the languages extended not only to the Hebrew, Greek, and Latin among the ancient, and to the French, Italian, Spanish, Portuguese, and Dutch, among the moderns; but likewise to the Oriental tongues. He was particularly fond of the Greek language. His attainments of such a variety of knowledge was exceedingly assisted by a memory surprisingly retentive, and which indeed astonished every person with whom he was conversant. In communicating his ideas, he had an uncommon readiness and facility; and the style of his works, which had been formed upon the model of that of the celebrated bishop Sprat, was picturesque, easy, flowing, and harmonious. To all these accomplishments of the understanding, Dr Campbell joined the more important virtues of a moral and pious character. His disposition was gentle and humane, and his manners kind and obliging. He was the tenderest of husbands, a most indulgent parent, a kind master, a firm and sincere friend. To his great Creator he paid the constant and ardent tribute of devotion, duty, and reverence; and in his correspondences he shewed that a sense of piety was always nearest his heart.

**CAMBELLTOWN,** a parliament town of Argyllshire in Scotland, seated on the lough of Kilkerran, on the eastern shore of Kintyre or Cantyre, of which it is the capital. It hath a good harbour; and is now a very considerable place, though within these 50 years, only a petty fishing town. It has in fact been created by the fishery: for it was appointed the place...
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CAMPDEN, a small town of Gloucestershire in England, containing about 200 houles. It gives title of Viceroy, by courtesy, to Earl of Gainsborough for four years. W. Long. 5. 10. N. Lat. 54.

CAMPEN, a strong town of Overfiel in the United Provinces. It hath a citadel and a harbour; but the latter is often filled up with sand. It was taken by the Dutch in 1573, and by the French in 1672; but they abandoned it the following year. It is situated near the mouth of the river Yfetl and Zuidcr. E. Long. 93. 7. N. Lat. 40. 20.

CAMPEACHY, a town of Mexico in South America, seated on the eaff coast of a bay of the same name, on the west of the province of Yucataro. It is defended by a good wall and strong forts; but is neither fo rich, nor carries on such a trade, as formerly; for it having been the port for the sale of logwood, the tree which it is cut being about 30 miles distant. It was taken by the English in 1596; by the buccaneers in 1673; and by the Flibustiers of St Domingo in 1685, who set on fire and blew up the citadel. W. Long. 93. 7. N. Lat. 50.

CAMPEACHY-Wood, in botany. See HEMATOXYLUM.

CAMPEN, a strong town of Overfiel in the United Provinces. It hath a citadel and a harbour; but the latter is often filled up with sand. It was taken by the Dutch in 1573, and by the French in 1672; but they abandoned it the following year. It is situated near the mouth of the river Yfetl and Zuidcr. E. Long. 93. 5. N. Lat. 52. 38.

CAMPESTR, in antiquity, a fort of cover for the privities, worn by the Roman soldiers in the field exercises; being girt under the navel, and hanging down to the knees. The name is supposed to be formed from campus, the field or place where the Roman soldiers performed their exercises.

CAMPHE, or CAMPHE, a solid concrete juice extracted from the wood of the laurus camphora. See LAURUS, CHEMISTRY, and MATERIA MEDICA.

Pure camphire is very white, pellucid, somewhat unctuous to the touch; of a bitterish aromatic taste, yet accompanied with a fene of coolness; of a very fragrant smell, somewhat like that of rosemary, but much stronger. It has been very long esteemed one of the most efficacious diaphoretics; and has been celebrated in fevers, and epidemical diseases. It has been very long esteemed one of the most efficacious diaphoretics; and has been celebrated in fevers, and epidemical diseases. It has been very long esteemed one of the most efficacious diaphoretics; and has been celebrated in fevers, and epidemical diseases. It has been very long esteemed one of the most efficacious diaphoretics; and has been celebrated in fevers, and epidemical diseases.

CAMPION (Edmond), an English Jesuit, was born at London, of indigent parents, in the year 1540; and educated at Christ's hospital, where he had the honor to speak an oration before queen Mary on her accession to the throne. He was admitted a scholar of St John's college in Oxford at its foundation, and took the degree of master of arts in 1564. About the same time he was ordained by a bishop of the church of England, and became an eloquent Protestant preacher. In 1566, when queen Elizabeth was entertained by the university of Oxford, he spoke an elegant oration before her majesty, and was also respondent in the philosophy act in St Mary's church. In 1568, he was junior proctor of the university. In the following year, he went over to Ireland, where he wrote a history of that kingdom, and turned papist; but being found rather too affiduous in perfusing others to follow his example, he was committed to prison. He soon however, found means to make his escape. He landed in England in 1571; and thence proceeded to Doway in Flanders, where he publicly recanted his former heresy, and was created bachelor of divinity. He went soon after to Rome, where, in 1573, he was admitted of the society of Jesus, and was sent by the general of that order to Vienna, where he wrote his tragedy called Neder et umbreusia, which was acted before the emperor with great applause.

From Vienna he went to Prague in Bohemia, where he resided in the Jesuits college about six years, and then returned to Rome. From thence, in 1580, he was sent by Pope Gregory XIII. with the celebrated Father Pallotti, to convert the people of England. From Pitts we learn, that, some time before, several English priests, inspired by the Holy Ghost, had undertaken to convert their countrymen; that some of them had suffered imprisonment, chains, tortures, and ignominious death, with becoming indigence and contempt; but being at last that the labor was abundant and the labourers few, they solicited the assistance of the Jesuits.
Campian Jesuits; requesting, that though not early in the morning, they would at least in the third, sixth, or ninth hour, send labourers into the Lord's vineyard. In consequence of this solicitation, the above two were sent to England. They arrived in an evil hour for Campian, at Dover; and were next day joyfully received by their friends at London. He had not been long in England, before Wallingham the secretary of state, being informed of his uncommon affability in the cause of the church of Rome, used every means in his power to have him apprehended, but for a long time without success. However, he was at last taken by one Eliott, a noted priest-taker, who found him in the house of Edward Yates, Esq. at Lyford in Berkshire, and conducted him in triumph to London, with a paper on his hat, on which was written campian the Jesuit. He was imprisoned in the tower; where, Wood says, "he did undergo many examinations, abuses, wrackings, and torments;" exquisitisimus cruciatibus tortus, says Pitts. It is hoped, for the credit of the reformers, this torturing part of the story is not true. The poor wretch, however, was condemned, on the statute 25 Ed. III. for high treason; and butchered at Tyburn, with two or three of his fraternity. However, though criminal in the eye of the law, or of the English gentry, might be the zeal of this Jesuit for the salvation of the poor heretics of that kingdom, biographers of each personage unite in giving him a great and amiable character. "All writers (says the Oxford antiquary), whether Protestants or Papists, say, that he was a man of admirable parts; an elegant orator, a subtle philosopher and disputant, and an exact preacher whether in English or the Latin tongue, of a sweet disposition, and a well-polished man." Fuller, in his church-history, says, "he was of a sweet nature, constantly carrying about him the charms of a plausible behaviour, of a fluent tongue, and good parts." His History of Ireland, in two books, was written in 1579; and published, by Sir James Ware, from a manuscript in the Cotton library, Dublin, 1633, folio. He wrote also Chronologia universalis, a very learned work; and various other tracts.

Campicursio, in the ancient military art, a march of armed men for several miles, from and back again to the camp, to instruct them in the military pace. This exercise was nearly akin to the decursio, from which it only differed, in that the latter was performed by horsemen, the former also by foot.

Campidoctores, or Campiductores, in the Roman army, were officers who instructed the soldiers in the discipline and exercises of war, and the art of handling their weapons to advantage. These are also sometimes called campigenii, and armidoctores.

Campiductor, in middle-age writers, signifies the leader or commander of an army, or party.

Campion, in botany, the English name of the Lychinis.

Campion, a town of the kingdom of Tanguth in Tartary. It was formerly remarkable for being a place through which the caravans passed on the road from Bokhara to China. E. Long. 104. 55. N. Lat. 40. 25.

Campistrion, a celebrated French dramatic author, was born in 1566. Racine directed his poetical talents to the theatre, and assistit him in his first pieces. He died in 1723.

Campita, in church history, an appellation given to the donatists, on account of their assembling in the field, for want of churches. For a similar reason, they were also denominated Montefes and Rupitani.

Campili, or Campoli, a town of Italy, in the kingdom of Naples, and in the farther Abruzzo, situated in E. Long. 13. 55. N. Lat. 42. 38.

Campno major, a town of the province of Alençon in Portugal. W. Long. 7. 24. N. Lat. 38. 50.

Campredon, a town of Catalonia in Spain, seated at the foot of the Pyrenean mountains. The fortifications were demolished by the French in 1694. W. Long. 1. 56. N. Lat. 42. 20.

Campis (Francis de), abbot of Notre Dame at Sigi, was born at Amiens in 1643; and distingghished himself by his knowledge of medals, by writing an history of France, and several other works. He died at Paris in 1723.

Campvere. See Veer.

Campus, in antiquity, a field or vacant plain in a city, not built upon, left vacant on account of flows, combats, exercises, or other uses of the citizens.

Campus Maius, in ancient authors, an anniverary assembly of the ancient citizens, performed on May-day, when they confederated together for the defence of their kingdom against all its enemies.

Campus Martius, a large plain in the suburbs of ancient Rome, lying between the Quirinal and Capitoline mounts and the Tiber, thus called because consecrated to the god Mars, and set apart for military sports and exercises to which the Roman youth were trained, as the use and handling of arms, and all manner of feats of activity. Here were the races run, either with chariots oringle horses; here also stood the villa publica, or place for the reception of ambassadors, who were not permitted to enter the city. Many of the public comitia were held in the same field, part of which was for that purpose cantoned out. The place was also nobly decorated with statues, arches, columns, porticoes, and the like structures.

Campus Scleratus, a place without the walls of ancient Rome, where the Vestals who had violated their vows of virginity were buried alive.

Camul, a town of Asia, on the eastern extremity of the kingdom of Cilicia, on the frontiers of Tangut. E. Long. 99. 5. N. Lat. 37. 15.

Camus, a person with a low flat nose, hollowed in the middle. The Tartars are great admirers of camus beauties. Rubrquis observes, that the wife of the great Jenghiz Khan, a celebrated beauty, had only two holes for a nose.

Camus (John Peter), a French prelate born in 1582. He was author of a number of pious romances (the taine of his time), and other theological works, to the amount of 200 vols. His definition of politics is remarkable: Ars non tantum regendi, quam fallendi, hominis; "the art not so much of governing, as of deceiving mankind." He died in 1682.

Can, in the sea-language, as can-pump, a vessel where with sseamen pour water into the pump to make it go.

Can-Boy, See Bouy.

Can-hook, an instrument used to sling a cauldron by the ends of the handles: it is formed by fixing a broad and flat
CANAAN

Canaan. (anc. geog.) a town on the confines of the Upper and Lower Galilee; memorable for the turning water into wine (John). The birth place of Simeon, called Canaanite from this place, and of Nathaniel.

Canaan, the fourth son of Ham. The irreverence of Ham towards his father Noah is recorded in Gen. ix. Upon that occasion the patriarch cursed him in a branch of his posterity: "Curfed," says he, "be Canaan; a servant of servants shall he be unto his brethren." This curse being pronounced, not against Ham the immediate transgressor, but against his son, who does not appear, from the words of Moses, to have been any ways concerned in the crime, hath occasioned several conjectures. Some have believed that Noah cursed Canaan, because he could not well have cursed Ham himself, whom God had not before blessed. Others think Moab's chief intent in recording this prediction was to raise the spirits of the Israelites, then entering on a terrible war with the children of Canaan, by the assurance, that, in consequence of the curse, that people were destined by God to be subdued by them. For the opinion of those who imagine all Ham's race were here accursed, seems repugnant to the plain words of Scripture, which confine the malediction to Canaan and his posterity; and is also contrary to fact. Indeed, the prophecy of Noah, that Canaan "should be a servant of servants to his brethren," seems to have been wholly completed in him. It was completed with regard to Shem, not only in that a considerable part of the seven nations of the Canaanites were made slaves to the Israelites, when they took possession of their land, as part of the remainder of them were afterwards enslaved by Solomon; but also by the subsequent expeditions of the Assyrians and Persians, who were both descended from Shem; and under whom the Canaanites suffered subjection, as well as the Israelites; not to mention the conquest of part of Canaan by the Elamites, or Persians, under Chedorlaomer, prior to them all. With regard to Japheth, we find a completion of the prophecy, in the successive conquests of the Greeks and Romans in Palestine and Phoenicia, where the Canaanites were settled, but especially in the total subversion of the Carthaginian power by the Romans; besides some invasions of the northern nations, as the posterity of Thogarma and Magog; wherein many of them, probably, were carried away captive.

The posterity of Canaan were very numerous. His eldest son was Sidon, who at least founded and populated the city of Sidon, and was the father of the Sidonians and Phoenicians. Canaan had besides ten sons, who were the fathers of so many people, dwelling in Palestine, and in part of Syria; namely, the Hitites, the Jebusites, the Amorites, the Girgarites, the Hivites, the Arphites, the Sittites, the Arvadites, the Zemaries, and Hamathites.

Land of Canaan, the country so named from Canaan the son of Ham. It lies between the Mediterranean sea and the mountains of Arabia, and extends from Egypt to Phoenicia. It is bounded to the east by the mountains of Arabia; to the south by the wilderness of Paran, Idumea, and Egypt; to the west by the Mediterranean, called in Hebrew the Great Sea; to the north by the mountains of Libanus. Its length from the city of Dan (since called Caesarea Philippi, or Paneas, which stands at the foot of these mountains) to Beerheba, is about 70 leagues; and its breadth from the Mediterranean sea to the eastern borders, is in some places 30. This country, which was first called Canaan, from Canaan the son of Ham, whose posterity possessed it, was afterwards called Palestine, from the people which the Hebrews called Philistines, and the Greeks and Romans corruptly Palestinian, who inhabited the sea coasts, and were first known to them. It likewise had the name of the Land of Promise, from the promise God made Abraham of giving it to him; that of the Land of Israel, from the Israelites having made themselves masters of it; that of Judah, from the tribe of Judah, which was the most considerable of the twelve; and lastly, the happiest it had of being blessed by the presence, actions, miracles, and death of Jesus Christ, has given it the name of the Holy Land, which it retains to this day.

The first inhabitants of this land therefore were the Canaanites, who were descended from Canaan, and the eleven sons of that patriarch. Here they multiplied extremely; trade and war were their first occupations; these gave rise to their riches, and the several colonies scattered by them over almost all the islands and maritime provinces of the Mediterranean. The measure of their idolatry and abominations was completed, when God delivered their country into the hands of the Israelites. In St Athanasius's time, the Africans still said they were descended from the Canaanites; and it is said, that the Punic tongue was almost entirely the same with the Canaanite and Hebrew language. The colonies which Cadmus carried into Boeotia, and his brother Cilix into Cilicia, came from the flock of Canaan. The cities of Sicily, Sar- dinia, Malta, Cyprus, Corfu, Majorca and Minorca, Gades and Ebusus, are thought to have been peopled by the Canaanites. Bochart, in his large work entitled Canaan, has set all this matter in a good light.

Many of the old inhabitants of the north-west of the land of Canaan, however, particularly on the coast or territories of Tyre and Sidon, were not driven out by the children of Israel, whence this tract seems to have retained the name of Canaan a great while after those other parts of the country, which were better inhabited by the Israelites, had lost the said name. The Greeks called this tract inhabited by the old Canaanites along the Mediterranean sea, Phoenicia; the more inland parts, as being inhabited partly by Canaanites, and partly by Syrians, Syrophoenicia; and hence the woman said by St Matthew (xv. 22.) to be a woman of Canaan, whose daughter Jesus cured, is said by St Mark (vii. 26.) to be a Syrophoenician by nation, as she was a Greek by religion and language.

CANAAN, or the province of Quebec, an extensive country of North America, bounded on the north-east by the gulf of St Lawrence, and St John's river; on the south-west, by lands inhabited by the savage Indians, which are frequently included in this province; on the south, by the province of Nova-Scotia, the states of New England, and New-York; and on the north-
Canada [76]

Canada, north-west, by other Indian nations. Under the name of Canada, the French comprehended a very large territory; taking into their claim part of New-Scotland, New-England, and New-York on the east, and extending it on the west as far as the Pacific Ocean. That part, however, which was reduced by the British arms in the last war, lies between 61 and 81 degrees of west longitude, and between 43 and 52 of north latitude. The climate is not very different from that of the northern British colonies; but as it is much further from the sea, and more to the northward, than of the parts, latitude. The climate is not very different from that of many parts extremely fertile; producing many kinds of grain, fruits, and vegetables. The uncultivated parts is such a rent forts of grains, fruits, and vegetables. The French had traders, who like the original inhabitants, traversed the vast lakes and rivers in canoes, with incredible industry and patience, carrying their goods into the remotest parts of America, and among nations entirely unknown to us. These again brought the furs, &c. home to them, as the Indians were thereby habituated to trade with them. For this purpose, people from all parts, even from the distance of 1000 miles, came to the French fair at Montreal, which began in June, and sometimes lasted three months. On this occasion many feccumities were observed, guards were

felves to carry on a considerable trade upon the great lakes of fresh water which these countries environ. Here are five lakes, the leaft of which is of greater extent than the fresh-water lakes to be found in any other part of the world: these are the lake Ontario, which is no less than 300 leagues in circumference; Erie, or Ofewgo, longer, but not so broad, is about the same extent. That of the Huron spreads greatly in width, and is about 300 leagues in circuit; as also is that of Machigian, though like lake Erie it is rather long, and comparatively narrow. But the lake Superior is larger than any of these, being no less than 500 leagues in circumference. All these are navigable by any vessels, and they all communicate with each other; but the passage between Erie and Ontario is interrupted by a vast stupendous fall or catacra, called the falls of Niagara*. The river St Lawrence, * See Ni amongst already observed, is the outlet of these lakes, by which they discharge themselves into the ocean. The French built forts at these several straits, by which the lakes communicate with one another, and on that side where the lake of them communicates with the river. By these, while the country was in their possession, they effectually secured to themselves the trade of the lakes, and preferred an influence over all the Indian nations that lie near them.

The most curious and interesting part of the natural history of Canada is the animals there produced. Thence are flags, elk, deer, bears, foxes, martins, wild cats, ferrets, weasels, large squirrels of a greyish hue, hares and rabbits. The southern parts, in particular, breed great numbers of wild bulls, divers forts of roe bucks, geats, wolves, &c. The marshes, lakes, and pools, with which this country abounds, swarm with otters and beavers, of which the white are highly valued, as well as the right black kind. A vast variety of birds are also to be found in the woods; and the river St Lawrence abounds with such quantities of fish, that it is affirmed by some writers, this would be a more profitable article that even the fur-trade.—There are in Canada a multitude of different Indian tribes; but these are observed to decrease in number where the Europeans are most numerous; owing chiefly to the immoderate use of spirituous liquors, of which they are excessively fond. Their manner of living we have already particularly described. The principal towns are Quebec, Trois Rivières, and Montreal. The commodities required by the Canadians from Europe are, wine, or rather rum; cloths, chiefly coarse; linen; and wrought iron. The Indian trade requires rum, tobacco, a fort of stuff blankets, guns, powder, balls, and flints, kettles, hatchets, toys, and trinkets of all kinds. While the country was in possession of the French, the Indians supplied them with poultry; and the French had traders, who like the original inhabitants, traversed the vast lakes and rivers in canoes, with incredible industry and patience, carrying their goods into the remotest parts of America, and among nations entirely unknown to us. These again brought the furs, &c. home to them, as the Indians were thereby habituated to trade with them. For this purpose, people from all parts, even from the distance of 1000 miles, came to the French fair at Montreal, which began in June, and sometimes lasted three months. On this occasion many fome aments were observed, guards were
were placed, and the governor assented to preserve order in so great and various a concourse of savage nations. But sometimes great disorders and tumults happened; and the Indians frequently gave for a dram all that they were poled of. It is remarkable, that many of these nations actually paid by the English settlement of Albany in New-York, and travelled 200 miles farther to Montreal, though they could have purchased the goods they wanted cheaper at the former.

Since Britain became possessed of Canada, their trade with that country has generally employed 34 ships and 400 seamen; their exports, on an average of three years, in skins, furs, ginseng, make-root, capillaire, and wheat, amount to 150,000L. Their imports from Great Britain are computed at nearly the same sum. It will, however, be always impossible to overcome certain inconveniences arising from the violence of the winter. This is so excessive from December to April, that the broadest rivers are frozen over, and the snow lies commonly from four to six feet deep on the ground, even in those parts of the country which lie three degrees south of London, and in the temperate latitude of Paris. Another inconvenience arises from the falls in the river St Lawrence below Montreal, which prevent ships from penetrating to that port from the interior of inland commerce. The communication therefore with Canada, and the immense regions beyond it, will always be interrupted during the winter season, until roads are formed that can be travelled without danger from the Indians. For these savage people often commit hostilities without any previous notice; and frequently, without any provocation, they commit the most horrid ravages for a long time with impunity.

Canada was undoubtedly discovered by Sebastian Cabot, the famous Italian adventurer, who failed under a commission from Henry VII. But though the English monarch did not think proper to make any use of this discovery, the French quickly attempted it; and we have an account of their fishing for cod on the banks of Newfoundland, and along the sea-coast of Canada, in the beginning of the 16th century. About the year 1506, one Denys, a Frenchman, drew a map of the gulf of St Lawrence; and two years after, one Aubert, a ship master of Dieppe, carried over to France some of the natives of Canada. As the new country, however, did not promise the fame amazing quantities of gold and silver produced by Mexico and Peru, the French for some years neglected the discovery. At last, in the year 1523, Francis I. a fertile and enterprising prince, sent four ships, under the command of Verazani, a Florentine, to prosecute discoveries in that country. The particulars of this man's first expedition are not known. All we can learn is, that he returned to France, and next year he undertook a second. As he approached the coast, he met with a violent storm; however, he came so near as to perceive the natives on the shore, making friendly signs to him to land. This being found impracticable by reason of the surf upon the coast, one of the sailors threw himself into the sea; but, endeavouring to swim back to the ship, a large fish him on shore without signs of life. He was, however, treated by the natives with such care and humanity, that he recovered his strength, and was allowed to swim back to the ship, which immediately returned to France. This is all we knew of Verazani's second expedition. He undertook a third, but was no more heard of, and it is thought that he and all his company perished before he could form any colony.

In 1534, one Jacques Cartier of St Malo was sent under a commission from the French king, and on the 10th of May arrived at Cape Bonavista in Newfoundland. He had with him two small ships beside the one in which he failed. He cruised along the coasts of that island, on which he discovered inhabitants, probably the Eskimans. He landed in several places along the coast of the Gulf, and took possession of the country in the king's name. On his return, he was again sent out with a commission, and a pretty large force; he returned in 1535, and passed the winter at St Croix; but the fea soon proved so severe, that he and his companions must have died of the cold, had they not, by the advice of the natives, made use of the decocion of the tops and bark of the white pines. As Cartier, however, could produce neither gold nor silver, all that he could say about the utility of the settlement was disregarded; and in 1540, he was obliged to become pilot to one M. Roberval, who was by the French king appointed viceroy of Canada, and who failed from France with five vessels. Arriving at the gulf of St Lawrence, they built a fort; and Cartier was left to command the garrison in it, while Roberval returned to France for additional recruits to his new settlement. At last, having embarked in 1549, with a great number of adventurers, neither he nor any of his followers were heard of more.

This fatal accident so greatly discouraged the court of France, that, for 50 years, no measures were taken for supplying with necessaries the settlers that were left. At last, Henry IV. appointed the Marquis de la Roche lieutenant-general of Canada and the neighbouring countries. In 1598 he landed on the isle of Sable, which he absurdly thought to be a proper place for a settlement, though it was without any port, and without produce except briars. Here he left about 40 malefactors, the refuse of the French jails. After cruising for some time on the coast of Nova Scotia, without being able to relieve these poor wretches, he returned to France, where he died of a broken heart. His colony must have perished, had not a French ship been wrecked on the island, and a few sheep driven upon it at the same time. With the boards of the ship they erected huts; and while the sheep fed they lived on them, feeding afterwards on fish. Their clothes wearing out, they made coats of seal-skins; and in this miserable condition they spent seven years, when Henry ordered them to be brought to France. The king had the curiosity to see them in their seal-skin dresses, and was so moved with their appearance, that he forgave them all their offences, and gave each of them 50 crowns to begin the world anew.

In 1600, one Chauvin, a commander in the French navy, attended by a merchant of St Malo, called Pontgrave, made a voyage to Canada, from whence he returned with a very profitable quantity of furs. Next year he repeated the voyage with the same good fortune, but died while he was preparing for a third. The many speciments of profit to be made by the Canadian trade, at last induced the public to think favourably of it. An armament was equipped, and the command of it given to Pontgrave, with powers to extend his discoveries.
varies up the river St Lawrence. He failed in 1603, having in his company Samuel Champlain, who had been a captain in the navy, and was a man of parts and spirit. It was not, however, until the year 1608, that the colony was fully established. This was accomplished by founding the city of Quebec, which from that time commenced the capital of all the settlements in Canada.

The colony, however, for many years continued in a low way, and was often in danger of being totally exterminated by the Indians. As the particulars of these wars, however, could neither be entertaining, nor indeed intelligible, to many of our readers, we choose to omit them, and in general observe, that the French not only concluded a permanent peace with the Indians, but so much ingratiated themselves with them, that they could with the greatest ease prevail upon them at any time to murder and scalp the English in their settlements. These practices had a considerable share in bringing about the war with France, when the whole country was conquered by the British in 1761.

The most remarkable transaction in this conquest was the siege of Quebec; for a particular account of which, see that article. And for the transactions here during the late American war, see America (United States of), no 195, 200-207.

Canal of Communication, an artificial cut in the ground, supplied with water from rivers, springs, &c. in order to make a navigable communication between one place and another.

The particular operations necessary for making artificial navigations depend upon a number of circumstances. The situation of the ground; the vicinity or connexion with rivers; the ease or difficulty with which a proper quantity of water can be obtained; and many other circumstances necessarily produce great variety in the structure of artificial navigations, and augment or diminish the labour and expense of executing them. When the ground is naturally level, and unconnected with rivers, the execution is easy, and the navigation is not liable to be disturbed by floods; but, when the ground rises and falls, and cannot be reduced to a level, artificial methods of raising and lowering vessels must be employed; which likewise vary according to circumstances.

A kind of temporary sluices are sometimes employed for raising boats over falls or floods in rivers by a simple operation. Two posts or pillars of mason-work, with grooves, are fixed, one on each bank of the river, at some distance below the boat. The boat having passed these posts, planks are let down across the river by pulling into the grooves, by which the water is dammed up to a proper height for allowing the boat to pass up the river over the shoal.

The Dutch and Flemings at this day sometimes, when obstructed by cascades, form an inclined plane or rolling-bridge upon dry land, along which their vessels are drawn from the river below the cascade into the river above it. This, it is said, was the only method employed by the ancients, and is still used by the Chinee, who are said to be entirely ignorant of the nature and utility of locks. These rolling bridges consist of a number of cylindrical rollers which turn easily on pivots, and a mill is commonly built near by, so that the same machinery may serve the double purpose of working the mill and drawing up vessels.

A lock is a bason placed lengthwise in a river or canal, lined with walls of masonry on each side, and terminated by two gates, placed where there is a cascade or natural fall of the country; and so constructed, that the bason being filled with water by an upper sluice to the level of the waters above, a vessel may ascend thro' the upper gate; or the water in the lock being reduced to the level of the water at the bottom of the cascade, the vessel may descend through the lower gate; for when the waters are brought to a level on either side, the gate on that side may be easily opened. But as the lower gate is strained in proportion to the depth of water it supports, when the perpendicular height of the water exceeds 12 or 15 feet, more locks than one become necessary. Thus, if the fall be 17 feet, two locks are required, each having 8 ½ feet fall; and if the fall be 26 feet, three locks are necessary, each having 8 ½ feet 8 inches fall. The side-walls of a lock ought to be very strong. Where the natural foundation is bad, they should be founded on piles and platforms of wood: they should likewise slope outward; in order to resist the pressure of the earth from below.

Plate CXIV. fig. 1. A perspective view of part of a canal: the vessel L, within the lock AC.—Fig. 2. Section of an open lock; the vessel L about to enter.—Fig. 3. Section of a lock full of water; the vessel L raised to a level with the water in the superior canal.—Fig. 4. Ground section of a lock. L, a vessel in the inferior canal. C, the under gate. A, the upper gate. GH, a subterraneous passage for letting water from the superior canal run into the lock. KF, a subterraneous passage for water from the lock to the inferior canal.

X and Y (fig. 1.) are the two flood-gates, each of which consists of two leaves, fitting upon one another, so as to form an obtuse angle, in order the better to resist the pressure of the water. The first (X) prevents the water of the superior canal from falling into the lock; and the second (Y) dams up and sustains the water in the lock. These flood-gates ought to be very strong, and to turn freely upon their hinges. In order to make them open and shut with ease, each leaf is furnished with a long lever A, A; C, C. They should be made very tight and close, that as little water as possible may be lost.

By the subterraneous passage GH (fig. 2, 3, & 4) which descends obliquely, by opening the sluice G, the water is let down from the superior canal D into the lock, where it is slop and retained by the gate C when shut, till the water on the lock comes to be on a level with the water in the superior canal D; as represented, fig. 3. When, on the other hand, the water contained by the lock is to be let out, the passage GH must be shut by letting down the sluice G, the gate A must be also shut, and the passage KF opened by raising the sluice K; a free passage being thus given to the water, it descends through KF, into the inferior canal, until the water in the lock is on a level with the water in the inferior canal B; as represented, fig. 3.

Now, let be required to raise the vessel L (fig. 2) from the inferior canal B to the superior one D; if the lock happens to be full of water, the sluice G must be shut, and also the gate A, and the sluice K opened,
Canal. So that the water in the lock may run out till it is on a level with the water in the inferior canal B. When the water in the lock comes to be on a level with the water at B, the leaves of the gate C are opened by the levers C 5, which is easily performed, the water on each side of the gate being in equilibrio; the vessel then falls into the lock. After this the gate C and the sluice K are shut, and the sluice G opened, in order to fill the lock, till the water in the lock, and consequently the vessel, be upon a level with the water in the superior canal D; as is represented in fig. 2. The gate A is then opened, and the vessel passes into the canal D.

Again, let it be required to make a vessel descend from the canal D into the inferior canal B. If the lock is empty, as in fig. 2, the gate C and sluice K must be shut, and the upper sluice G opened, so that the water in the lock may rise to a level with the water in the upper canal D. Then open the gate A, and let the vessel pass thro' into the lock. Shut the gate A and the sluice G; then open the sluice K, till the water in the lock be on a level with the water in the inferior canal; then the gate C is opened, and the vessel passes along into the canal B, as was required.

It is almost needless to spend time in enumerating the many advantages which necessarily result from artificial navigations. Their utility is now so apparent, that most nations in Europe give the highest encouragement to undertakings of this kind wherever they are practicable. The advantages of navigable canals did not escape the observation of the ancients. From the earliest accounts of society we read of attempts to cut through large isthmuses, in order to make a communication by water, either betwixt different nations, or distant parts of the same nation, where land-carriage was long and expensive. Herodotus relates, that the Cnidians, a people of Caria in Asia Minor, designed to out the isthmus which joins that peninsula to the continent; but were superstitious enough to give up the undertaking, because they were interdicted by an oracle. Several kings of Egypt attempted to join the Red-Sea to the Mediterranean. Cleopatra was exceedingly fond of this project. Soliman II. emperor of the Turks, employed 50,000 men in this great work. This canal was completed under the caliphate of Omar, but afterwards allowed to fall into disrepair; so that it is now difficult to discover any traces of it. Both the Greeks and Romans intended to make a canal across the Isthmus of Corinth, which joins the Morea and Achaea, in order to make a navigable passage by the Ionic sea into the Archipelago. Demetrius, Julius Caesar, Caligula, and Nero, made several unsuccessful efforts to open this passage. But, as the ancients were entirely ignorant of the use of water-locks, their whole attention was employed in making level cuts, which is probably the principal reason why they so often failed in their attempts. Charlemagne formed a design of joining the Rhine and the Danube, in order to make a communication between the ocean and the Black Sea, by a canal from the river Almutz which discharges itself into the Danube, to the Reditz, which falls into the Main, and this last falls into the Rhine near Mayence; for this purpose he employed a prodigious number of workmen; but he met with so many obstacles from different quarters, that he was obliged to give up the attempt.

The French at present have many fine canals: that of Briare was begun under Henry IV. and finished under the direction of cardinal Richelieu in the reign of Louis XIII. This canal makes a communication betwixt the Loire and the Seine by the river Loing. It extends 11 French great leagues from Briare to Montargis. It enters the Loire a little above Briare, and terminates in the Loing at Cepoi. There are 42 locks on this canal.

The canal of Orleans, for making another communication between the Seine and the Loire, was begun in 1675, and finished by Philip of Orleans, regent of France, during the minority of Louis XV. and is furnished with 20 locks. It goes by the name of the canal of Orleans; but it begins at the village of Kombles, which is a short French league from the town of Orleans.

But the greatest and most useful work of this kind is the junction of the ocean with the Mediterranean by the canal of Langnedoc. It was proposed in the reigns of Francis I. and Henry IV. and was undertaken and finished under Louis XIV. It begins with a large reservoir 4000 paces in circumference, and 24 feet deep, which receives many springs from the mountain Noire. This canal is about 64 leagues in length, is supplied by a number of rivulets, and is furnished with 104 locks, of about eight feet each. In some places it passes over bridges of vast height; and in others it cuts thro' solid rocks for 1000 paces. At one end it joins the river Garonne near Toulouse, and terminates at the other in the lake Tau, which extends to the port of Cette. It was planned by Francis Riquet in 1666, and finished before his death, which happened in 1680.

In the Dutch, Austrian, and French Netherlands, there is a very great number of canals; that from Bruges to Oostend carries vessels of 200 tons.

The Chinese have also a great number of canals; that which runs from Canton to Pekin extends about 825 miles in length, and was executed about 800 years ago.

It would be an endless task to describe the numberless canals in Holland, Russia, Germany, &c. We shall therefore confine ourselves to those that are either already finished, or at present executing, in Great-Britain.

As the promoting of commerce is the principal intention of making canals, it is natural to expect that their frequency in any nation should bear some proportion to the trade carried on in it, providing the situation of the country will admit of them. The present state of England and Scotland confirms this observation. Though the Romans made a canal between the Nynie, a little below Peterborough, and the Witham, three miles below Lincoln, which is now almost entirely filled up, yet it is not long since canals were revived in England. They are now however become very numerous, particularly in the counties of York, Lincoln, and Chester. Most of the counties betwixt the mouth of the Thames and the Bristol channel are connected together either by natural or artificial navigations; those upon the Thames and its reaching within about
20 miles of the Clyde; when the subscription and a subsequent loan being exhausted, the work was flopped in 1775. The city of Glasgow, however, by means of a collateral branch, opened a communication with the Firth, which has produced a revenue of about L. 6000 annually; and, in order to finish the remaining six miles, the government in 1794 gave L. 50,000 out of the forfeited estates, the dividends arising from this sum to be applied to making and repairing roads in the Highlands of Scotland. Accordingly the work has been resumed; and by contract, under a high penalty, must be entirely completed in November 1789. The aqueduct bridge over the Kilven (now finished, and supposed the greatest of the kind in the world) consists of four arches, and carries the canal over a valley 65 feet high and 420 in length, exhibiting a very singular effort of human ingenuity and labour. To supply the canal with water was of itself a very great work. There is one reservoir of 50 acres 24 feet deep, and another of 70 acres 22 feet deep, into which many rivers and springs terminate, which it is thought will afford sufficient supply of water at all times. This noble undertaking was finished, and the bill at cost L. 200,000. It is the greatest of the kind in Britain, and without doubt will be of great national utility; though it is to be regretted that it had not been executed on a still larger scale, the locks being too short for transporting large meals.

**Canal**

In anatomy, a duct or passage through which any of the juices flow.

**Cananor**

A large maritime town of Asia, on the coast of Malabar, in a kingdom of the same name, with a very large and safe harbour. It formerly belonged to the Portuguese, and had a strong fort to guard it; but in 1663, the Dutch, together with the natives, drove them away; and after they became masters of the town, enlarged the fortifications. They have but a very small trade; but there is a town at the bottom of the bay independent of the Dutch, whose prince can bring 20,000 men into the field. The Dutch fort is large, and the governor’s lodgings are at a good distance from the gate; so that, when there was a skirmish between the factory and the natives, he knew nothing of it till it was over. E. Long. 78° 10’. N. Lat. 12° 0’.

**Canara**

A small kingdom of Asia, on the coast of Malabar, whose king can raise a considerable army. The natives are generally Mahometans; and the country produces pepper, cardamoms, ginger, mirbolans, and tamarinds, in which they drive a considerable trade.

**Canara, a kingdom of Asia, on the coast of Malabar**. The inhabitants are Gentoos, or Pagans; and there is a pagod, or temple, called Rawtrat, which is visited every year by a great number of pilgrims. Here the custom of burning the wives with their husbands has its beginning, and is practised to this day. The country is generally governed by a woman, who keeps her court at a town called Baydur, two days journey from the sea. She may marry whom she pleases; and is not obliged to burn with her husband, like her female subjects. They are so good observers of their laws, that a robbery or murder is scarce ever heard of among them. The Canars have forts built of earth along the coast, which are garnished with 200 or 300 souldiers, to guard against the robberies of their neighbours.
Canarias, or the GRAND CANARY, is an island in the
Atlantic Ocean, about 180 miles from the coast of Af-rica. It is about 100 miles in circumference, and 33
in diameter. It is a fruitful island, and famous for the
wine that bears its name. It contains about 150,000
inhabitants, but they were a conquered people, and live
in the same manner, as the people of Barbary in complex-ity. There is no iron. After the discovery of the Spaniards, iron was dug from the soil, and was used to make utensils. The inhabitants are chiefly Spaniards; though there are some of the first people remaining, whom they call Guanches, who are somewhat civilized by their intercourse with the Spaniards. They are a hardy, ac-
tive, bold people, and live on the mountains. Their
chief food is goat's milk. Their complexion is swarthy,
and their noses flat. The Spaniards were the first to make use of the wine called Canary or Sack.

The Canary-birds are subject to many diseases, particularly imps, which affect the head, cause them
to fall suddenly from the perch, and die in a short
time, if not speedily cured. The most approved me-thod is an ointment made of fresh butter and capon's
grease melted together. With this the top of the
bird's head is to be anointed for two or three days,
and it will dissolve the impomhus; but if the medici-
cine has been too long delayed, then, after three or
four times anointing, see whether the place of his
head be soft; and if so, open it gently, and let out
the matter, which will be like the yolk of an egg; when
this is done, anoint the place, and the bird will be
cured. At the same time he must have figs with his
other food, and in his water a slice or two of liqueur,
with white figar-candy.

The Canary-birds are distinguished by different names at different times and ages; such as are about three years old are called adults; and those above two are named
eriffs; those of the first year under the care of the old
ones, are termed branchers; those that are new born,
and cannot feed themselves, pushers; and those brought
up by hand, nestlings.

The Canary-birds may be bred with ease; and, if
treated with proper care, they will become as vigorous
and healthful as in the country from whence they have
their name. The cages in which these birds are
kept are made either of walnut-tree or oak, with bars of wire; because these being woods of
strength, do not require to be used in large pieces.
The common shape of cages, which is cylindrical, is very improper for these birds; for this allows little room to walk, and without that the birds usually become melancholy. The most proper of all shapes is the high and long, but narrow.

If these birds eat too much, they grow over-fat, lose their shape, and their singing is spoiled: or at least they become so idle, that they will scarce ever sing. In this case their vicarial is to be given to them in a much smaller quantity, and they will by this means be recovered by degrees to all their beauty, and will sing as at first.

At the time that they are about to build their nests, there must be put into their cages some hay, dried thoroughly in the sun: with this must be fixed some moss dried in the same manner, and some flag's hair; and great care is to be taken of breeding the young, in the article of food. As soon as the young birds are eight days old, or somewhat more, and are able to have been kept thus about eight days, they are to be put in a room where of hearing the voice of any other bird. After they be given them early in the morning, one are sufficient for these young melancholy, and will not sing with a black cloth, and for the fifteen days following excited to sing by a bird-pipe; but this is not to be left out, and he will always after this live in friendship with the female.

If the male become sick during the time of the female's sitting or bringing up her young, he must be removed immediately, and only brought to the side of her cage at certain times, that she may see him, till he is perfectly cured; and then he is to be shut up again in his cage in the middle.

Canary-birds are various in their notes, some having a sweet song, others a lowish note, others a long song, which is best, as having the greatest variety of notes: but they sing chiefly either the titlark or nightingale notes. See SONG of Birds.

Cancelled, a town of France, in Upper Brittany, by the sea-side, where there is a road. Here the British landed in 1758, in their way to St Maloes, where they burnt a great number of ships in the harbour, and then retired without loss. This town was in their power; but they acted like generous enemies, and did no hurt to this nor any other on the coast. W. Long, 0 13. N. Lat. 41° 45′.

Canceller, in falconry, is when a light brown hawk, in her stooping, turns two or three times upon the wing, to recover herself before the feizes.

Cancell, a term used to denote lattice windows, of those made of cross bars disposed latticewise; it is also used for rails or ballustrades inclosing the communion table, a court of justice, or the like, and for the network in the inside of hollow bones.

Cancelling, in the civil law, an act whereby a peron contents that some former deed be rendered null and void. This is otherwise called refization. The word comes from the Latin cancellare to encompass or pale a thing round. In the proper sense of the word, to cancel, is to deface an obligation, by passing the pen from top to bottom, or across it; which makes a kind of checker lattice, which the Latins call cancelli.

Cancer, in zoology, a genus of infects belonging to the order of infecta apera. The generic characters are these: they have eight legs, (feldom ten or six); besides the two large claws which answer the purpose of hands. They have two eyes at a considerable distance from each other, and for the most part supported by a kind of pedunculi or footstalks; the eyes are likewise elongated and movable; they have two clawed pulps, and the tail is jointed. This genus includes the lobster, shrimp, &c. There are no less than 87 species of cancer, distinguished principally by the length of their tails and the margins of their breasts. The following are the most remarkable.

1. The gammarus, or common common thorax, short ferrated finnot; very long antennae; and lobsters between them two shorter ones, bifid; claws and fangs large, the greater tuberculated, the lesser ferrated on the inner edge; four pair of legs; six joints in the tail; tail-fins rounded. It inhabits all the rocky shores of America, but chiefly where there is a depth of water. In Llyn in Wales, a certain small lobster, nothing
Cancer. After, nothing different except in size, burrows in the sand. They are brought in vast quantities from the Orkney isles, and many parts of the eastern coast of Scotland, to the London markets. Sixty or seventy thousand are annually brought from the neighbourhood of Montrose alone.—The lobster was well known to the ancients, and is well described by Aristotle under the name of *scylla*. It is found as far as the Hellepont; and is now called at Constantinople *licuuda* and *licuuda*.

Lobsters fear thunder, and are apt to caust their claws on a great clap; it is said that they will do the same on the firing of a great gun; and that, when men of war meet a lobster boat, a jocular threat is used, that, if the master does not sell them good lobsters, they will salute him.

The habitat of this species is in the clearest water, at the foot of rocks that impend over the sea. This has given opportunity of examining more closely into the natural history of the animal, than of many others who live in an element that prohibits most of the human researches, and limits the enquiries of the most inquisitive. Some lobsters are taken by hand; but the greater quantity in pots, a fort of trap formed of twigs, and baited with garbage; they are formed like a wire moufe-trap, so that when the lobster gets in, there is no return. These are fastened to a cord sunk in the sea, and their place marked by a buoy.—They begin to breed in the spring, and continue breeding most part of the summer. They propagate *more humains*, and are extremely prolific. Dr Balfour says he counted 12,444 eggs under the tail, besides those that remained in the body unprotruded. They deposit those eggs in the sand, where they are soon hatched.

Lobsters change their crust annually. Previous to their putting off their old one, they appear sick, languid and reflifts. They totally acquire a new coat in a few days; but during the time that they remain defenceless, they seek some very lonely place, for fear of being devoured by fuch of their brethren as are not in the same situation. It is also remarkable, that lobsters and crabs will renew their claws, if by accident they are torn off; and it is certain they will grow again in a few weeks, though they never attain to the strength of the firft. They are very voracious animals, and feed on seaweeds, garbage, and all sorts of dead bodies. The pincers of one of the lobsters large claws are furnished with knobs, and those of the other are always ferrated. With the former it keeps firm hold of the flanks of submarine plants, and with the latter it cuts and minces its food very dexterouily. The knobbed or numb claw, as the fishermen call it, is sometimes on the right and sometimes on the left side indifferently. It is more dangerous to be feized by them with the cutting claw than the other; but in either cafe, the quickest way to get disengaged from the creature is to pull off its claw. The female or ten lobster does not caft her shell the fame year that she depofiês her ova, or, in the common phrase, is in *berry*. When the ova firft appear under her tail, they are small and extremely black; but they become in succession almost as large as ripe elder berries before they are deposited, and turn of a dark brown colour, epecially towards the end of the time of her depofiing them. They continue full, and depofiing the ova in constant succession, as long as any of that black substance can be found in their body, which, when boiled, turns of a beautiful red colour, and is called their coral. Hen-lobsters are found in berry at all times of the year, but chiefly in winter. It is a common mistake, that a berried hen is always in perfection for the table. When her berries appear large and brownish, the will always be found exhausted, wanty and poor. Though the ova be caft at all times of the year, they seem only to come to life during the warm summer months of July and August. Great numbers of them may then be found, under the appearance of tadpoles, swimming among the little pools left by the tides among the rocks, and many also under their proper form from half an inch to four inches in length. In examining their shells, it is hard to conceive how the lobster is able to draw the fin of their large claws out, leaving the shell entire and attached to the shell of their body, in which state they are comtantly found. The fishermen say, the lobster pines before casting, till the fin of its large claw is no thicker than the quill of a goose, which enables it to draw its parts through the joints and narrow passage near the trunk. The new shell is quite membraneous at first, but hardens by degrees. Lobsters only grow in size while their shells are in their soft state. They are chosen for the table, by their being heavy in proportion to their size; and by the hardnec of their shells on their sides, which, when in perfection, will not yield to moderate pressure. Barnacles and other small fish adhering to them are reckoned certain signs of superior goodness. Cock-lobsters are in general better than the hens in winter; they are distinguished by the narrowness of their tails, and by their having a strong spine upon the centre of each of the tranverse processes beneath the tail, which support the four middle plates of their tails. The fin of a lobster's claw is more tender, delicate, and easy of digestion, than that of the tail. In summer, the lobsters are found near the shore, and thence to about five fathoms water; in winter, they are seldom taken less than 12 or 15 fathoms. Like other fishes, they are much more active and alert in warm weather than in cold. In the water, they can run nimbly upon their legs or small claws; and, if alarmed, can spring, tat! the cutting claw is more tender, delicate, and easy of digestion, than that of the tail. In summer, the lobsters are in full perfection, will

2. The friguros, or plated lobster, with a pyra-
The Diogenes, shrimp, &c. clawed, the two Hermit-joints; the feelers; claws small, smooth, with two small spines on each side; two first pair of legs clawed, the two next subdivided; tail confisting of five joints; the caudal fins rounded. It inhabits many of the rivers in England, lodged in holes which they form in the clayey banks. Cardan says, that this species indicates the goodness of water; for in the beet water they are boiled into the reddish colour.

4. The ferratus, or prawn, with a long ferrated fin bending upwards; three pair of very long filiform feelers; claws small, furnished with two fangs; smooth thorax; five joints to the tail; middle caudal fin subdivided, two outmost flat and rounded. It is frequent in several shores among loose stones; sometimes found at sea, and taken on the surface over 30 fathoms depth of water; cinerous when fresh, of a fine red when boiled.

5. The crangon, or hrimp, with long flesser feelers, and between them two projecting lamina; claws with a single, hooked, moveable fang; three pair of legs; seven joints in the tail; the middle caudal fin subdivided, the four others rounded and fringed, a spine on the exterior side of each of the outmost. It inhabits the shores of Britain in vast quantities, and is the most delicious of the genus.

6. The squilla, with a finnot like a prawn, but deeper and broader; its inferior feelers longer in proportion to the bulk; the sub-caudal fins rather larger; is, at full growth, not above half the bulk of the former.—It inhabits the coasts of Kent; and is sold in London under the name of the white hrimp, as it assumes that colour when boiled.

7. The atomos, or atom-lobster, with a slender body; filiform antennae; three pair of legs near the head; behind which are two pair of oval vesicles; beyond are three pair of legs, and a flesser tail between the last pair. It is very minute, and the help of the microscope is often necessary for its inspection.

8. The pulax, or flea hrimp, with five pair of legs, and two claws imperfect; with 12 joints of the body. It is very common in fountains and rivulets; swims very swiftly in an incurved posture on its back; embraces and protects its young between the legs; does not leap.

9. The locust, or locust-lobster, with four antennae; two pair of imperfect claws; the first joint ovated; body consists of 14 joints, in which it differs from the former. It abounds in summer, on the shore, beneath stones and algae; leaps about with vast agility.

10. The diogenes, soldier-erab, or hermit crab, with rough claws; the left claw is the longest (this being the only difference between the diogenes and bernardus); the legs are subdivided, and ferrated along the upper ridge; the tail naked and tender, and furnished with a hook, by which it secures itself in its lodging. This species is parasitic; and inhabits the empty cavities of turbinated shells, changing its habitation according to its increase of growth from the small *nirite* to the large *uloea*. Nature denies it the strong covering behind, which it hath given to other of this class; and therefore directs it to take refuge in the deserted caves of other animals. They crawl very fast with the shell on their back; and at the approach of danger draw themselves within the shell, and, thrusting out the larger claw, will pinch very hard whatever molests them. Aristotle describes it very exactly under the name of *alugia*

By the moderns it is called the soldier, from the idea of its dwelling in a tent; or the hermit, from retiring into a cell.

It is very diverting to observe this animal when wanting to change its shell. The little soldier is seen busily parading the shore along that line of pebbles and shells which is formed by the eastermost wave; still, however, dragging its old incommendable habitation at its tail, unwilling to part with one shell, even though it be troublesome appendage, till it can find another more convenient. It is seen flopping at one shell, turning it, and passing it by; going on to another, contemplating that a while, and then slipping its tail from its old habitation to try on the new; this also is found to be inconvenient, and it quickly returns to its old shell again. In this manner it frequently changes, till at last it finds one light, roomy, and commodious; to this it adheres, though the shell be sometimes so large as to hide the body of the animal, claws and all. Yet it is not till after many trials, and many combats also, that the soldier is thus completely equipped; for there is often a contest between two of them for some well-looked favourite shell for which they are rivals. They both endeavour to take possession; they strike with their claws, they bite each other, till the weakest is obliged to yield by giving up the object of dispute; it is then that the victor immediately takes possession, and parades it in his new conquest three or four times back and forward upon the strand before his envious antagonist. When this animal is taken, it sends forth a feeble cry, endeavouring to feize the enemy with its nippers; which if it fastens upon, it will sooner die than quit the grasp.

The hermit-crabs frequent mostly those parts of the sea-shores which are covered with thurbs and trees, producing various wild fruits on which they subsist; though they will also feed on the fragments of fish and other animal substances cast on shore. When roosted in the shell, they are esteemed delicate. The hermit-crab, hung in the air, dissolves into a kind of oil, which speedily cures the rheumatism, if rubbed upon the part.

11. The vocans, or sand-crab, is but of a small size; its colour light brown, or dusky white. It has eight legs and two claws, one of which is double the size of the other: these claws serve both to defend and to feed themselves with. The head has two square holes, which are receptacles for its eyes; out of which it thrusts them, and draws them in again at pleasure. Their abode is only on the sandy shores of lathers, and many others of the Bahama islands. They run very fast, and retreat from danger into little holes they make in the sand.

12. The grapalus, or redotted crab, hath a round body, the legs longer and larger than in other kinds; the claws red; except which, the whole is motiled in a beautiful manner with red and white. These crabs inhabit the rocks hanging over the sea; they are the nimblest of all others, and run with surprising agility along the upright side of a rock, and even under the rocks that hang horizontally below the water. This they are often necessitated to do for escaping the assaults of rapacious birds that pursue them. These crabs never
Tops Casalpinia Brasiliensis or Brazil wood Tree

Cancer

Hermit Crab

 의해 Crab

Plumed Lobster

Plate CXXV
Cancer. never go to land; but frequent mostly those parts of
the promontories and islands of rocks in and near the
sea, where, by the continual and violent agitation of
the waves against the rocks, they are always wet, con-
tinually receiving the spray of the sea, which often
washes them into it; but they at length return to
the rock again, not being able to live under water, and yet
requiring more of that element than any of the crusta-
cceans kinds that are not fish.

13. The granulatus, or rough-shelled crab: these
crabs are pretty large, and are commonly taken from
the bottom of the sea in shallow water; the legs are
small in proportion to the body; the two claws are re-
markably large and flat. The whole shell is covered
over with innumerable little tubercles like flaggreen:
the colour is brown, variously stained with purple.

14. The cancer erythropus, or red-claw crab; is of
a small size, and brown colour; it hath two claws of
unequal bigness, red at the ends; and eight legs, which
sccn of less use to them than in other crabs; for when
on the ground, they crawl with slow pace, dragging
their bodies along; but they are mostly seen grasping
with their claws, and hanging to some sea plant, or
other marine substance.

The pea-
crab.

15. The pioum, or pea-crab, with rounded and
smooth thorax, entire and blunt; with a tail of the size
of the body, which commonly is the bulk of a pea.
It inhabits the mufcle, and has a repute of
feive
their vigilant friend.

to have been the confentable inmates of the
ches on the front; five ferrated teeth on
claws ovated; next joint toothed; hind feet fabulate;
body covered with short, brown, velvet-like pile; claws covered with minute tubercles;
small spines round the top of the second joint; hind
legs broadly ovated.—This is among the species taken
notice of by Aristotle on account of the broad feet,
which, he says, assist them in swimming; as web-feet
do the water-fowl. It inhabits the western coast of
Anglesea.

19. The horridus, or horrid-crab, with a projecting
bifurcated fhit, the end diverging; body heart-
shaped; with the claws and legs covered with long and
very sharp spines.—It is a large species, and inhabits
the rocks on the eastern coasts of Scotland. It is com-
mon to Norway and Scotland, as many of the marine
animals and birds are.

20. The ruticola, land-crab, or violet-crab, with a
smooth entire thorax, and the two last joints of the feet
armed with spines. It inhabits the Bahamas islands,
as well as most lands between the tropics; and feeds
upon vegetables.

These animals live not only in a kind of orderly so-
ciety in their retreats in the mountains, but regularly
once a year march down to the sea-side in a body of
some millions at a time. As they multiply in great
numbers, they choose the month of April or May to
begin their expedition; and then fally out by thou-
sands from the stumps of hollow trees, from the clefts
of rocks, and from the holes which they dig for them-
selves under the surface of the earth. At that time
the whole ground is covered with this band of adventur-
ers; there is no setting down one’s foot without tread-
ing upon them. The sea is their place of deification,
and to that they direct their march with right-lined
precision. No geometrician could send them to their
defined station by a shorter course; they neither turn
to the right nor left, whatever obstacles intervene; and
even if they meet with a house, they will attempt to
scale the walls to keep the unbroken tenor of their way.
But though this be the general order of their route,
they, upon other occasions, are obliged to conform to
the face of the country; and if it is intersected with
rivers, they are then seen to wind along the course of
the stream. The procession sets forward from the
mountains with the regularity of an army under the
guidance of an experienced commander. They are
commonly divided into three battalions; of which the
first consists of the strongest and boldest males, that,
like pioneers, march forward to clear the route and
face the greatest dangers. These are often obliged to
halt for want of rain, and to go into the most conve-
nient encampment till the weather changes. The main
body of the army is composed of females, which never
leave the mountains till the rain is set in for some time,
and then descend in regular battalions, being formed into
columns of 50 paces broad, and three miles deep, and
so close that they almost cover the ground. Three
or four days after this, the rear-guard follows, a frag-
Cancer, a roundish, unequal, hard, and livid tumour, generally seated in the glandular parts of the body, supposed to be so called, because it appears at length with surging veins hollowing out from it, as to resemble, as it is thought, the figure of a crab-fish; or, others say, because like that fish, where it has once got, it is scarce possible to drive it away. See (the Index subjoined to) Medicine.

Cancer, in astronomy, one of the twelve signs, represented on the globe in the form of a crab, and thus marked (♀) in books. It is the fourth constellation in the starry zodiac, and that from which one quadrant of the ecliptic takes its denomination. The reason generally assigned for its name as well as figure, is a supposed resemblance which the sun's motion in this sign bears to the crab-fish. As the latter walks backwards, so the former, in this part of his course, begins to go backwards, or recede from us; though the disposition...
CANDAHAR, a province of Persia, bounded on the north by the province of Balk; on the east, by that of Cabul; on the south, by Buchor and Sablestan; and on the west, by Sigetan. There have been bloody wars between the Indians and Persians on account of this province; but in 1650 it fell to the Persians. The inhabitants are known by the name of Aghhans, or Afghans, who have often endeavoured to throw off the yoke. But in 1737, they were severely punished for such an attempt. See Persia.

CANDAHAR, the capital of the above province, is seated on a mountain; and being a place of great trade, has a considerable fortress. The caravans that travel from Persia and the parts about the Caspian sea to the East Indies, choose to pass through Candahar, because there is no danger of being robbed on this road, and provisions are very reasonable. The religion is Mahometanism, but there are many Baniyans and Gucrees. E. Long. 67° 5. N. Lat. 33° 6.

CANDAULES, the last king of Lydia, of the family of the Heraclides. See Lydia.

CANDELARES, from Candelas, a candle, the name of an order in the former editions of Linnaeus's Fragments of a natural method, consisting of three genera, rhizophora, nyssa, and minujops. They are removed, in the latter editions, into the order Holoceraee, to which see.

CANDIA, the modern name of the island of Crete (see Crete). The word is a variation of Khanda, which was originally the Arabian name of the metropolis only, but in time came to be applied to the whole island.

Candia came into the possession of the Venetians by purchase in the year 1194, as related under the article Crete; and soon began to flourish under the laws of that wise republic. The inhabitants, living under the protection of a moderate government, and being encouraged by their masters, engaged in commerce and agriculture. The Venetian commandants readily afforded to those travellers who visited the island, that assistance which is necessary to enable them to extend and improve useful knowledge. Belon, the naturalist, is lavish in praise of their good offices, and describes, in an interesting manner, the flourishing state of that part of the island which he visited.

The seat of government was established at Candia. The magistrates and officers, who composed the council, resided there. The provost-general was president. He possessed the chief authority; and his power extended over the whole principality. It continued in the possession of the Venetians for five centuries and an half. Cornaro held the chief command at the time when it was threatened with a storm on the side of Constantinople. The Turks, in the space of a year, had been employed in preparing a vast armament. They deceived the Venetian, by affuring him that it was intended against Malta. In the year 1645, in the midst of a solemn peace, they appeared unexpectedly before Crete with a fleet of 400 sail, having on board 60,000 land forces, under the command of four pachas. The emperor Ibrahim, under whom this expedition was undertaken, had no fair pretext to offer in justification of his enterprise. He made use of all that perfidy which characterizes the people of the east, to impose on the Venetian senate. He loaded their ambassador with presents, directed his fleet to bear for Cape Matapan, as if they had been going beyond the Archi-
Archipelago; and caused the governors or Tira and Cerigna to be solemnly assured, that the republic had nothing to fear for her possessions. At the very instant when he was making these assurances, his naval armament entered the gulf of Canea’s and, passing between that city and St Theodore, anchored at the mouth of Platania.

The Venetians, not expecting this sudden attack, had made no preparations to repel it. The Turks landed without opposition. The site of St Theodore is but a league and a half from Canea. It is only three quarters of a league in compass. The Venetians had erected two forts there; one of which, standing on the summit of the highest eminence, on the coast of that little isle, was called Turluru; the other, on a lower situation, was named St Theodore. It was an important object to the Mussulmans to make themselves masters of that rock, which might annoy their ships. They immediately attacked it with ardour. The first of those fortresses, being defiinate of soldiers and cannon, was taken without firing a blow. The garrison of the other consisted of about 60 men. They made a gallant defence, and stood out till the last extremity; and when the Turks at last prevailed, their number was diminished to 10, whom the captain-pacha cruelly caused to be beheaded.

Being now masters of that important post, as well as of Lazarat, an elevated rock, standing about a league from Canea, the Turks invested the city by sea and land. General Cornaro was struck, as with a thunder-clap, when he learned the descent of the enemy. In the whole island there were no more than 3500 infantry, and a small number of cavalry. The besieged city was defended only by 1000 regular troops, and a few citizens, who were able to bear arms. He made haste to give the republic notice of his distress, and posted himself off the road, that he might the more readily succour the besieged city. He threw a body of 350 men into the town, before the lines of the enemy were completed. He afterwards made several attempts to strengthen the besieged with other reinforcements; but in vain. The Turks had advanced in bodies close to the town, had carried a half-moon battery, which covered the gate of Retimo, and were battering the walls night and day with their numerous artillery. The besieged defended themselves with resolution, and the smallest advantage which the besiegers gained cost them dear. General Cornaro made an attempt to arm the Greeks, particularly the Spachions, who boasted loudly of their valour. He formed a battalion of these. But the aera of their valour was long past. When they beheld the enemy, and heard the thunder of the cannon, they took to flight; not one of them would stand fire.

While the senate of Venice were deliberating on the means to be used for relieving Canea, and endeavouring to equip a fleer, the Mahometan generals were sacrificing the lives of their followers to bring their enterprise to a glorious termination. In different engagements they had already lost 20,000 warriors; but, descending into the ditches, they had undermined the walls, and blown up the most impregnable forts with explosions of powder. They sprang one of those mines beneath the bastion of St Demetri. It overturned a considerable part of the wall, which crushed all the defenders of the bastion. That instant the besiegers sprang up with their fabrics in their hands, and taking advantage of the general consternation of the besieged on that quarter, made themselves masters of the post. The besieged, recovering from their terror, attacked them with unequalled intrepidity. About 400 men failed to 2000 Turks already firmly posted on the wall, and pressed upon them with such obstinate and dauntless valour, that they killed a great number, and drove the rest down into the ditch. In this extremity, every person in the city was in arms. The Greek monks took up muskets; and the women, forgetting the delicacy of their sex, appeared on the walls among the defenders, either supplying the men with ammunition and arms, or fighting themselves; and several of those daring heroines lost their lives.

For 50 days the city held out against all the forces of the Turks. If, even at the end of that time, the Venetians had sent a naval armament to its relief, the kingdom of Canea might have been saved. Doubtless, they were not ignorant of this well known fact. The north wind blows straight into the harbour of Canea. When it blows a little briskly, the sea rages. It is then impossible for any squadron of ships, however numerous, to form in line of battle in the harbour, and to meet an enemy. If the Venetians had set out from Cerigo with a fair wind, they might have reached Canea in five hours, and might have entered the harbour with full sails, without being exposed to one cannon-shot; while none of the Turkish ships would have dared to appear before them; or if they had ventured, must have been driven back on the shore, and dashed in pieces among the rocks. But, instead of thus taking advantage of the natural circumstances of the place, they sent a few galleys, which, not daring to double Cape Spada, coasted along the southern shore of the island, and failed of accomplishing the design of their expedition.

At last, the Caneans, despairing of relief from Venice, seeing three breaches made in their walls, thought which the infields might easily advance upon them, exhausted with fatigue, and covered with wounds, and reduced to the number of 500 men, who were obliged to fascinate themselves round the walls, which were half a league in extent, and undermined in all quarters, demanded a parley, and offered to capitulate. They obtained very honourable conditions; and after a glorious defence of two months, which cost the Turks 20,000 men, marched out of the city with the honours of war. Those citizens, who did not chuse to continue in the city, were permitted to remove; and the Ottomans, contrary to their usual practice, faithfully observed their stipulations.

The Venetians, after the loss of Canea, retired to Retimo. The captain-pacha laid siege to the citadel of the Sude, situated in the entrance of the bay, on a high rock, of about a quarter of a league in circumference. He raised earthen-batteries, and made an ineffectual attempt to level its ramparts. At last, despairing of taking it by assault, he left some forces to block it up from all communication, and advanced towards Retimo. That city, being unwalled, was defended by a citadel, standing on an eminence which overlooks the harbour. General Cornaro had retired thither. At the approach of the enemy, he advanced from
The Turks having landed additional forces on the island, they introduced the plague, which was almost a constant attendant on their armies. This dreadful pest rapidly advanced, and, like a devouring fire, wasting all before it, destroyed most part of the inhabitants. The rest, fleeing in terror before its ravages, escaped into the Venetian territories, and the island was left almost desolate.

The siege of the capital commenced in 1646, and was protracted much longer than that of Troy. Till the year 1648, the Turks fearlessly gained any advantages before that city. They were often routed by the Venetians, and sometimes compelled to retire to Retimo. At that period Ibrahim was solemnly deposed, and his eldest son, at the age of nine years, was raised to the throne, under the name of Mahomet IV. Not satisfied with confining the sultan to the horrors and obscurity of a dungeon, the partisans of his son strangled him on the 19th of August, in the same year. That young prince, who mounted the throne by the death of his father, was afterwards expelled from it, and condemned to pass the remainder of his life in confinement.

In the year 1649, Ufsein Pacha, who blockaded Candia, receiving no supplies from the Porte, was compelled to raise the siege, and retreat to Canea. The Venetians were then on the sea with a strong squadron. They attacked the Turkish fleet in the bay of Smyrna, burnt 12 of their ships and 2 galleys, and killed 6000 of their men. Some time after, the Mahometans having found means to land an army on Candia, renewed the siege of the city with greater vigour, and made themselves masters of an advanced fort that was very troublesome to the besieged; which obliged them to blow it up.

From the year 1650 till 1658, the Venetians, continuing the sieges of the sea, intercepted the Ottomans every year in the straits of the Dardanelles, and fought them in four naval engagements; in which they defeated their numerous fleets, sunk a number of their caravels, took others, and extended the terror of their arms even to the walls of Constantinople. That capital became a scene of tumult and disorder. The Grand Signior alarmed, and trembling for his safety, left the city with precipitation.

Such glorious successes revived the hopes of the Venetians, and discouraged the courage of the Turks. They converted the siege of Candia into a blockade, and suffered considerable losses. The Sultan, in order to exclude the Venetian fleet from the Dardanelles, and to open to his own navy a free and safe passage, caused two fortresses to be built at the entrance of the straits. He gave orders to the Pacha of Canea to appear again before the walls of Candia, and to make every possible effort to gain the city. In the mean time, the republic of Venice, to improve the advantages which they had gained, made several attempts on Canea. In 1660, that city was about to surrender to their arms, when the Pacha of Rhodes, hastening to its relief, reinforced the defenders with a body of 2000 men. He happily doubled the extremity of Cape Mele, though within sight of the Venetian fleet, which was recalled from Cape Spada, and could not advance one fathom to oppose an enemy, considerably weaker than themselves.

Kiopuli, son and successor to the vâr of that name, who had long been the support of the Ottoman empire, knowing that the murmurs of the people against the long continuance of the siege of Candia were rising to an height, and fearing a general revolt, which would be fatal to himself and his master, set out from Byzantium, about the end of the year 1666, at the head of a formidable army. Having escaped the Venetian fleet, which was lying off Canea with a view to intercept him, he landed at Palio Cafirg, and formed his lines around Candia. Under his command were four Pachas, and the flower of the Ottoman forces. These troops, being encouraged by the presence and the promises of their chiefs, and supported by a great quantity of artillery, performed prodigies of valor. All the exterior forts were destroyed. Nothing now remained to the besieged but the barren line of the walls, unproctected by fortresses; and these being battered by an incessant discharge of artillery, soon gave way on all quarters. Still, however, what patience may perhaps regard as incredible, the Candians held out three years against all the forces of the Ottoman empire. At last they were going to capitulate, when the hope of assistance from France reanimated their valor and rendered them invincible. The expected succours arrived on the 26th of June 1669. They were conducted by the duke of Noailles. Under his command were a great number of French noblemen, who came to make trial of their skill in arms against the Turks.

Next day after their arrival, the ardour of the French prompted them to make a general sally. The duke of Beaufort, admiral of France, assumed the command of the forlorn hope. He was the first to advance against the Moislitans, and was followed by a numerous body of infantry and cavalry. They advanced furiously upon the enemy, attacked them within their trenches, forced the trenches, and would have compelled them to abandon their lines and artillery, had not an unforeseen accident damped their courage. In the midst of the engagement a magazine of powder was set on fire; the foremost of the combatants lost their lives; the French ranks were broken; several of their leaders, among whom was the duke of Beaufort, disappeared for ever; the soldiers fled in disorder: and the duke of Noailles, with difficulty, effected a retreat within the walls of Candia. The French accused the Italians of having betrayed them; and on that pretext prepared to set off sooner than the time agreed upon. No intreaties of the commandant could prevail with them to delay their departure; so they reimbarked. Their departure determined the fate of the city. There were now no more than five hundred men to defend it. Morofini capitulated with Kiopuli, to whom he surrendered the kingdom of Crete, excepting only the Sude, Grabula, and Spina-Longua. The grand vâr made his entrance into Candia on the 4th of October 1670; and stayed eight months in that city, inspecting the repairation of its walls and fortresses.

The three fortresses left in the hands of the Venetians
Candidians by the treaty of capitulation remained long after in their possession. At last they were all taken, one after another. In short, after a war of thirty years continuance, in the course of which more than two hundred thousand men fell in the island, and it was deluged with streams of Christian and Mahometan blood, Candidia was entirely subdued by the Turks, in whose hands it still continues.

Of the history of Candidia travellers speak with rupture. The heat is never excessive; and in the plains violent cold is never felt. In the warmest days of summer the atmosphere is cooled by breezes from the sea. Winter properly begins here with December and ends with January; and during that short period snow never falls on the lower grounds, and the surface of the water is rarely frozen over. Most frequently the weather is as fine then as it is in Britain at the beginning of June. These two months have received the name of winter, because in them there is a copious fall of rain, the sky is obscured with clouds, and the north winds blow violently; but the rains are favourable to agriculture, the winds chase the clouds towards the foot of the mountains, where a repository is formed for those waters which are to fertilize the fields; and the inhabitants of the plain suffer no inconvenience from these transient blizzards. In the month of February, the ground is overspread with flowers and rising crops. The rest of the year is almost one continued fine day. The inhabitants of Crete never experience any of those mortifying returns of piercing cold, which are so frequently felt in Britain and even more so in other countries, and which, succeeding suddenly after the cherishing heat of spring, nip the blossoming flowers, wither the open buds, destroy half the fruits of the year, and are fatal to delicate constitutions. The sky is always unclouded and serene; the winds are mild and refreshing breezes. The radiant sun proceeds in smiling majesty along the azure vault, and ripens the fruits on the lofty mountains, the rising hills, and the plains. The nights are no less beautiful; their coolness is delicious. The atmosphere not being overloaded with vapours, the sky unfolds to the observer's view a countless profusion of stars; those numerous stars sparkle with the most vivid rays, and shine the azure vault in which they appear fixed, with gold, with diamonds, and with rubies. Nothing can be more magnificent than this light, and the Cretans enjoy it for six months in the year.

To the charms of the climate other advantages are joined which augment their value: There are scarce any morasses in the island; the waters never stand here in a state of stagnation; they flow in numberless streams from the tops of the mountains, and form here and there large fountains or small rivers that empty themselves into the sea; the elevated situation of their springs cause them to dash down with such rapidity, that they never lose themselves in pools or lakes, consequently insects cannot deposit their eggs upon them, as they would be immediately hurried down into the sea; and Crete is not infected like Egypt with those clouds of insects which swarm in the hedges, and whose stinging is insufferably painful, nor is the atmosphere here loaded with those noxious vapours which rise from marshy grounds.

The mountains and hills are overspread with various kinds of thyme, favoury, wild thyme, and with a multitude of odoriferous and balsamic plants; the rivulets which flow down the valleys are overhung with myrtle and laurel rosettes; clumps of orange, citron, and almond trees, are plentifully scattered over the fields; the gardens are adorned with rafts of Arabian jasmine. In spring, they are belittled with beds of flowers, some extensive plains are arrayed in saffron; the cavities of the rocks are fringed with sweet-smelling dinners. In a word, from the hills, the vales, and the plains, on all hands, there arise clouds of exquisitely perfumes, which embalm the air, and render it a luxury to breathe it.

As to the inhabitants, the Mahometan men are generally from five feet and an half to six feet tall. They bear a strong resemblance to ancient statues; and it must have been after such models that the ancient artists wrought. The women also are generally beautiful. Their dresses do not restrain the growth of any part of their bodies, and their shape therefore affumes those admirable proportions with which the hand of the Creator has graced his fairest workmanship on the earth. They are not all handsome or charming; but some of them are beautiful, particularly the Turkish ladies. In general, the Cretan women have a riving throat, a neck gracefully rounded, black eyes sparkling with animation, a small month, a fine nose, and cheeks delicately coloured with the fresh vermilion of health. But the oval of their form is different from that of Europeans, and the character of their beauty is peculiar to their own nation.

The quadrupeds belonging to the island are not of a ferocious temper. There are no lions, tigers, bears, wolves, foxes, nor indeed any dangerous animal here. Wild goats are the only inhabitants of the forests that overspread the lofty mountains; and these have nothing to fear but the ball of the hunter; hares inhabit the hills and the plain; sheep graze in security on the thyme and the heath; they are folded every night, and the shepherd sleeps soundly without being disturbed with the fear that wild animals may invade and ravage his folds.

The Cretans are very happy in not being exposed to the troublesome bite of noxious insects, the poison of serpents, and the rapacity of the wild beasts of the defart. The ancients believed that the island enjoyed these singular advantages, on account of its having been the birth-place of Jupiter. "The Cretans (say the ancients) celebrate in their songs the beneficence of Jupiter, and the favour which he conferred on their island, which was the place of his birth and education, by freeing it from all noxious animal, and even rendering it unfit for nourishing those noxious animals that are introduced into it from foreign countries."

Dittany holds the first rank among the medicinal plants which are produced in Crete. The praises bestowed on the virtues of this plant by the ancients are altogether extravagant; yet we perhaps treat the medicinal virtues of this plant with too much contempt, its leaf is very balsamic, and its flower diffuses around it a delicious odour. At present the inhabitants of the island apply it with success on various occasions. The leaf, when dried and taken in an infusion with a little sugar, makes a very pleasant drink, of a finer flavour than tea. It is there an immediate cure for a weak
CANDIA [91]

CANDIA weak stomach, and enables it to recover its tone after a bad digestion.

Diseases are very rare in a country whose atmosphere is exceedingly pure; and in Candia, epidemical diseases are unknown. Pests prevail here in summer, but are not dangerous; and the plague would be wholly unknown, had not the Turks destroyed the lazarets that were established by the Venetians, for strangers to do quarantine in. Since the period when these were demolished, it is occasionally introduced by dys from Smyrna and Constantinople. As no precautions are taken against it, it gains ground, and spreads over the island from one province to another; and as the colds and heats are never intertemperate, it sometimes continues its ravages for six months at a time.

This fine country is infected with a disease somewhat less dangerous than the plague, but whose symptoms are somewhat more hideous; that disease is the leprosy. In ancient times, Syria was the focus in which it raged with most fury: and from Syria it was carried into several of the isles of the Archipelago. It is infectious, and is instantly communicated by contact. The victims who are attacked by it, are driven from society, and confined to little rainy hovels on the highway. They are strictly forbidden to leave these miserable dwellings, or hold intercourse with any person. Those poor wretches have generally beside their huts a small garden producing pulse, and feeding poultry; and with that support, and what they obtain from passengers, they find means to drag out a painful life in circumstances of shocking bodily distempers. Their bloated skin is covered with a scaly crust, speckled with red and white spots, which afflict them with intolerable itchinngs. A hoarse and tremulous voice issues from the bottom of their breasts. Their words are scarce articulated; because their tongue inwardly preys upon the organs of speech. These frightful spectres gradually lose the use of their limbs. They continue to breathe till such time as the whole mass of their blood is corrupted, and their bodies entirely in a state of putrefaction. The men are not attacked by this distemper: it confines itself to the poor, chiefly to the Greeks. But those Greeks observe strictly their four lentis; and eat nothing during that time but salt fish, botordo, salted and flinked pickled olives, and chefe. They drink plentifully of the hot and muddy wines of the island. The natural tendency of such a regimen must be, to fire the blood, to thicken the fluid part of it, and thus at length to bring on a leprosy.

Candia is at present governed by three Pachas, who reside respectively at Candia, Canas, and Retimo. The first, who is always a Pacha of three years, may be considered as viceroy of the island. He enjoys more extensive powers than the others. To him the inspection of the forts and arsenals is entrusted. He nominate to such military employments as fall vacant, as well as to the governments of the Sode, Grabofs, Spina Longa, and Gira-petra. The governors of these forts are denominated Beys. Each of them has a confidential and three general officers under him: one of whom is commander of the artillery; another of the cavalry; and the third of the janizaries.

The council of the pacha consists of a kaisan, who is the channel through which all orders are issued, and all favours bestowed; an aga of the janizaries, colonel-general of the troops, who has the chief care of the regulation of the police; two topizi bachis; a desdertar, who is treasurer-general for the imperial revenues; a keeper of the imperial treasury; and the chief officers of the army. This government is entirely military, and the power of the pacha farisqur is absolute. The justice of his sentences is never called into question; they are instantly carried into execution.

The people of the law are the muftis, who is the religious head, and the cadi. The first interprets those laws which regard the division of the patrimony among the children of a family, successions, and marriages; in a word, all that are contained in the Koran; and he also decides on every thing that relates to the ceremonies of the Mussulman religion. The cadi cannot pronounce sentence on affairs connected with these laws, without first taking the opinion of the mufti in writing, which is named Faitsa. It is his business to receive the declarations, complaints, and donations of private persons; and to decide on such differences as arise among them. The pacha is obliged to consult those judges when he puts a Turk legally to death, but the pacha, who is dignified with three tails, sets himself above all laws, condemns to death, and sees his sentence executed, of his own proper authority. All the mosques have their liams, a kind of curate, whose duty is to perform the service. There are schoolmasters in the different quarters of the city. These persons are much respected in Turkey, and are honoured with the title of Effendi.

The garrisons of Candia consists of forty-six companies, composing a military force of about ten thousand men. All these forces do not reside constantly in the city, but they may be mustered in a very short time. They are all regularly paid every three months excepting the janizaries, none of whom but the officers receive pay. The different gradations of this military body do not depend on the pacha. The council of each company, consisting of veterans, and of officers in actual service, has the power of naming to them. A person can occupy the same post for longer than two years; but the pacha of Sorbag, or captain, which is purchased at Constantinople, is held for life. The cadi, or cook, is also continued in his employment as long as the company to which he belongs is satisfied with him. Each company has its almoner, denominated imam.

The garrisons of Canas and Retimo, formed on a similar plan, are much less numerous. The first consists of about three thousand men, the other of five hundred; but as all the male children of the Turks are enrolled among the janizaries as soon as born, the number of these troops might be greatly augmented in time of war; but, to say the truth, they are far from formidable. Moll of them have never seen fire, nor are they ever exercised in military evolutions.

The pachas of Canas and Retimo are no less absolute, within the bounds of their respective provinces, than the pacha of Candia. They enjoy the same privileges with him, and their council consists of the same officers. These governors chief object is to get rich as speedily as possible; and in order to accomplish that end, they practise all the arts and cruelties of oppression, to squeeze money from the Greeks. In truth,
The Capuchins

The Jews, of whom there are not many in the island, amount only to 200,000 Jews.

Total is 350,000 souls.

This fertile country is in want of nothing but industry, and fertile lands, secure of enjoying the fruit of their labours. It might maintain four times its present number of inhabitants.

Antiquity has celebrated the island of Crete as containing an hundred populous cities: and the industry of geographers has preferred their names and situations. Many of these cities contained no fewer than thirty thousand inhabitants; and by reckoning them, on an average, at six thousand each, we shall in all probability be rather within than beyond the truth. This calculation gives for an hundred cities 600,000

By allowing the same number as inhabitants of the towns, villages, and all the rest of the island, 600,000

The whole number of the inhabitants of ancient Crete will amount to 1,200,000

This number cannot be exaggerated. When Candia was in the hands of the Venetians, it was reckoned to contain nine hundred four-score and sixteen villages.

It appears, therefore, that when the island of Crete enjoyed the blessing of liberty, it maintained to the number of eight hundred and forty-nine thousand eight hundred more inhabitants than it does at present. But since those happier times, they have been deprived of her laws by the tyranny of the Romans; has groaned under the destructive sway of the monarchs of the lower empire; has been exposed for a period of an hundred and twenty years to the ravages of the Arabs; has since passed under the dominion of the Venetians; and has at last been subjected to the despotism of the Turks, who have produced a dreadful depopulation in all the countries which have been subdued by their arms.

The Turks allow the Greeks the free exercise of their religion, but forbid them to repair their churches or monasteries; and accordingly they cannot obtain permission to repair their places of worship, or religious houses, but by the powerful influence of gold. From this article the pachas derive very considerable sums.

They have twelve bishops as formerly, the first of whom assumes the title of archbishop of Gortynia. He resides at Candia; in which city the metropolitical church of the island stands. He is appointed by the patriarch of Constantinople; and has the right of nominating to all other bishoprics of the island: the names of which are, Gortynia, Cnossus, Mirabella, Iyara, Gire-petra, Arcadia, Cherronee, Lambis, Niphopomat, Retimo, Canea, Cilamo. These bishoprics are nearly the same as under the reign of the Greek emperors. The patriarch wears a triple tiara, writes his signature in red ink, and answers for all the debts of the clergy.

To enable him to fulfil his engagements, he lays impositions on the rest of the bishops, and particularly on the monasteries, from which he draws very handsome contributions. He is considered as the head of the Greeks, whom he protects, as far as his fonder credit goes. The orders of government are directed to him on important occasions; and he is the only one of all the Greeks in the island who enjoys the privilege of entering the city on horseback.

CANDIA, is the capital of the above island, situated on its northern coast, in E. Long. 25° 60. N. Lat. 35° 30. It stands on the same situation which was formerly occupied by Heraclea, and is the seat of government under the Turks. Its walls, which are more than a league in compass, are in good repair, and defended by deep ditches, but not protected by any exterior fort. Towards the sea it has no attacks to fear; because the shallowness of the harbour renders it inaccessible to ships of war.

The Porte generally commits the government of this island to a Pacha of three tailes. The principal officers, and several bodies of the Ottoman soldiery, are stationed here. This city, when under the Venetians, was opulent, commercial, and populous; but it has now lost much of its former strength and grandeur. The harbour, naturally a fine haven, in which ships are securely sheltered from every storm, is every day becoming narrower and shallower. At present it admits only boats and small ships after they have discharged a part of their freight. These vessels, which the Turks are obliged to Candia, are obliged to go almost empty to the ports of Standie, whether their cargoes are conveyed to them in barks. Such inconveniences are highly unfavourable to commerce; and as government never thinks of removing them, the trade of Candia is therefore considerably decayed.

Candia, which was embellished by the Venetians with regular streets, handsome houses, a fine square, and a magnificent citadel, contains at present but a small number of inhabitants, notwithstanding the vast extent of the area inclosed within its walls. Several divisions of the city are void of inhabitants. That in which the market-place stands is the only one which discovers any stir of business, or show of afluence. The Mahometans have converted most of the Christian temples into mosques; yet they have left two churches to the Greeks, one to the Armenians, and a synagogue to the Jews. The Capuchins possess a small convent, with a chapel in which the vice-count of France hears mass. At present he is the only Frenchman who attends it, as the French merchants have taken up their residence at Canea.

Well of the city of Candia is an extensive range of hills;
CANDIDATE, a person who aspires to some public office.

In the Roman commonwealth, they were obliged to wear a white gown during the two years of their soliciting a place. This garment, according to Plutarch, they wore without any other clothes, that the people might not suspect they concealed money for purchasing votes, and also that they might more easily show to the people the scars of those wounds they had received in fighting for the defence of the commonwealth. The candidates usually declared their pretensions a year before the time of election, which they spent in making interest and gaining friends. Various arts of popularity were practiced for this purpose, and frequent circuits made round the city, and visits and compliments to all sorts of persons, the process of which was called ambitus. See Ambitus.

CANDIDATE MILITAE, an order of soldiers, among the Romans, who served as the emperor's bodyguards to defend him in battle. They were the tallest and strongest of the whole troops, and most proper to inspire terror. They were called candidati, because clothed in white, either that they might be more conspicuous, or because they were considered in the way of preference.

CANDISH, a considerable province of Asia, in the dominions of the Great Mogul, bounded by Chytor and Malva on the north, Orissa on the east, Decan on the south, and Guzarat on the west. It is populous and rich; and abounds in cotton, rice, and indigo. Barampore is the capital town.

CANDLE, a small taper of tallow, wax, or spermaceti; the wick of which is commonly of several threads of cotton, spun and twisted together.

A tallow-candle, to be good, must be half sheep's and half bullock's tallow; for hog's tallow makes the candle gutter, and always gives an offensive smell, with a thick black smoke. The wick ought to be pure, sufficiently dry, and properly twisted; otherwise the candle will emit an inconstant vibratory flame, which is both prejudicial to the eyes and insufficient for the distinct illumination of objects.

There are two sorts of tallow-candles: the one dipped, the other moulded: the former are the common candles; the others are the invention of the fleur le Bregre at Paris.

As to the method of making candles in general: After the tallow has been weighed, and mixed in the due proportions, it is cut into very small pieces, that it may melt the sooner; for the tallow in lamps, as it comes from the butchers, would be in danger of burning or turning black, if it were left too long over the fire. Being perfectly melted and skimmed, they pour a certain quantity of water into it, proportionable to the quantity of tallow. This serves to precipitate to the bottom of the vessel the impurities of the tallow which may have escaped the skimmer. No water, however, must be thrown into the tallow designed for the three first dips; because the wick, being fill quite dry, would imbibe the water, which makes the candles crackle in burning, and renders them of bad use. The tallow, thus melted, is poured into a tub, through a coarse sieve of horse-hair, to purify it still more, and may be used after having stood three hours. It will continue fit for use 24 hours in summer and 15 in winter. The wicks are made of spun cotton, which the tallow-chandlers buy in skins, and which they wind up into bottoms or clues. Whence they are cut out, with an instrument contrived on purpose, into pieces of the length of the candle required; then put on the sticks or broaches, or else placed in the moulds, as the candles are intended to be either dipped or moulded.

Wax-candles are made of a cotton or flaxen wick, slightly twisted, and covered with white or yellow wax. Of these, there are several kinds: some of a conical figure, used to illuminate churches, and in processions, funeral ceremonies, &c. (see TAPER); others of a cylindrical form, used on ordinary occasions. The first are either made with a lade or the hand. 1. To make wax-candles with the lade. The wicks being prepared, a dozen of them are tied by the neck, at equal distances, round an iron circle, suspended over a large bason of copper tinned, and full of melted wax: a large lade full of this wax is poured gently on the tops of the wicks one after another, and this operation continued till the candle arrive at its defined bigness; with this precaution, that the three first ladies be poured on at the top of the wick, the fourth at the height of \( \frac{1}{3} \), the fifth at \( \frac{1}{4} \), and the sixth at \( \frac{1}{4} \), in order to give the candle its pyramidal form. Then the candles are taken down, kept warm, and
CANDLES

and rolled and smoothed upon a walnut-tree table, with a long square instrument of box, smooth at the bottom.

2. As to the manner of making wax-candles by the hand, they begin to soften the wax, by working it several times in hot water, contained in a narrow but deep caldron. A piece of the wax is then taken out, and dipped by little and little around the wick, which is hung on a hook in the wall, by the extremity opposite to the neck; so that they begin with the big end, diminishing till they defend towards the neck. In other respects the method is nearly the same as in the former cafe. However, it must be observed, that, in the former cafe, water is always used to moisten the several instruments, to prevent the wax from flicking; and in the latter, oil of olives, or lard, for the hands, &c. The cylindrical wax-candles are either made as the former, with a ladle, or drawn. Wax-candles drawn, are so called, because actually made in the manner of wire, by means of two large rollers of wood, turned by a handle, which, turning backwards and forwards several times, pafs the wick through melted wax contained in a brafs basin, and at the same time through the holes of an instrument like that used for drawing wire fastened at one side of the basin.

If any candlers in Britain mix with their wares any thing deceitfully, &c. the candlers shall be forfeited.

Stat. 23 Eliz. and a tax or duty is granted on candles, by 8 and 9 Anne, cap. 6. made for sale, of one penny a pound, besides the duty upon tallow, by 8 Anne, cap. 9. And by 24 Geo. III. cap. 11. an additional duty of an halfpenny a pound: and by the same an additional duty of an halfpenny a pound is laid upon all candles imported (except those of wax and spermaceti, for which see WAX-CANDLES), subject also to the two additional 5 per cent. imposed by 19 and 22 Geo. III. besides the duty of 2½d. formerly imposed by 2 W. etf. 2. cap. 4. 8 Anne, cap. 9. and 9 Anne, cap. 6.

And every maker of candles, other than wax candles, for sale, shall annually take out a licence at L. 1. The maker of candles shall, in four weeks within the bills, and elsewhere in six weeks, after entry, clear off the duties on pain of double duty: nor shall any after default in payment on pain of double value; 8 Anne, cap. 9.

The makers of candles are not to use melting hоuses, without making a true entry, on pain of L. 100, and to give notice of making candles to the excise officer for the duties: and of the number, &c. or shall forfeit L. 50. Stat. 11. Geo. I. cap. 30. See also 21 Geo. II. cap. 21. and 26 Geo. II. cap. 22. No maker of candles for sale shall begin to make candles, without notice first given to the officer, unless from September 29th to March 25th yearly, between seven in the morning and five in the evening, and from March 25th to September 29th, between five in the morning and seven in the evening, on pain of L. 10, 8 Anne, cap. 26. The penalty of obstructing the officer is L. 20, and of removing of candles before they are surveyed L. 20, 8 Anne, cap. 9. The penalty of privately making candles is the forfeiture of the flame and utensils, and L. 100, 5 Geo. III. cap. 43. And the penalty of mingling weighed with unweighted candles, of removing them before they are weighed, or of concealing them, is the forfeiture of L. 100, 11 Geo. cap. 30. Candles, for which the duty hath been paid, may be exported, and the duty drawn back; but no draw-back shall be allowed on the exportation of any foreign candles imported. 8. Ann. cap. 9. 23 Geo. II. cap. 21.

The Roman candles were at first little strings dip in pitch, or surrounded with wax; though afterwards they made them of the papyrus, covered likewise with wax; and sometimes also of rushes, by stripping off the outer rind, and only retaining the pith.—For religious offices, wax candles were used; for vulgar uses, those of tallow. Lord Bacon proposes candles of divers compositions and ingredients, as also of different sorts of wicks; with experiments of the degrees of duration, and light of each. Good houf-wives bury their candles in flour or bran, which it is said increases their lasting almost half.

Experiments to determine the real and comparative value of burning CANDLES of different sorts and fixes.

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<th>Numbr of Weight</th>
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<th>Farthings and 100th parts.</th>
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</thead>
<tbody>
<tr>
<td>One candle of one pound</td>
<td>0.14</td>
<td>3.15</td>
<td>59 26</td>
<td>4.55</td>
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<tr>
<td>One candle of one divided pound</td>
<td>0.15</td>
<td>2.40</td>
<td>44 2</td>
<td>6.54</td>
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<tr>
<td>Small wick</td>
<td>15 0 15</td>
<td>2.40</td>
<td>44 2</td>
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<tr>
<td>Large wick</td>
<td>15 0 15</td>
<td>2.40</td>
<td>44 2</td>
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<tr>
<td>12 1 5</td>
<td>3.27</td>
<td>41 24</td>
<td>8.94</td>
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<tr>
<td>10 1 8</td>
<td>3.36</td>
<td>38 24</td>
<td>8.47</td>
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<td>7 2 1</td>
<td>4.9 32</td>
<td>12 8</td>
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<tr>
<td>6 2 0</td>
<td>4.15</td>
<td>34 0</td>
<td>9.53</td>
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<tr>
<td>5 2 13</td>
<td>5.19</td>
<td>30 15</td>
<td>3.78</td>
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<tr>
<td>Mould candles</td>
<td>5 2 13</td>
<td>5.19</td>
<td>30 15</td>
<td>3.78</td>
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<tr>
<td>5 2 13</td>
<td>5.19</td>
<td>30 15</td>
<td>3.78</td>
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<td>4 0 9</td>
<td>3.26</td>
<td>20</td>
<td>3.29</td>
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<td>8 26</td>
<td>4.15</td>
<td>34 0</td>
<td>9.53</td>
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</tbody>
</table>

N.B. The time that one candle lasted was taken from an average of several trials in each fixe.

It is observable, in opins, that the flame of two candles joined, give a much stronger light than both of them separate. The observation was suggested by Dr Franklin. Probably the union of the two flames produces a greater degree of heat, whereby the vapour is attenuated, and the particles of which light consists more copiously emitted.

Lighting a CANDLE by a small spark of electricity. This method, which is an invention of Dr Ingenhousz, is recorded in the Phil. Trans. vol. 68. It is done by a small phial, having eight or ten inches of metallic coating, or even less, charged with electricity, which may be done at any time of the night by a person who has an electric machine in his room. “When I have occasion to light a candle,” says he, “I charge a small coated phial, whose knob is bent outwards, so as to hang a little over the body of the phial; then I wrap some loose cotton over the extremity of a long brass pin or wire, so as to flick moderately fast to its subsistance. I next roll this extremity of the pin wrapped up with cotton in some fine powder of (which, I always keep in readiness upon the table for this purpose, either in a wide-mouthed phial or in a
Candle, or Candlberry.

Candle, a feast of the church held on the second day of February, in honour of the purification of the Virgin Mary. It is borrowed from the practice of the ancient Christians, who on that day used abundance of lights both in their churches and processions, in memory, as is supposed, of our Saviour's being on that day declared by Simeon 'to be a light to lighten the Gentiles.' In imitation of this custom, the Roman-catholics on this day consecrate all the tapers and candles which they use in their churches during the whole year. At Rome, the Pope performs that ceremony himself; and distributes wax-candles to the cardinals and others, who carry them in procession through the great hall of the Pope's palace. This ceremony was prohibited in England by an order of council in 1548.

Candlemas, in England, is made one of the four terms of the year for paying and receiving rents or borrowed money, &c.—In the courts of law, Candlemas term begins 15th January, and ends 3d February.

Candlestick, an instrument to hold a candle, made in different forms, and of all sorts of matter.

The golden candlestick was one of the sacred utensils made by Moses to be placed in the Jewish tabernacle. It was made of hammered gold, a talent in weight. It consisted of seven branches supported by a base or foot. These branches were adorned at equal distances with six flowers like lilies, and with as many bowls and knobs placed alternately. Upon the flock and four branches of the candlestick were the golden lamps, which were immovable, wherein were put oil and cotton.

These seven lamps were lighted every evening, and extinguished every morning. The lamps had their tongs or snuffers to draw the candle in or out, and dished underneath them to receive the sparks or droppings of the oil. This candlestick was placed in the antechamber of the sanctuary on the south side, and served to illuminate the altar of perfume and the tabernacle of the shew-bread. When Solomon had built the temple of the Lord, he placed in it ten golden candlesticks of the same form as that described by Moses, five on the north and five on the south side of the holy place; but after the Babylonian captivity, the golden candlestick was again placed in the temple, as it had been before in the tabernacle by Moses. This sacred utensil, upon the destruction of the temple by the Romans, was lodged in the temple of peace built by Vespasian; and the representation of it is still to be seen on the triumphal arch at the foot of Mount Palatine, on which Vespasian's triumph is delineated.

Candy, a large kingdom of Asia, in the island of Ceylon. It contains about a quarter of the island; and as it is encompassed with high mountains, and covered with thick forests, through which the roads and paths are narrow and difficult, the king has them guarded to prevent his subjects from going into other countries. It is full of hills, from whence rivulets proceed which are full of fish; but as they run among the rocks, they are not fit for boats: however, the inhabitants are very dexterous in turning them to water their land, which is fruitful in rice, pille, and hemp. The king is absolute, and his subjects are idolaters. The capital town is of the same name.

Candy, a town of Asia, and capital of a kingdom of...
of the same name, in the island of Ceylon. It has been often burnt by the Portugeuefe, when they were masters of these coasts. The houses are very poor, low, and badly furnished. E. Long. 79. 12. N. Lat. 7. 35.

CANDY, or Sugar-Candy, a preparation of sugar made by melting and crystallizing it six or seven times over, to render it hard or transparent. It is of three kinds, white, yellow, and red. The white comes from the leaf-fugar, the yellow from the cassonado, and the red from the turpincado.

CANDYING, the art of preserving simples in substance, by boiling them in sugar. The performance of this originally belonged to the apothecaries, but is now become a part of the business of the confectioner.

CANE, in botany. See ARUNDO and CALAMUS.

Cane, denotes also a walking flick. It is customary to adorn it with a head of gold, silver, agate, &c. Some are without knots, and very smooth and even; others are full of knots about two inches distance from one another. These last have very little elasticity, and will not bend so well as the others.

Canes of Bengal are the most beautiful which the Europeans bring into Europe. Some of them are five feet, five inches English measure: the cane of Toulouse and the Upper Languedoc, is equal to the varre of Arragon, and contains five feet 8½ inches; at Montpellier, Provence, Dauphine, and the Lower Languedoc, to six English feet ½ inches.

CANEHA, a considerable town of the island of Candia, where a bark-reefe. It was built by the Venetians, and occupies part of the site of the ancient CYDONIA. It is but about two miles in compass; encircled on the land side with a single wall, extremely thick; and defended by a broad and deep ditch, cut through a bed of rock, which extends all around the wall. By cutting it still deeper, they might cause the sea to flow round its ramparts; on which they have raised high platforms, that their great guns might command a wider extent of the adjacent plain. The city has only one gate, the gate of Retimo, protected by a half-moon battery, which is the only exterior fort. The side which faces the sea is the best fortified. On the left of the harbour are four batteries, rising one above another, and planted with a number of large cannon of cast metal, marked with the arms of Venice. The first of these batteries stands close on the brink of the sea. The right side of the harbour is defended only by a strong wall, extending along a chain of pointed rocks which it is dangerous for ships to approach. At the extremity of this wall, there is an old castle, falling into ruins. Beneath that castle, the Venetians had immense arsenals, vaulted with stone. Each of these vaults was of sufficient length, breadth, and height, to serve as a work-shop for building a ship of the line. The ground is floping, and the outermost part of these spacious arsenals is on a level with the sea; so that it was very easy to launch the ships built there into the water. The Turks are suffering that magnificent work to fall into ruins.

The city of Canea is laid out on a fine plan. The streets are large and straight; and the figures adorned with fountains. There are no remarkable buildings in it. Most of the houses are flat-roofed, and have only one story. Those contiguous to the harbour are adorned with galleries, from which you enjoy a delightful prospect. From the windows you discover the large bay formed between Cape Spada and Cape Melec, and all the ships that are entering in or passing out. The harbour, at present, receives ships of 200 tons burden; and it might be enlarged so as to admit the largest frigates. Its mouth is exposed to the violence of the north winds, which sometimes swell the billows above the ramparts. But, as it is narrow, and the bottom is good, ships that are well moored run no danger. At the time when Tournafort visited Crete, Canea did not contain more than five or six thousand inhabitants. But, at present, when the gates of Girapetra, Candia, and Retimo are choked up, the merchants have retired to Canea; and it is reckoned to contain 16,000 souls. The environs of the town are admirable; being adorned with forests of olive-trees mixed with fields, vineyards, gardens, and brooks bordered with myrtle-trees and lattal-roles. The chief revenue of this town consists in oil-olive. E. Long. 24. 15. N. Lat. 35. 28.

CANELLA, in botany: A genus of the monogynia order belonging to the dodecandra class of plants; and in the natural method ranking under the 12th order, Holocaracata. The calyx is three lobi, the petals are five; the antheræ 16, growing in an uncurculated or bladder-shaped neftarium; and the frut is a trilocular berry, with two seeds. There is but one species, the alba; which grows usuallly about 20 feet high, and eight or ten inches in thickness, in the thick woods of most of the Bahama islands. The leaves are narrow at the stalk, growing wider at their ends, which are broad and rounding, having a middle rib only; they are very smooth, and of a light shining green. In May and June the flowers, which are pentapetalons, come forth in clusters at the ends of the branches: they are red, and very fragrant, and are succeeded by round berries, of the size of large peas, green, and when ripe (which is in February) purple, containing two shining black seeds, flat on one side, otherwise not unlike in shape to a kidney bean: these seeds in the berry are enveloped in a filmy mucilage. The whole plant is very aromatic, the bark particularly, being more used in distilling, and in greater esteem, in the more northern parts of the world than in Britain.

The bark is the canella alba of the flippers. It is brought to us rolled up into long quills, thicker than cinnamon, and both outwardly and inwardly of a white colour, slightly inclining to yellow. Infusions of it in water are of a yellowish colour; and smell of the canella; but they are rather bitter than aromatic. Tinctures in rectified spirit have the warmth of the bark, but little of its smell. Proof-spirit diffolves the aromatic as well as the bitter matter of the canella, and is therefore the best meucrum.

The canella is the interior bark fed from an outward thin
CANELLA, or CANNEL, a large country in the island of Crete, called formerly the kingdom of Creta. It contains a great number of canes, the principal of which are occupied by the Dutch. The chief riches of this country consist in cinnamon, of which there are large forests. There are five towns on the coast, some forts, and a great number of harbours. The rest of the country is inhabited by the natives; and there are several rich mines, from whence they get rubies, sapphires, topazes, cat's-eyes, and several other precious stones.

CANEPORE, in Grecian antiquity, virgins who, when they became marriageable, presented certain baskets full of little curiosities to Diana, in order to get leave to depart out of her train, and change their state of life.

CANEPORIA, in Grecian antiquity, a ceremony which made part of a feast, celebrated by the Athenians virgins on the eve of their marriage-day. At Athens the canephoria consisted in this; that the maid, conducted by her father and mother, went to the temple of Minerva, carrying with her a basket full of presents to engage the gods to make the marriage-state happy; or, as the scholiast of Theocritus has it, the basket was intended as a kind of honourable amends made to that goddes, the protector of virginity, for abandoning her party; or as a ceremony to appease her wrath. Sidra calls it a festival in honour of Diana.

CANE, in Egypt and other eastern countries, a poor fort of buildings for the reception of strangers and travellers. People are accommodated in these with a room at a small price, but with no other necessaries: so that, excepting the room, there are no greater accommodations in these houses than in the defarts, only that there is a market near.

CANS, in astronomy, the grey-hounds, two new constellations, first established by Feveius, between the tail of the Great Bear and Bootes' arms, above the Coma Berenices. The first is called aferior, being that next the Bear's tail; the other inferior. They comprehended 25 stars, of which Tycho only observed two. The longitudes and latitudes of each are given by Feveius. In the British Catalogue they are 25.

CANETO, a strong town of Italy in the duchy of Mantua, seated on the river Cagio, which was taken by the Imperialists in 1702, afterwards by the imperialists, and then by the French in 1705. E. Long. to 45. N. Lat. 40. 55.

CANGA, in the Chinese affairs, a wooden clog borne on the neck, by way of punishment for divers offenses. The canga is composed of two pieces of wood notched, to receive the criminal's neck; the load lies on his shoulders, and is more or less heavy according to the quality of his offense. Some cangas weigh 20 lb.; the generality from 30 to 60. The Mandarin condemn to the punishment of the canga. Sentence of death is sometimes changed for this kind of punishment.

CANGE, (Charles du Fresne sieur du), one of the most learned writers of his time, was born at Aumins in France, and studied at the Jefuits college in that city. Afterwards he applied himself to the study of law at Orleans, and gained the reputation of his works; among which are: 1. The history of the empire of Conftantinople under the French emperors. 2. John Cinnamus's six books of the history of the affairs of John and Manuel Comnenus in Greek and Latin, with historical and philological notes. 3. Clefsium ad Scriptores mediae et infime Latinitatis.

CANGI, CANGI, or Cangi, anciently a people of Britain, concerning whose situation antiquaries have been much perplexed. They are all the same people. Camden discovered some traces of them in many different and distant places, as in Somcrsfetshire, Wales, Derbyshire, and Cheshire; and he might have found as plain vestiges of them in Devonshire, I orkfhir, Eicex, Wiltshire, &c. Mr. Fordey and others are no less perplexed and undecided in their opinions on this subject. But Mr. Baxter seems to have discovered the true cause of all this perplexity, by observing that the Cangi or Cangii were not a distinct nation seated in one particular place, but such of the youth of many different nations as were employed in pasturage, in feeding the flocks and herds of their respective tribes. Almost all the ancient nations of Britain had their cangii, their pafloriata valores, the keepers of their flocks and herds, who ranged about the country in great numbers, as they were invited by the favor and plenty of pasture for their cattle. This is the reason that vestiges of their name are to be found in so many different parts of Britain; but chiefly in those parts which are most fit for pasture. These cangii of the different British nations, naturally brave, and rendered still more hardy by their way of life, were constantly armed for the protection of their flocks from wild beasts; and these arms they occasionally employed in the defence of their country and their liberty.

CANGIAGIO, or CANGIAGIO, (I dodici) one of the most eminent of the Genoese painters, was born in 1527. His works at Genoa are very numerous; and he was employed by the king of Spain to adorn part of the Etruria. It is remarked of him, that he was not only a most expeditious and rapid painter, but also that he worked equally well with both hands.
and by that unusual power he executed more designs, and finished more grand works with his own pencil, in a much shorter time, than most other artists could do with several assistants. He died in 1683.

In the royal collection at Paris, there is a Sleeping Cupid, as large as life, and likewise judith with her attendant; which are painted by Cangiagio, and are an honour to that matter. And in the Pembroke collection at Wilton, is a picture, reputed the work of Cangiagio, representing Christ bearing his Cross.

CANICULA, is a name proper to one of the stars of the constellation canis major, called also simply the *See Sirius dog-star; by the Greeks τηρης, στερ[is]. Canicula is the tenth in order in the Britannic catalogue; in Tycho's and Ptolemey's it is the second. It is situated in the mouth of the constellation; and is of the first magnitude, being the largest and brightest of all the stars in the heavens. From the rising of this star not co林ically, or with the sun, but heliacally, that is, its emersion from the sun's rays, which now happens about the 15th day of August, the ancients reckoned their dio caniculares, or dog-days. The Egyptians and Ethiopians began their year in the mouth of the constellation; and is of the first rising, which is called the Canis canarius, or canicular year. This year constituted ordinarily of 365 days, and every fourth year of 366, by which it was accommodated to the civil year. The reason of their choice of the canicula before the other stars to compute their time by, was not only the superior brightness of that star, but because its heliacal rising was in Egypt a time of singular note, as falling on the greatest augmentation of the Nile, the reputed father of Egypt. Ephesien adds, that the Canicula is a dog, the representative of the sun, or rather because it was partakes of, or has any relation to, the nature of a dog.

**Canine Teeth** are two sharp edged teeth in each jaw; one on each side, placed between the incisors and molars.

**Canini,** (John Angelo and Marc Anthony) brothers and Romans, celebrated for their love of antiquities. John excelled in designs for engraving on stones, particularly heads; Marc engraved them. They were encouraged by Colbert to publish a collection of heads of the heroes and great men of antiquity, collected from medals, antique stones, and other ancient remains; but John died in one of those attempts. The work was given to Canini, however, procured alliance, published and printed in Italian in 1669. The cuts of this edition were engraved by Canini, Picard, and Vaut; and a curious explanation is given, which discovers the skill of the Canini in history and mythology. The French edition of Amsterdam, 1731, is in Latin.

**Canis, or Dog** in zoology, a genus of quadrupeds, belonging to the order of ferae. The characters of the dog are these: he has six fore-teeth in the upper jaw, those in the fides being longer than the intermediate ones, which are lobated; in the under jaw there are likewise six fore-teeth, those in the fides being lobated. He has six grinders in the upper jaw, and six in the under jaw. The teeth called dog-teeth, in each side, both in the lower and upper jaw; they are sharp-pointed, bent a little inward, and stand at a distance from any of the rest.

There are 14 species of this genus, viz.

I. The Familias, or Domestic Dog, is distinguished from the other species by having his tail bent to the Dog-left side; which mark is so singular, that perhaps the tail of no other quadruped is bent in this manner. Of See Plates this species there are a great number of varieties. Lin. CXVIII, nunc enumerates 11, and Buffon gives figures of no less than 27. The mastiff is about the size of a wolf, with the sides of the lips hanging down, and a full round body. The large Danish dog differs only from the former in being fuller in the body, and generally of a larger size. The grey-hound is likewise the same with the mastiff; but its make is more slender and delicate. Indeed the difference betwixt these three dogs, although perfectly indistinguishable at first sight, is not greater than that betwixt a Dutchman, a Frenchman, and an Italian. The shepherd's dog, the wolf-dog, and what is commonly called the Siberian dog, to which may be joined the Lapland dog, the Canada dog, and, in general, all those which have straight ears and a pointed snout, are all one kind, differing only in thickness, the roughness or smoothness of their skin, the length of their legs and tails. The hound or beagle, the terrier, the braque or harrier, and the spaniel, may be considered as the same kind: they have the same form and the same instincts; and differ only in the length of their legs, and size of their ears, which in each of them are long, soft, and pendulous. The bull-dog, the small Danish dog, the Turkish dog, and the Iceland dog, may likewise be considered as the same kind, all the varieties in their appearance taking their rise merely from climate. For instance, the Turkish dog, which has no hair, is nothing else but the small Danish dog transported to a warm climate, which makes the hair fall off. A dog of any kind loses its hair in very warm climates. But this is not the only change which arises from the difference of climate. In some countries, the voice is changed.,
The variety called the Highland grey-hound, and now become very scarce, is of very great size, strong, deep-cheeked, and covered with long rough hair. This kind was much esteemed in former days, and used in great numbers by the powerful chieftains in their magnificent hunting-matches. It had as sagacious nostrils as the blood-hound, and was as fierce.

f. The third species is the leovinarius, or lorarius; the leoviner or lyemmer; the first name is derived from the lightness of the kind; the other from the old word lyemme, thong; this species being used to be led in a thong, and dipped at the game. Our author says that this dog was a kind that hunted both by scent and fight; and in the form of its body observed a medium between the hound and greyhound. This probably is the kind now known by the name of the Irish grey-hound, a dog now extremely scarce in that kingdom, the late king of Poland having procured from them as many as possible. They were of the kind called by Buffon le grand Danois, and probably imported there by the Danes who long possessed that kingdom. Their use seems originally to have been for the chase of wolves with which Ireland swarmed till the latter end of the last century. As soon as these animals were extirpated, the numbers of the dogs decreased; for, from that period, they were kept only for State.

g. The vortagus, or tumbler, is a fourth species; which took its prey by mere curiosity, depending neither on the caginess of its nose, nor its swiftness; if it came into a warren, it neither barked, nor ran on the rabbits; but by a seeming neglect of them, or attention to something else, deceived the object till it got within reach, so as to take it by a sudden spring. This dog was less than the hound, more frangible, had prickled up ears, and by Dr Caius's description seems to answer to the modern lurcher.

The third subdivision of the more generous dogs comprehends those which were used in fowling.

h. First, the Hispaniarius, or spanteri; from the name, it may be supposed that we were indebted to Spain for this breed. There were two varieties of this kind: the first used to squire the game, which are the same with the sparters. The other variety was used only for the net, and was called index, or the setter; a kind well known at present. Britain has been long remarkable for producing dogs of this sort, particular care having been taken to preserve the breed in the utmost purity. They are still distinguished by the name of English Spaniels; so that, notwithstanding the derivation of the name, it is probable they are natives of Great Britain.

i. The aquatipus, or finder, was another species used in fowling; was the same with the water-sparie; and was used to find or recover the game that was shot.

k. The Melitus, or fitor, the spaniel gentle or comforter of Dr Caius (the modern lap-dog), was the laft of this division. The Maltese little dogs were as much esteemed by the fine ladies of past times as those of Bologna are among the modern. Old Hollinghead is

1. The Gratus, fit inter canes, "the first in rank among dogs;" that it was formerly esteemed so, appears from the forest-laws of King Canute, who enabled that no one under the degree of a gentleman should presume to keep a grey-hound; and still more strongly from an old Welsh saying which signifies, that "you may know a gentleman by his hawk, his horse, and his grey-hound."

Dr Caius has left, among several other traits relating to natural history, one written expressly on the species of British dogs; besides a description of the variety of dogs then existing in that country, he has added a systematical table of them, which we shall here insert, and explain by a brief account of each kind.

SYNOPSIS OF BRITISH DOGS.

Hounds. 1. The most generous kinds. 2. Dogs of chase.

- Terrier
- Harrier
- Blood-hound
- Gaze-hound
- Grey-hound
- Leviner, or Lycemer
- Tumbler
- Spaniel
- Setter
- Water-spaniel, or finder
- Spaniel gentle, or comforter
- Shepherd's dog
- Maltiff, or ban dog.
- Wappe
- Turnspit
- Dancer

1. a. The first variety is the terrarius or terrier, which takes its name from its subterraneous employ; being a small kind of hound used to force the fox or other beasts of prey out of their holes; and in former times, rabbits out of their burrows into nets.

b. The levinarious, or harrier, is a species well known at present; it derives its name from its use, that of hunting the hare; but under this head may be placed the fox-hound, which is only a stronger and fleetier variety, applied to a different chase.

c. The fanguinarius, blood-hound, or hounds of the Scots, was a dog of great use, as already noticed under the article Blood-Hound.

The next subdivision of this species of dogs comprehends those that hunt by the eye; and whose faculties depend either upon the quickness of their sight, their swiftness, or their curiosity.

d. The agfasus, or gaze-hound, was the first; it chased indifferently the fox, hare, or buck. It would seek from the herd the fairest and fairest deer; pursue it by the eye; and, if lost for a time, recover it again by its singular distinguishting faculty; nay, should the beast rejoi the herd, this dog would fix unerringly on the same. This species is now lost, or at least unknown to us.

e. The next kind is the leporarius, or gre-hound. Dr Caius informs us, that it takes its name quad præcipu
ridiculously severe on the fair of his days for their executive passion for these little animals; which is sufficient to prove that it was, in his time, a novelty. 2. The second grand division of dogs comprehends the rastris, or those that were used in the country.

a. The first species is the pajaloralis, or shepherd's dog; which is the same that is used at present, either in guarding the flocks, or in driving herds of cattle. This kind is so well trained for these purpooses as to attend to every part of the herd, be it ever so large; confine them to the road; and force in every straggler, without doing it the least injury.

b. The next is the cattedicus, or catenarius; the mastiff or fad dog; a species of great size and strength, and a very loud barker. Cain tells us that three of these were reckoned a match for a bear; and these climates, his ears are withnot doing it.

2. The second grand division of dogs comprehends of a geographical chart, preferring as much as possible, the position of the different climates to which each variety naturally belongs. The shepherd's dog, as already mentioned, is the root of the tree. This dog, when transported into Lapland, or other very cold climates, assumes an ugly appearance, and shrinks into a smaller size: but, in Russia, Iceland, and Siberia, where the climate is less rigorous, and the people more advanced in civilization, it seems to be better accomplished. These changes are occasioned solely by the influence of these climates, which produce no great alteration in the figure of this dog; for, in each of these climates, his ears are erect, his hair thick and long, his aspect wild, and he barks less frequently, and in a different manner, than in more favourable climates, where he acquires a finer polish. The Iceland dog is the only one that has not his ears entirely erect; for their extremities are a little inclined; and Iceland, of all the northern regions, has been longest inhabited by half civilized men.

The same shepherd's dog, when brought into temperate climates, and among a people perfectly civilized, as Britain, France, and Germany, would, by the mere influence of the climate, lose his savage aspect, his erect ears, his rude, thick, long hair, and assume the figure of a bull dog, the hound, and the Irish greyhound.

The bull-dog and Irish greyhound have their ears still partly erect, and very much refembl’d, both in their size, and their man! He seems to be better accommodated. The genealogical chart, or tree, of the species of dogs, in which he makes the acquaintance of the different climates, is intend’d to give an idea of their varieties as arising from a degeneration in particular climates, and from a commixture of the different races. It is constructed in the form of a geographical chart, preferring as much as possible, the position of the different climates to which each variety naturally belongs. The shepherd’s dog, as already mentioned, is the root of the tree. This dog, when transported into Lapland, or other very cold climates, assumes an ugly appearance, and shrinks into a smaller size: but, in Russia, Iceland, and Siberia, where the climate is less rigorous, and the people more advanced in civilization, it seems to be better accomplished. These changes are occasioned solely by the influence of these climates, which produce no great alteration in the figure of this dog; for, in each of these climates, his ears are erect, his hair thick and long, his aspect wild, and he barks less frequently, and in a different manner, than in more favourable climates, where he acquires a finer polish. The Iceland dog is the only one that has not his ears entirely erect; for their extremities are a little inclined; and Iceland, of all the northern regions, has been longest inhabited by half civilized men.

The hound, the harrier, and the terrier, constitute but one race; for, it has been remarked, that in the same litter, hounds, harriers, and terriers, have been brought forth, though the female hound had been covered by only one of these three dogs. I have joined the common harrier to the Dalmatian dog, or harrier of Bengal, because they differ only in having more or fewer spots on their coat. I have also linked the turnip, or terrier with crooked legs, with the common terrier; because the defect in the legs of the former has originally proceeded from a difference similar to the rickets, with which some individuals had been affected, and transmitted the deformity to their descendants.

The hound, when transported into Spain and Barbary, where all animals have fine, long, bushy hair, would be converted into the Spanish and water-dog. The great and small spaniel, which differ only in size, when brought into Britain, have changed their white colour into black, and become, by the influence of climate, the great and little King Charles's dog: To these may be joined the pyramine, which is only a King-Charles's dog, black like the others, but marked with red on the four legs, and a spot of the same colour above each eye, and on the muzzle.

The Irish greyhound, transported to the north, is become the great Dalmatian dog; and, when carried to the south, was converted into the common greyhound.
The largest grey-hounds come from the Levant, those of a smaller size from Italy; and those Italian grey-hounds, carried into Britain, have been still farther diminished.

The great Danish dog, transported into Ireland, the Ukraine, Tartary, Epirus, and Albania, has been changed into the Irish grey-hound, which is the largest of all dogs.

The bull-dog, transported from Britain to Denmark, is become the little Danish dog; and the latter, brought into warm climates, has been converted into the Turkish dog. All these races, with their varieties, have been produced by the influence of climate, joined to the effects of shelter, food, and education. The other dogs are not pure races, but have proceeded from mixtures of those already described. I have marked, in the table, by dotted lines, those which form a pure race with a mongrel.

The grey-hound and Irish grey-hound have produced the mongrel grey-hound, called also the grey-hound with wolf's hair. The muzzle of this mongrel is less refined to the head than that of the true grey-hound, which is very rare in France.

The great Danish dog and the large spaniel have produced the Calabrian dog, which is a beautiful animal, with long bushy hair, and larger than the Irish grey-hound.

The spaniel and terrier have produced the dog called berger.

From the spaniel and little Danish dog has proceeded the lion-dog, which is now very rare.

The dogs with long, fine, crisp red hair, called the bouffe dogs, and which are larger than the water-dog, proceed from the spaniel and water-dog.

The little water-dog comes from the water-dog and small spaniel.

From the bull-dog and Irish grey-hound proceeds a mongrel called the mastiff, which is larger than the bull-dog, and resembles the latter more than the Irish grey-hound.

The pug-dog proceeds from the bull-dog and small Danish dog.

All these dogs are simple mongrels, and are produced by the commixture of two pure races. But there are other dogs, called double mongrels, because they proceed from the junction of a pure race with a mongrel. The bullard pug-dog is a double mongrel from a mixture of the pug-dog with the little Danish dog. The Alicant dog is also a double mongrel, proceeding from the pug-dog and small spaniel. The Maltese, or lap-dog, is a double mongrel, produced between the small spaniel and little water-dog.

Lastly, there are dogs which may be called triple mongrels, because they are produced by two mixed races. Of this kind are the Artois and officer dogs, which are produced by the pug-dog and the bullard pug-dog; to which may be added the dogs called street-dogs, which resemble no particular kind, because they proceed from races which have previously been several times mixed.

The following is a systematic catalogue of all the known dogs, as arranged by Mr. Pennant in his History of Quadrupeds:

1. Shepherd's dog (Canis domesticus, Lin. Le Chien de Berger, Buff.); so called, because it becomes without discipline almost infamously the guardian of the flocks, keeps them within bounds, reduces the stragglers to their proper limits, and defends them from the attacks of the wolves. They have that variety in England, but it is small and weak. It is the natural of Canis abovementioned. Those of France and the Alps are very large and strong; sharp-nosed; erect and sharp eared; very hairy, especially about the neck; and have their tails turned up or curled; and by accident their faces often show the marks of their combats with the wolf.

Its varieties or nearest allies are: a, Pomeranian dog, a, Siberian dog. The other varieties in the inland parts of the empire and Siberia noticed by Buffon, are chiefly from the shepherd's dog; and there is a high-limbed taper-bodied kind, the common dog of the Cilcme and independent Tartars, excellent for the chase and all uses.

2. The hound, or dog with long, smooth, and pendulous ears. This is the same with the blood-hound in Cains's Table, (Le Chien courant, Buff. Canis fagax, Lin.) It is the head of the other kinds with smooth hanging ears. a, Harrier; b, Dalmatian, vulgarly called the Danish, a beautiful pointed dog; c, Terrier; d, Water dog, great and small.

From this stock branches out another race with pendant ears, covered with long hairs, and less in size; which form,

3. The Spaniel; (Canis avicularius, Lin.) Those of this kind vary in size from the setting dog to the springing spaniels, and some of the little lap-dogs; as, a, King Charles's. Charles II. never went out except attended by numbers of this kind. b, Le pyrane of Buffon. For this sort, though common in Britain, there is no English name. It is black, marked on the legs with red, and having a spot of the same colour above each eye. c, The Shock-dog.

4. Dogs with short pendant ears, and long legs and bodies; as,

a, Irish grey-hound; (le Matin, Buff.): a variety once very frequent in Ireland, and used in the chase of the wolf; now very scarce. Probably the same with the leviner in Cain's Table, described above.

b, Common grey-hound, described above under Cain's Table; (Le Louvier et Schreber, Buff. Canis graius, Lin.) Its varieties are, 1. Italian grey-hound, small and smooth.

2. Oriental grey-hound, tall, slender, with very pendulous ears, and very long hairs on the tail hanging down a great length.

c, Danish dog, of a stronger make than a grey-hound: the largest of dogs; (le Grand Danis, Buff.) Mr. Pennant thinks it probable, that this kind were the dogs of Epirus, mentioned by Aritoteles, lib. iii. c. 21.; or those of Albania, the modern Schirwan or East Georgia, so beautifully described by Pliney, lib. viii. c. 40. Perhaps to this head may be referred the vast dogs of Thibet, said by Marco Paolo to be as big as asses, and used in that country to take wild beasts, and especially the wild oxen called Beymami.

d, Maltiff, (le Dogue de forte race, Buff. Canis moloDius, Lin.) Very strong and thick made; the head large; the lips great, and hanging down on each side: a fine and noble countenance; grows to a great size: A British kind. See above under Dr. Cain's Table.

5. Dogs with short pendant ears, short compact bodies,


bodies, short noses, and generally short legs. a, Bulldog (le Dogue, Buff.), with a short nose, and under jaw longer than the upper: a cruel and very fierce kind, often biting before it barks; peculiar to England; the breed is rarer than has been since the barbarous custom of bull-baiting has declined. b, Pug-dog, (le Dogue, Buff.): A small species; an innocent resem­blance of the last. c, Baflard pug, (le Roquet, Buff.): A degenerate species with naked bodies; having lost their hair by the heat of climate.

Dogs are found in the Society islands, New Zealand, and the Low islands; there are also a few in New Holland. Of these are two varieties:

a, Resembling the sharp-nosed pricked-ear shepherd's cur. Tho'f of New Zealand are of the largest fort. In the Society islands they are the common food, and are fattened with vegetables, which the natives cram down their throats as fish are steamed, and baked for the table. They grow very fat, and are allowed, even by Europeans who have got there, to procure a puke, he eats the leaves of the quicken- 
grafs, the bearded wheat-grafts, or the rough cock's-foot graps, which gives him immediate relief. When he steals a piece of flesh, as conscious of the immorality of the action, he runs off with his tail hanging and bent in betwixt his feet.

His drink is water, which he takes in small quantities at a time, by licking with his tongue. He is in some measure obliged to lick in this manner, otherwise his nose would be immersed in the water.

His excrements are generally hard foyals, which, especially after eating bones, are white, and go by the name of album graecum among physicians. This album graecum was for a long time in great repute as a septic; but it is now entirely disregarded. He does not throw out his excrements promiscuously upon every thing that happens to be in the way, but upon flones, trunks of trees, or barren places. This is a wife institution of nature; for the excrements of a dog destroy almost every vegetable or animal substance. They are of such a putrid nature, that if a man's shoe touches them when recently expelled, that particular part will rot in a few days. He observes the same method in making his urine, which he throws out at a side. It is remark­able, that a dog will not pass a flone or a wall, against which any other dog has pissed, without following his example, although a hundred should occur in a few minutes, in so much that it is astonishing how such a quantity can be secreted in so short a time.

The dog is an animal not only of quick motion, but remarkable for travelling very long journeys. He can easily keep up with his master, either on foot or horse-back, for a whole day. When fatigued, he does not sweat, but lolls out his tongue. Every kind of dog can swim; but the water-dog excels in that article.

The dog runs round when about to lie down, in order to discover the most proper situation. He lies gen­erally on his breast, with his head turned to one side, and sometimes with his head above his two fore-feet. He sleeps little, and even that does not seem to be very quiet: for he often start, and seems to hear with more acuteff in sleep than when awake. They have a tremulous motion in sleep, frequently move their legs, and bark, which is an indication of dream­ing.

Dogs are possessed of the sensation of smelling in a high degree. They can trace their master by the smell of his feet in a church, or in the streets of a populous city. This sensation is not equally strong in every kind. The hound can trace game, or his master's steps, 24 hours afterwards. He barks more furiously the nearer he approaches the fowls, unless he be beat and trained to silence.

The dog eats enviously, with oblique eyes; is an enemy to beggars; bites at a fow as it is; is fond of licking wounds; howls at certain notes in music, and often urines on hearing them.

With regard to the propagation of dogs, the females admit the males before they are 12 months old. They remain in season 10, 12, or even 15 days, during which time they will admit a variety males. They come in season generally twice in the year, and more fre­quently in the cold than in the hot months. The male discovers the condition of the female by the smell; but the feldom admits him the first six or seven days. One
coitus will make her conceive a great number of young; but, when not restrained, she will admit several dogs every day: this seems to have no choice or predilection, except in favour of large dogs: from this circumstance it sometimes happens, that a small female, who has admitted a matrif, periplies in bringing forth her young. During the time of copulation, these animals cannot separate themselves, but remain united so long as the erection subsists. His is owing to the structure of the parts. The dog has not only a bone in his penis, but in the middle of the corpus cavernosum there is a large hollow, which is blown up in the time of erection to a considerable bulk. The female, on the other hand, has a larger clitoris than perhaps any other animal: besides, a large firm protuberance rises in the time of copulation, and remains perhaps longer than that of the male, and prevents him from retracting till it subsides: accordingly, after the act of copulation is over, the male turns about in order to rest himself on his legs, and remains in that position till the parts turn scabrous. The female goes with young about nine weeks. They generally bring forth from six to twelve puppies. Those of a small size bring forth five, four, and sometimes but two. They continue to copulate and bring forth during life, which lasts generally about 14 or 15 years. The whelps are commonly blind, and cannot open their eyes till the 10th or 12th day: the males are like the dog, the females like the bitch. In the fourth month, they lose some of their teeth, which are soon succeeded by others.

The dog has such a strong resemblance to the wolf and the fox, that he is commonly supposed to be the production of one or other of these animals tamed and civilized. Buffon informs us, that he kept a young dog and a young wolf together till they were three years of age, without their discovering the least inclination to copulate. He made the same experiment upon a dog and a fox; but their antipathy was rather increased when the female was in season. From these experiments he concludes, that dogs, wolves, and foxes, are perfectly distinct genera of animals. There has, however, been lately an instance to the contrary: Mr. Brooke, animal-merchant in Holborn, turned a wolf to a Pomeranian bitch in heat; the congrés was immediate, and as usual between dog and bitch: the production was ten puppies. Mr. Brooke was informed by a gentleman at Gordon Castle, that he had very much the resemblance of a wolf, and also much of its nature; being dipp’d at a weak deer, it instantly caught at the animal’s throat and killed it. “I could not learn (says Mr. Pennant) whether this mongrel continued its species; but another of the same kind did, and stocked the neighbourhood of Fochabers, in the county of Moray (where it was kept), with a multitude of cubs of a most wolfish aspect. — There was lately living a mongrel offspring of this kind. It greatly resembled its wolf parent. It was first the property of Sir Woltein Dixey; afterwards of Sir Willoughby Aiton. During day it was very tame; but at night sometimes relapsed into ferocity. It never barked, but rather howled; when it came into fields where sheep were it would feign lameness, but if no one was present would instantly attack them. It had been seen in copulation with a bitch, which afterwards panned: the breed was imagined to resemble in many respects the supposed fire. It died between the age of five and six.—The bitch will also breed with the fox. The woodman of the manor of Monewell, in Oxfordshire, has a bitch, which constantly follows him, the offspring of a tame dog-fox by a shepherd’s cur, and the again has had puppies by a dog. Since there are such authentic proofs of the further continuance of the breed, we may surely add the wolf and fox to the other supposed stocks of those faithful domestics.”

With regard to the natural disposition of the dog: in a savage state, he is fierce, cruel, and voracious; but, when civilized and accustomed to live with men, he is polished of every amiable quality. He seems to have no other desire than to please and protect his master. He is gentle, obedient, submissive, and faithful. These dispositions, joined to his almost unbounded sagacity, justly claim the esteem of mankind. Accordingly no animal is so much cherished and respected: he is to ducile, and so much formed to please, that he assumes the very air and temper of the family in which he resides.

An animal endowed with such uncommon qualities must answer many useful purposes. His fidelity and vigilance are daily employed to protect our persons, our flock, or our goods. The acuteness of his smell gains him employment in hunting: he is frequently employed as a turnspit: at Brussels and in Holland he is trained to draw little carts to the herb-market; and in the northern regions draws a sledge with his master in it, or laden with provisions. The Kamchatkans, Equimaux, and Greenlanders, strangers to the fadder virtues, treat these poor animals with great neglect. The former, during summer, the season in which they have greatest numbers, are fed with fish bones and spise, i.e. putrid fish preserved in pits, and served up to them mixed with hot water. Those used for draught are castrated; and four, yoked to the carriage, will draw five loads, or a hundred and ninety English pounds, besides the driver; and thus laden, will travel 100 versts, or 20 miles a-day; or if unloaded, can be sent by water in four days over the Lena and Yenisei rivers. Its use in war is great; it is turned against its master, so as to be as useful as possible to the enemy. The Kamchatkans make use of the skins of dogs for clothing, and the long hair for ornament: some nations are fond of them as a food, and reckon a fat dog a great delicacy. Both the African and American savages use these animals in sacrifices to their gods, to bespeak favour or avert evil. When the Kossik dreads any infection, they kill a dog, wind the intestines round two poles, and pass between them.
The Greenlanders are not better masters. They leave their dogs to feed on muckle or berries; unless in a great capture of seals, when they treat them with the blood and garbage. These people also sometimes eat their dogs; use the skins for coverlets, for clothing, or to border and seam their habits; and their belt thread is made of the guts. These northern dogs in general are large; and in the frigid parts at least have the appearance of wolves; are usually white, with a black face; sometimes varied with black and white, sometimes all white; rarely brown or all black: have sharp noses, thick hair, and short ears; and seldom bark, but set up a sort of growl or savage howl. They sleep abroad; and make a lodge in the snow, lying with only their noses out. They swim most excellent; and will hunt in packs the ptarmigan, arctic fox, polar bear, and seals lying on the ice. The natives sometimes use them in the chase of the bear. They eat their dogs; leave the ice sharp sometimes all white; rarely brown or all black: have their furs. Hudson's bay make use of the wolfish kind to draw their carriages.

Hudfon's bay make use of the wolfish kind to draw their carriages.

They will fight among themselves even to death. Egede says that they will travel over the ice fifteen German miles in a day, or sixty English, with sledges loaded with their masters and five or six large seals.

Those of the neighbouring island of Iceland have a great resemblance to them. As to those of Newfoundland, it is not certain that there is any distinct breed: most of them are curs, with a crook of the maififf: some will, and others will not, take the water; absolutely refusing to go in. The country was found uninhabited, which makes it more probable that they were introduced by the Europeans, who use them, as the factory does in Hudson's bay, to draw firing from the woods to the forts. The ravages which they make in the bay are of the wilful kind to draw their furs.

It is singular, that the race of European dogs show as strong an antipathy to this American species as they do to the wolf itself. They never meet with them, but they shew all possible signs of dislike, and will fall on and worry them: while the wolfish breed, with every mark of timidity, puts its tail between its legs, and runs from the rage of the others. This aversion to the wolf is natural to all genuine dogs; for it is well known that a whelp, which has never seen a wolf, will at first fight tremble, and run to its master for protection: an old dog will instantly attack it. Yet these animals may be made to breed with one another as above shown: and the following abstract of a letter from Dr Pallas to Mr Pennant, dated October 5th 1781, affords a further confirmation of the fact. "I have seen at Moscow about twenty splendid animals from dogs and black wolves. They are for the most part like wolves, except that some carry their tails higher, and have a kind of hoarse barking. They multiply among themselves: and some of the whelps are greyish, rufy, or even of the whitish hue of the arctic wolves: and one of those I saw, in shape, tail, and hair, and even in barking, so like a cur, that was it not for his head and ears, his ill-natured look, and fearfulness at the approach of man, I should hardly have believed it was of the same breed."

The dog is liable to many diseases, as the feb, madness, &c. and he seldom wants the tænia, or tape-worm in his guts, especially if he drinks dirty water.

II. The second species of this genus is the Lupus, The Wolf, or Wolf. He has a long head, pointed nose, ears erect and sharp, long legs, well clothed with hair, tail bushy and bending down, with the tip black; head and neck all coloured; body generally pale brown tinged with yellow; sometimes round white, and sometimes entirely black. The wolf is larger and terror than a dog. His eyes sparkle, and there is a great degree of fury and wildness in his looks. He draws up his claws when he walks, to prevent his tread from being heard. His neck is short, but admits of very quick motion to either side. His teeth are large and sharp; and his bite is terrible, as his strength is great. The wolf, cruel, but cowardly and voluptuous, sties from man; and seldom ventures out of the woods, except prodded by hunger: but when this becomes extreme, he braces danger, and will attack men, horses, dogs, and cattle of all kinds; even the graves of the dead are not proof against his rapacity. These circumstances are finely describ'd, in the following lines:

By wintry famine rous'd,
Cruel as death, and hungry as the grave!
Burning for blood! bony, and ghastly, and grim!
Assembling wolves in raging troops to descend;
And, pouring o'er the country, bear along,
Keen as the north-wind sweeps the gladly frow.
All is their prize. They stilet on the feed,
Prey but him to earth, and pierce his mighty heart.
Nor can the bull his awful front defend,
Or shake the murthering fawages away,
Rapacious at the mother's throat they prey,
And tear the screaming infant from her breast.
The god like face of man avails him nought.
Even beauty, force divine! at w'hole bright glance

The generous lion fronds in soften'd gaze,
On church yards drear (inhuman to relate!)
The disappointed prowlers fall, and dig
The shrouded body from the grave: o'er which,
Mix'd with foul shades and frighted ghshes, they howl.

Thomson's Winter.

The wolf, unlike the dog, is an enemy to all society, and keeps no company even with those of his own species. When several wolves appear together, it is not a society of peace, but of war: it is attended with tumult and dreadful prowlings, and indicates an attack upon some large animal, as a flag, an ox, or a formidable mastiff. This military expedition is no sooner finished, than they separate, and each returns in silence to his solitude. There is even little intercourse between the males and females: They feel the mutual attractions of love but once a-year, and never remain long together. The females come in season: many males follow the same female, and this affection is more bloody than the former; for they growl, chafe, fight, and tear one another, and often sacrifice
The female commonly lives a long time, fatigues her admirers, and retires, while they sleep, with the most alert or most favourite male.

They adhere to the female only when they wish to copulate, and when the female is ready to bring forth. When the females are about to bring forth, they copulate again, and have an offensive penis, which are generally five or six inches long, and, when erected, look like the horns of a ram. When first brought to them, they are often overpowered with terror, that he may be either killed or taken alive without resistance: he allows himself to be chained, muzzled, and led where you please, without exhibiting the least symptom of resentment or discontent.

The sense of smell of the wolf are excellent, but particularly his sense of hearing, which often extends farther than his eye. The sound of carriage strikes him at the distance of more than a league. He likewise scents live animals very far, and hunts them a long time by following their track. When he scents the wood, he never loses the wind. He flies upon the borders of the forest, smells on all sides, and receives the emanation of the dead animals; yet he devours the most putrid carcasses. He is fond of human flesh; and, if stronger, he would perhaps eat no other. Wolves have been known to follow armies, to come in troops to the field of battle where bodies are carelessly interred, to tear them up, and to devour them with an insatiable avidity: and, when once accustomed to human flesh, these wolves ever after attack men, prefer the shepherd to the flock, devour women, and carry off children. Wolves of this vicious disposition are called loups garous by the French peasants, who suppose them to be possessed with some evil spirit; and of this nature were the wulf of the old Saxons.

The wolf inhabits the continents of Europe, Asia, Africa, and America, Kamtchaka, and even as high as the Arctic Circle. The wolves of north America, are the smallest; and, when reclaimed, are the dogs of the natives: the wolves of Senegal the largest and fiercest; they prey in company with the lion. Tho' of the Cape are grey striped with black; others are black.—They are found in Africa as low as the Cape; and are believed to inhabit New Holland, animals resembling them having been seen there by the late circumnavigators. Dampier's people also saw some half-starved animals in the same country, which they supposed to be wolves. In the east, and particularly in Persia, wolves are exhibited as spectacles to the people. When young, they are learned to dance, or rather to perform a kind of wrestling with a number of men. Charlin tells us, that a wolf, well educated in dancing, is sold at 500 French crowns. This fact proves, that these animals, by time and restraint, are susceptible of some kind of education. M. Buffon brought up several of them: "When young, or during their first year (he informs us), they are very docile, and even carefull; and, if well fed, neither disturb the poultry or any other animal: but, at the age of three months or two years, their natural ferocity appears, and they must be chained, to prevent them from running off and doing mischief. I brought up one till the age of 18 or 19 months, in a court along with fowls, none of which he ever attacked; but for his first day, he killed the whole in one night, with-
J cryef did fome years ago allow a
elans. A young, old, and very old. They know them by the
tracks of their feet. The older the wolf, his feet is
the larger. The file-wolf’s feet are longer and more
flender; her heel is also thinner, and her toes thinner.
A good blood-hound is necessary for hunting the wolf:
and, when he falls into the fcent, he must be coaxed
and encouraged: for all dogs have an aversion from the
wolf, and proceed with coldness in the chase.
When the wolf is raised, the gre-hounds are let
loose in pairs, and one is kept for dilobging him, if
he gets under cover; the other dogs are led before as
a reserve. The first pair are let loose after the wolf,
and are supported by a man on horse-back; then the
second pair are let loose, at the distance of seven or
eight hundred paces; and, laftly, the third pair, when
the other dogs begin to join and to tease the wolf.
The whole together foon reduce him to the left extre­
mit y; and the hunters complete the bufines by flab­
bing him with a dagger. The dogs have fuch a re­
tance to the wolf’s fcent, that it must be prepared and
feafoned before they will eat it. The wolf may also
be hunted with beagles or hounds; but as he darts
always straight forward, and runs for a whole day
without fopping, the chance is irkifome, unlefs the
beagles be supported by grey-hounds, to tease him,
and give the hounds time to come up.

Wolves are now fo rare in the populated parts of
America, that the inhabitants leave their theep the
whole night unguarded; yet the government of Penn­
sylvania and New-Jersey did fome years ago allow a
reward of twenty thillings, and the laft even thirty
thillings for the killing of every wolf. Tradition in­
fomed them what a favage fhote animals had been
in the colonies, f0 they wifely determined to prevent the
like evil. In their infancy, wolves came down in multitudes from the mountains, often attracted by the
fmell of the corpfe of hundreds of Indians, who
died of the small-pox, brought among them by the
Europeans. The animals did not confine their
attacks to the dead, but even devoured in their holes the
fick and dying fpecies.

Before being hunted, wolves are destroyed by pit­
falls, traps, or poiison. A peafant in France who kills
a wolf, carries its head from village to village, and
collects fome small reward from the inhabitants: the
Kirgis-Collacks take the wolves by the help of a large
hawk called berikut, which is trained for the divifion,
and will fatten on them and tear out their eyes. Brit­
ain, a few centuries ago, was much infected by them. It
was, as appears by Hollinghed, very noxious to the
flocks in Scotland in 1577; nor was it entirely extir­
pated till about 1650, when the left wolf fell by the
hand of the famous Sir Ewen Cameron. We may
therefore with confidence affirm the non-exifence of
these animals, notwithstanding M. de Buffon maintains
that the English pretend to the contrary. It has
been a received opinion, that the other parts of
Britain were in early times delivered from this peft
by the care of king Edgar. In England he attempted
to effec t it, by commuting the punishments of certain
crimes into the acceptance of a certain number of wolves
tongues from each criminal; and in Wales by con­
turining the tax of gold and silver into an annual tax
of 300 wolves heads. But, notwithstanding these his
endeavours, and the affections of some authors, his
scheme proved abortive. We find, that fome cen­
turies after the reign of that Saxon monarch, these
animals were again increafed to fuch a degree as to
become again the objec t of royal attention: ac­
cordingly Edward I. iffued out his royal mandate to Pe­
ter Corbet to superintend and affift in the de­
struction of them in the feveral counties of Gloucef­
fter, Worcelfter, Hereford, Salop, and Stafford; and in
the afjcndant county of Derby (as Cambiden, p. 902,
inform us), certain perfon$ at Wormhill held their
lands by the duty of hunting and taking the wolves
that infected the country, whence they were fty­
led wofe-bunt. To look back into the Saxon times,
we find, that in Athelstan’s reign wolves abounded to
in Yorkshire, that a retreat was built at Flixton, in
that county, “to defend fengers from the wolves,
that they should not be devoured by them,” and that
the ravages did those animals make during winter, par­
ticularly in January, when the cold was feverest, that
the Saxons diftinguifhed that month by the name of
the wolf-month. They alfo called an outlaw wolf’s-head,
as being out of the protection of the law, profcribed,
and as liable to be killed as that deftructive beast.
Ireland was infected by wolves for many centuries after
their extinction in England; for there are accounts of
fome being found there as late as the year 1710, the
laft pretention for killing of wolves being made in the
county of Cork about that time.

In many parts of Sweden the number of wolves has
been considerably diminished by placing poisoned car­
cakes in their way: but in other places they are found
in great multitudes. Hunger fometimes compels them to
eat lichens; fhote vegetables were found in the
body of one killed by a foldier; but it was fo weak,
that it could scarcely move. It probably had fed on
the lichen vulpinus, which is a known poiion to fhote
animals. Madness, in certain years, is apt to feize
the wolf. The confquences are often very me­
lancholy. Mad wolves will bite hogs and dogs, and
the laft again the human fpecies. In a single parish
34 perfon$ were victims to this dreadful malady.
The fhoms are the fame with thole attendant on the
bite of a mad dog. Fury sparkles in their eyes; a glu­
tinous saliva diﬄus from their mouths; they carry their
tails low, and bite indifferently men and bees. It
is remarkable that this disease happens in the depth of
winter, fo can never be attributed to the rage of
the dog-days. Often towards spring, wolves get upon
the ice of the sea, to prey upon the young feals, which
they catch alike: but this repulf often proves fatal to
them; for the ice, detached from the shore, carries
them to a great distance from land, before they are
feafible of it. In some feas a large district is by this
means delivered from thofe pernicious bees; which
are heard howling in a moft dreadful manner, far in
the fea. When wolves come to make their attack on
a castle, they never fail attempting to frighten away the
men by their cries; but the found of the horn makes
them flying like lightning.

There is nothing valuable in the wolf but his skin
which
Hyæna.

able; his odour makes them know it is.

He vomits frequently, and emits himself oftener than he fills. In time, the wolf is conterminously disagreeable; his aspect is base and savage, his voice dreadful, his odour intolerable, his disposition perverse, his manners furious, odious and destractive when living; and, when dead, he is perfectly useless.

III. The Hyæna has a straight jointed tail, with the hair of its neck erect, small naked ears, and four toes on each foot. It inhabits Caucasian Turkey, Syria, Per
dia, and Barbary. Like the jackal, it violates the tombs of the dead, and greedily devours the putrid contents of the grave; like it, preys on the herds and flocks; yet for want of other food, will eat the roots of plants, and the tender shoots of the palms: but, contrary to the nature of the former, it is an un
fhociable animal; is solitary, and inhabits the chafins of the rocks. The superstitious Arabs, when they kill one, carefully bury the head, lest it should be employed for magical purposes; as the neck was of old by the Thelkalian forcers.

Viccra non lynx, non dix nodus hyæna.

Defunt.

Lucan, vi. 672.

The ancients were wild in their opinion of the hyæna; they believed that its head consisted of one bone without any joint; that it changed its sex; imitated the human voice; had the power of charming the shepherds, and, as it were, rivetting them to the place they stood on: no wonder that an ignorant Arab should attribute preternatural powers to its remains. They are cruel, fierce, and untameable animals, of a rage which will make them face stronger quadrupeds than themselves. Kempter relates, that he saw one which had put two lions to flight, regarding them with the utmost coolness. Their voice is hoarse, a disagreeable mixture of growling and roaring.

Mr Pennant describes a variety of this species, undistinguished by former naturalists which he calls the spotted hyæna. It has a large and flat head; some long hairs above each eye; very long whiskers on each side of the nose; a short black mane, hair on the body short and smooth; ears short and a little pointed, their outside black, inside cinereous; face and upper part of the head black; body and limbs reddish brown, marked with distinct black round spots; the hind legs with black transverse bars; the tail short, black, and full of hair. It inhabits Guinea, Ethiopia, and the Cape; lives in holes in the earth, or cliffs of the rocks; preys by night; howls horribly; breaks into the folds, and kills two or three sheep; devours as much as it can, and carries away one for a future repast; will attack mankind, scrape open graves, and devour the dead. Bofman has given this creature the name of jackal; by which Buffon being misled, makes it synonymous with the common jackal. This hyæna is called the tiger

wolf by the colonists at the Cape, where it is a very common and formidable beast of prey. Of this ani

mal, formerly but imperfectly known, the following account is given by Dr Sparrmann in his voyage to the Cape.

"The night, or the dusk of the evening only, is the time in which these animals seek their prey, after which they are used to roam about both separately and in flocks. But one of the most unfortunate properties of this creature is that it cannot keep its own counsel. The language of it cannot easily be taken down upon paper: however, with a view to make this species of wolf better known than it has been hitherto, I shall relate, that it is in many of its found something like the following, audac, and sometimes ooto, yelled out with a tone of despair (at the interval of some minutes between each howl), that nature obliges this, the most voracious animal in all Africa, to discover itself, just as it does the most venomous of all the American serpents, by the rattle in its tail, itself, to warn every one to avoid its mortal bite. This same rattle

howse would seem, in consequence of thus betraying its own delights, and of its great inactivity (to be as it were nature's leg child), if, according to many credible accounts, it had not the wondrous property of charming its prey by fixing its eye upon it. Its like is affirmed also of the tiger-wolf. This creature, it is true, is obliged to give information against itself; but, on the other hand, it is actually possessed of the peculiar gift of being enabled, in some measure, to imitate the cries of other animals; by which means this arch-deceiver is sometimes lucky enough to beguile and attract calves, foals, lambs, and other animals. Near some of the larger farms, where there is a great deal of cattle, this ravenous beast is to be found almost every night; and at the same time frequently from one hour to another betraying itself by its howlings, gives the dogs the alarm. The pearsaffs assured me, that the cunning of the wolves was so great (adding, that the trick had now and then even succeeded with some of them), that a party of them, half flying and half defending themselves, would employ the whole pack of dogs to follow them to the distance of a gun-shot or two from the farm, with a view to give an opportunity to the rest of the wolves to come out from their ambuscade, and, without meeting with the least resistance, carry off booty sufficient for themselves and their fugitive brethren. As the tiger-wolf, though a much larger and stronger animal, does not venture, without being driven to the utmost necessity, to measure its strength with the common dog, this is certainly an evident proof of its cowardice. Neither does this same voracious beast dare openly to attack oxen, cows, horse, or any of the large animals, while they make the least appearance as if they would defend themselves, or even as long as they do not betray any signs of fear. On the other hand, it has art enough to rush in upon them suddenly and unexpectedly, at the same time setting up a horrid and strange cry, so as to let them have a running in consequence of the fright, that it may afterwards keep close to their heels with safety, till it has an opportunity with one bite or stroke to rip up the belly of its prey (even though it should be so large an animal as a draught ox), or else give it some dangerous bite, and so at one single blow make itself master of its antagonist. On this account the peasants are obliged to drive their cattle home every evening, for it
it is dark, excepting the more considerable droves of
draught oxen, which they let roam about day
and night to seek their food unattended, by reason that
they are used both to the country and the artifices of
the wolves, and can therefore the easier depend upon
and defend each other.

"Travellers, on the other hand, who are obliged to
keep on in their journey, frequently suffer great losses
by turning their cattle out at night; especially of
the young ones, which are easiest feared. The Hotentots
informed me that it was still within the memory of
man, that the tiger-wolf was bold enough to steal
upon them and molest them in their huts, particularly
by carrying off their children. This, however, is now
no longer the case; a circumstance, perhaps, proceeding
from the introduction of fire-arms into the coun-
try, a circumstance, which in these latter times, has
caulked this, as well as other wild beasts, to stand in
greater awe of man than it did formerly. I have heard
the following story of the tiger-wolf mentioned, as be-
ing related in a certain treatise on the Cape, of which
I now cannot exactly remember the title. The tale is
laughable enough, though perhaps not quite so pro-
bable. "At a feast near the Cape one night, a trum-
peter who had got his fill was carried out of doors in
order that he might cool himself, and get sober again.
The scent of him soon drew thither a tiger-wolf, which
threw him on his back, and dragged him along with
him as a corse, and consequently a fair prize, up to-
wards Table-mountain. During this, however, our
drunken musician waked, enough in his senses to know
the danger of his situation, and to sound the alarm
with his trumpet, which he carried fastened to his side.
The wild beast, as may easily be supposed, was not
less frightened in his turn. Any other besides a trum-
peter would, in such circumstances, have undoubtedly
been no better than wolf's meat.

In the mean while it is certain, that these wolves are
to be found almost every dark night about the
farms at the Cape, where they devour the offals of
bones, fish, &c. which are thrown out there in great
quantities, and drag away with them what they cannot
eat. The inhabitants repay these good offices of the
hyæna with fire and unlimited privileges of entry and
egres. The dogs too hereabouts, perfectly accustomed
to their company, are said never to throw any
impe-
diment in their way; so that the beast, entertained
and fed in the very heart of the town, has been seldom
known to do any mischief there. It is likewise a well-
known fact, that these wolves in different parts of
Africa, exhibit different degrees of courage; this,
however, may perhaps proceed from their being of dif-
ferent species in different parts.

"Yet in this very greediness of the hyæna, and its
disposition to confume every thing it can get at, the
provident economy of nature is abundantly evinced.
The flowery fields at the Cape would certainly soon
become hideous and disfigured with carcases and skele-
tous, the relics of the great quantity of game of all
sorts which graze and die there in Succession, were not
the tiger-wolf manifestly subservient to nature in
the regulation of her police, by clearing her theatre from
them; nay, I had almost said the wolf alone; for
lions and tigers, for example, never eat bones, and are
not very fond of carcases. These are serviceable in
another way. They make the other animals vigilant
and attentive to the functions for which nature has de-
signed them; and besides answering several other in-
tentions of Providence, they serve, in conjunction with
mankind, to keep in a just equilibrium the increase of
the animal kingdom; so that it may not exceed the
supplies afforded by it the vegetable part of the cre-
ation, and by this means prevent the necessary removal
of the latter by feeds, &c. and thus by desolating it
and laying it waste, in the end impoverish and de-
stroy themselves, and die most wretchedly in hunger;
so that, notwithstanding the immense quantities of
game existing in this country, there are very
feddom found any bones in the humps they have left,
and never after the tiger, lion, jackal, wild cat,
and wild dog. These latter animals, that they may not
cumber and litter the ground which nature has or-
dained them to clear, never go out of their dens and
ravens when they find themselves sick and disabled;
but there, opposed with hunger and disease, await
the transitory moment, when they must pay obedience
to nature's last law."

IV. The MEXICANUS has a smooth, crooked tail. The Mexi-
can wolf is also called the mountain-cat by Seba. It agrees with the European wolf in its
manners, attacks cattle, and sometimes men.

V. THE Vulpes, or Fox, has a straight tail, white at the Fox.
grant to the point. His body is yellowish, or rather straw-
coiled; his ears are small and erect; his hips are whit-
ish, and his forehead black. From the base of the tail
a strong scent is emitted, which to some people is very
fragrant, and to others extremely disagreeable.
The fox is a native of almost every quarter of the globe, and
is if such a wild and savage nature that it is impossible
fully to tame him. He is esteemed to be the most
fugacious and the most crafty of all beasts of prey.
The former quality he shows in his method of pro-
viding himself with an asylum, where he retires from
perilling dangers, here he dwells, and where he brings
up his young; and his craftiness is chiefly discovered
by the schemes he falls upon in order to catch lambs,
geese, hens, and all kinds of small birds. The fox fixes
its abode on the borders of dry streams and waters,
and in the neighbourhood of cottages; he lurks near the
fowling of cocks, in the crowing of the poultry.
He scents them at a distance; he chooses his time with judgment; he conceals his
road as well as his design; he slips forward with cau-
tion, sometimes even trailing his body, and seldom
makes a fruitless expedition. If he can leap the wall,
or get in, he ravages the court-yard, cuts all to death,
and then retires softly with his prey, which he either hides under the herbage, or carries off
to his kennel. He returns in a few minutes for an-
other, which he carries off, or conceals in the same
manner, but in a different place. In this way he pro-
ceeds till the progress of the sun, or some movements
perceived in the house, advertise him that it is time to
suspend his operations, and to retire to his den. He
plays the same game with the catchers of thrushes,
woodcocks, &c. He visits the nests and bird-lime very
close in the morning, carries of successively the birds
which are entangled, and lays them in different places,
especially near the sides of high-ways, in the furrows,
under the herbage or bush wood, where they sometimes
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**Canis**

The two or three days; but he knows perfectly where to find them when he is in need. He hunts the young hares in the plains, seizes the old ones in their lairs, never misfires those which are wounded, digs out the rabbits in the warrens, disfavors the nests of partridges and quails, seizes the mothers on the eggs, and destroys a vast quantity of game. The fox is exceedingly voracious; besides feets of all kinds, he eats with equal avidity, eggs, milk, cheese, fruits, and particularly grapes. When the young hares and partridges fall him, he makes war against rats, field-mice, serpents, lizards, toads, &c. Of these he destroys vast numbers; and this is the only service he does to mankind. He is so fond of honey, that he attacks the wild bees, wasps, and hornets. They at first put him to flight by a thousand flings; but he retires only for the purpose of rolling himself on the ground to cruel them; and he returns to it often to the charge, that he obliges them to abandon the hive, which he soon uncovers, and devours both the honey and wax. In a word, he eats fishes, lobsters, grass hoppers, &c.

The fox is not easily and never fully tamed; he languishes when deprived of liberty; and if kept too long in a domestic state, he dies of chagrin. Foxes produce but once a year; and the litter commonly consists of four or five, seldom six, and never less than three. When the female is full, the litter retires, and seldom goes out of her hole, where she prepares a bed for her young. She comes in season in the winter; and young foxes are born in the month of April. When the perceives that her retreat is discovered, and that her young have been disturbed, she carries them off by one, and goes in search of another habitation. The young are brought forth blind; like the dogs, they grow 18 months or two years, and live 13 or 14 years.—The fox, as well as the generous wolf, will produce with the dog-kind, as noticed above.

The fences of the fox are equally good as those of the wolf; his sentience is more delicate; and the organs of his voice are more pliant and perfect. The wolf sends forth only frightful howlings; but the fox barks, yelps, and utters a mournful cry like that of the peacock. In winter, and especially in the season, he calls his hair. He fleeps found, and may be easily approached without weakening: he fleeps in a round form, like the dog; but, when he only reposes himself, he extends his hind legs, and lies on his belly. It is in this situation that he flies the birds along the hedges, and mediates schemes for their surprize. The fox flies when he hears the explosion of a gun, or smells gun-powder. He is exceedingly fond of grapes, and does much mischief in vineyards. Various methods are daily employed to destroy foxes: they are hunted with dogs; iron traps are frequently set at their holes; and their holes are sometimes smoked to make them run out, that they may the more readily fall into the snares, or be killed by dogs or fire-arms.

The chase of the fox requires less apparatus, and is more amusing, than that of the wolf. To the latter every dog has great reluctance: but all dogs hunt the fox spontaneously and with pleasure; for, though his own odor be strong, they often prefer him to the stag or the hare. He may be hunted with terriers, hounds, &c. Whenever he finds himself pursued, he runs to his hole; the terriers with crooked legs, or turnpits, go in with moft ease. This mode answers very well when we want to carry off a whole litter of foxes, both mother and young. While the mother defends herself against the terriers, the hunters remove the earth above, and either kill or seize her alive. But, as the holes are often under rocks, the roots of trees, or forked too deep in the ground, this method is frequently unsuccessful. The most certain and most common method of hunting foxes, is to begin with flushing up their holes, to place a man with a gun near the entrance, and then to search about with the dogs. When they fall in with him, he immediately makes for his hole; but when he comes up to it he is met with a discharge from the gun. If the fox escapes the shot, he runs with full speed, takes a large circuit, and returns again to the hole, where he is fired upon a second time; but, finding the entrance shut, he now endeavours to escape by darting straight forward, with the design of never reviving his former habitation. He is then pursued by the hounds, whom he seldom fails to fatigue, because he purposefully passes through the thickest parts of the forest or places of the most difficult access, where the dogs are hardly able to follow him; and, when he takes to the plains, he runs straightforward, without stopping or doubling.

Of all animals the fox has the most significant cries, which it emits even in its palpitations of love, fear, hatred, &c. It is remarkably playful and feemingly amorous, like all savage creatures half reclaimed, with the least offence bite those it is most familiar with. It is a great admirer of all its fellow, and which frequently amuses and exercises itself, by running in circles to catch it; and, in cold weather, wraps it round its nose. The snail of this animal is in general very strong, but that of the urine is remarkably fetid. This seems so offensive, even to itself, that it will take the trouble of digging a hole in the ground, stretching its body at full length over it; and there, after depositing its water, covers it over with the earth, as the cat does its dung. The snail is so obnoxious, that it has often proved the ruin of the fox's escape from the dogs; who, having shot the avenger of his effluvia, or effluvium, as to avoid encountering the animal it came from. It is said that the fox makes use of its urine as an expedient to force the cleanly badger from its habitation: whether that is the means is rather doubtful; but that the fox makes use of the badger's hole is certain: not through want of ability to form its own retreat, but to save itself some trouble; for after the expulsion of
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Canis. of the first inhabitants, the fox improves as well as enlarges it considerably, adding several chambers, and providing making several entrances to secure a retreat from every quarter. In warm weather, it will quit its habitation for the sake of basking in the sun, or to enjoy the free air; but then it rarely lies exposed, but chooses some thick brake, that it may rest secure from surprize. Crows, magpies, and other birds, who consider the fox as their common enemy, will often, by their notes of anger, point out its retreat. The skin of this animal is furnished with a warm soft fur, which in many parts of Europe is used to make muffs and to line cloths. Vast numbers are taken in Le Valais, and the Alpine parts of Switzerland. At Lauzanne there are furriers who are in possession of between 2000 and 3000 skins, all taken in one winter.

Of the fox there are several varieties, derived from colour:

1. The field-fox, or alopex of Linnaeus, who makes it a distinct species; but it is every way the same with the common fox, except in the point of the tail, which is black.

2. The crofs-fox, with a black mark passing transversely from shoulder to shoulder, with another along the back to the tail. It inhabits the coldest parts of Europe, Asia, and North-America: a valuable fur, thicker and softer than the common fort; great numbers of the skins are exported from Canada.

3. The black fox is the most cunning of any, and its skin the most valuable; a lining of it is in Russia, esteemed preferable to the finest tables: a single skin will sell for 400 rubles. It inhabits the northern parts of Asia and North-America. The last is inferior in goodnefs.

4. The brant fox, as described by Geofner and Linnaeus, is of a fiery redness; and called by the frift brand-fuch, by the lafth brandraeff; it is fcarce half the fize of the common fox: the nofe is black, and much flharper; the space round the ears ftrufingous; the forehead, back, shoulders, thighs, and fides black mixed with black, alſo-colour, and black; the belly yellow-fifth; the tail black above, red beneath, and cinereous on its fide. It is a native of Pennsylvania.

5. The cufcuf-fox, with upright ears, foft, downy hair; tail bulfy; colour in summer pale tawney, in winter grey; the bafe and tip of the tail black; a small kind. It inhabits the depafs beyond the Yack: lives in holes; bowls and barks: is caught by the Kirgis Caſſacks with falcons and grey-hounds; 40 or 50,000 are annually taken, and sold to the Russians, at the rate of 40 kopeks, or 20 pence each: the former tie their skins instead of money; great numbers are fent into Turkey.

6. There are three varieties of foxes found in the mountainous parts of Britain, which differ a little in form, but not in colour, from each other. They are distinguished in Wales by as many different names. The milgi, or gre-bounded-fox, is the largest, tallest, and boldeft; and will attack a grown ſheep or wedder: the mastiff-fox is lefs, but more strongly built: the corgi, or cur-fox is the leaft; lurks about hedges, out-houſes, &c. and is the moſt pernicious of the three to the feathered tribe. The frift of thee varieties has a white tag or tip to the tail; the laft a black. When hunted, they never run directly forward, but make a great ma-

ny doublings and turnings; and when in danger of being taken, they emit fuch a smell from their pofterious that the hunters can hardly endure it.

VI. The Lagopus, or Arctic fox, with a hair nife; short rounded ears almost hid in the fur; long and soft hair, somewhat woolly; short legs; toes covered on all parts, like that of a common hare, with fur; tail shorter and more bulfy than that of the common fox, of a blufh grey or alſo colour, sometimes white: the young of the grey are black before they come to maturity: the hair much longer in winter than in fummer, as is uſual with animals of cold climates. It inhabits the countries bordering on the Frozen Sea; Kamfchatka, the Ifles between it and America, and the opposite parts of America discovered in captain Bluring's expedition, 1741; is again found in Greenland, Iceland, Spitzbergen, Nova Zembla, and Lapland. It burrows underground, forms holes many feet in length, and strews the bottom with moft. In Greenland and Spitzbergen, it lives in the cliffs of rocks, not being able to burrow, by reason of the fvt: two or three pair inhabit the fame hole. They are in heat about Lady-day; and during that time, they continue in the open air, but afterwards take to their holes. They go with young nine weeks: like dogs, they continue united in copulation: they bark like that animal, for which reaon the Russians call them peftis, or dogs. They have all the cunning of the common fox; can eat geese, docks, and other water-fowl, before they can fly; on grove of the country, on hares, and the eggs of birds; and in Greenland (through neceffity) on berries, thel fith, or any thing the sea flings up. But their principal food in the north of Asia and in Lapland is the leming, or Lapland marmot: those of the countries laft mentioned are very migratory, purfuing the leming which is a wandering animal: sometimes thefe foxes will defert the country for three or four years, probably in purfuit of their prey; for it is well known that the migrations of the leming are very inconstant, it appearing in some countries only once every few years. The people of Jenofa ſufpect they go to the banks of the Oby. Their chief rendezvous is on the banks of the Frozen Sea, and the rivers that flow into it, where they are found in great troops. The Greenlanders take them either in pitfalls dog in the fnow, and baided with the capell ſfish; or in springs made with whalebone, laid over a hole made in the fnow, firewed over at bottom with the fame kind of ſfish; or in traps made like little huts, with flat ſtones, with a broad one by way of door, which falls down (by means of a ſtring baited on the inſide with a piece of ſteel) whenever the fox enters and pulls it at. The Greenlanders prefer the ſkins for traſf; and in cafes of neceffity eat the ſteel. They alfo make buttons of the ſkins; and split the tendons, and make use of them instead of thread.

The blue ſkins are much more esteemed than the white.

VII. The Indica, or American fox (the coyel of The an- Fernandez, the loup-renard of Bougainville), has short tartar pointed ears; irides hazel; head and body cinereous Fox brown; hair more woolly than that of the common fox, refembling much that of the arctic; legs dafhed with ruff colour; tail bulfy, tipped with white; shorter and more bulfy than that of the common fox, to which it is about one-third inferior in fize. It has much the habit of the wolf, in ears, tail, and strength of limbs. The
The French therefore call it loup-renard, or wolf-fox. It may be a wolf degenerated by climate. The largest are those of Senegal: the next are the European; those of North America are still smaller. The Mexican wolves, which Mr Pennant apprehends to be this species, are again less; and this, which inhabits the Falkland islands near the extremity of South America, is dwindled to the size described. This is the only land animal of those distant islands: it has a fennel smell, and barks like a dog. It lives near the shores; kennels like a fox; and forms regular paths from bay to bay, probably for the convenience of surprising the waterfowl, on which it lives. It is at times very meagre, from want of prey; and is extremely tame. The islands were probably stocked with those animals by means of masts of ice broken from the continent, and carried by the currents.

The grey-fox of Catech. VII. The Grey-fox of Carolina, &c. has a sharp nose; sharp, long, upright ears; legs long; colour grey, except a little reddish about the ears. It inhabits Carolina, and the warmer parts of North America: it differs from the Arctic fox in form, and the nature of its dwelling; agrees with the common fox in the first, varies from it in the last: it never burrows, but lives in hollow trees; it gives no diversion to the sportsman; for after a mile’s chase, it takes to its retreat; it has no strong smell; it feeds on poultry, birds, &c. These foxes are easily made tame; their skins, when in season, make use of for muffins.

The silver Fox of Louisiana. VIII. The Silver Fox of Louisiana. It resembles the common fox in form, but has a moist beautiful coat. The short hairs are of a deep brown; and over them spring long silvery hairs, which give the animal a very elegant appearance. They live in forests abounding in game, and never attempt the poultry which run at large. The woody eminences in Louisiana are every where pierced with their holes.

The Barbary Fox. X. The Barbary Fox, (le Chouchal, Buff,) or jackal-adive, has a long and slender nose, sharp upright ears, long bushy tail: colour, a very pale brown; space above and below the eyes, black; from behind each ear, there is a black line, which soon divides into two, which extend to the lower part of the neck; and the tail is surmounted with three broad rings. This species is of the size of the common fox, but the limbs are shorter, and the nose is more slender.—M. de Buffon informs us, that Mr Bruce told him this animal was common in Barbary, where it was called thakel, But Mr Pennant observes, that Mr Bruce should have given it a more distinguishing name: for thakels, or taneels, is no more than the Arabic name for the common fox, which is also frequent in that country.

The Jackal. XI. The Aureus, Schakal, or Jackal, as described by Mr Pennant, has yellowish brown irides; ears erect, formed like those of a fox, but shorter and less pointed: hairy and white within; brown without, tinged with dusky; head shorter than that of a fox, and nose blunt: lips black, and somewhat loose: neck and body very much resembling those of that animal, but the body more compressed: the legs have the same resemblance, but are longer: tail thicker at the middle, tapering to the point: five toes on the fore-feet: the inner toe very short, and placed high: four toes on the hind-feet: all covered with hair even to the claws. The hairs are much flimmer than those of a fox, but scarcely to fluff as those of a wolf; short about the nose; on the back, three inches long; on the belly shorter. Those at the end of the tail four inches long. Colour of the upper part of the body a dirty tawny; on the back, mixed with black: lower part of the body of a yellowish white: tail tippd with black; the rest of the same colour with the back: the legs of an unmixed tawny brown: the fore legs marked (but not always) with a black spot on the knees; but on no part are those vivid colours which could merit the title of golden, bestowed on it by Kempfer.—The length of this animal from the nose to the root of the tail is little more than twenty-nine inches English: the tail, to the ends of the hairs, ten three quarters; the tip reaching to the top of the hind legs: the height, from the space between the shoulders to the ground, rather more than eighteen inches and a half; the hind parts a little higher.—This species inhabits all the hot and temperate parts of Asia, India, Persia, Arabia, Great Tartary, and about Mount Caucasus, Syria, and the Holy Land. It is found in most parts of Africa, from Barbary to the Cape of Good Hope.

Professor Gledenlstedt*, the able describer of this long-lost animal, remarks, that the cæcum entirely agrees in form with that of a dog, and differs from that of the wolf and fox. And Mr Pennant observes, that there is the fame agreement in the teeth with those of a dog; and the same variation in them from those of the two other animals. These circumstancies strengthen the opinion entertained by some writers, that the dogs of the old world did derive their origin from one or other of them. The jackals have indeed so much the nature of dogs, as to give reasonable cause to imagine that they are at least the chief flock from which is sprung the various races of those domestic animals. When taken young, they grow instantly tame; attach themselves to mankind; wag their tails; love to be foked; distinguish their masters from others; will come on being called by the name given to them; will lean on the table, being encouraged to it: they drink, lapping; and make water sideways, with their legs held up. Their dung is hard: odorat arom alterius, cobar et copula junctus. When they see dogs, instead of flying, they seek them, and play with them. They will eat bread eagerly; notwithstanding they are in a wild state carnivorous. They have a great resemblance to some of the Calmuc dogs, which perhaps were but a few decades removed from the wild kinds. Our dogs are probably derived from those reclaimed in the early ages of the world; altered by numberless accidents into the many varieties which now appear among us.

The wild schakals go in packs of 40, 50, and even two hundred, and hunt like hounds in full cry from evening to morning. They destroy flocks and poultry, but in a less degree than the wolf or fox: ravage the streets of villages and gardens near towns, and will even destroy children, if left unprotected. They will enter stables and out-houses, and devour skins, or say thing made of that material. They will familiarly enter a tent, and eat whatsoever they can find from the sleeping traveller. In default of living prey, they will feed on roots and fruits; and even on the most infected carrion: they will greedily disinter the dead, and devour the putrid carcasses; for which reason, in many countries the graves are made of a great depth. They attend

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their voice naturally is a howl. Barking, Mr Pennant observes, is lately inherent; and in their state of nature seldom exerted; but its different modifications are adventitious, and expressive of the new sensations and emotions gained by a domestic state. Their howlings and clamours in the night are dreadful, and so loud that people can scarcely hear one another speak. Dellow says, their voice is like the cries of a great many children of different ages mixed together: when one begins to howl, the whole pack join in the cry. Kaempfer says, that every now and then a fort of bark is intermixed; which confirms what is above ascertained by Mr Pennant. Dellow agrees in the account of their being tamed, and entertained as domestic animals. During day they are silent. They dig burrows in the earth, in which they lie all day, and come out at night to range for prey: they hunt by the nose, and the valves of their nostrils, being much more acute than those of any other animal. The pack. The jackal is described by Appian, under the name of Ano. Zebos, or yellow wolf; who mentions its horrible howl. It may, as M. de Buffon conjectures, be the dog of Aristotle, who mentions it with the remark, that it has something of the squirrel; and that it lives on the fruits. C A N I S. The Meso- melas, or Cepheus of Schreber, the tenth of Kenite of the Hottentots, has erect yellowish brown ears, mixed with a little black hairs: the head and neck, with a few black hairs: the body and also the back part of the legs are of a yellowish brown, lighter on the body: the throat, breast, and belly white. On the neck, shoulders, and back, is a bed of a black: broad on the shoulders, and growing narrower to the tail: when the hairs are smooth, the part on the neck seems barred with white; that on the shoulders with white comb marks, one within the other, the end pointing to the back: when the hairs are ruffled, these marks vanish, or grow less distinct, and a hoaryness appears in their head. The tail is bushy, of a yellowish brown; marked on the upper part with a longitudinal stripe of black, and towards the end encircled with two rings of black, and is tipped with white. In length, the animal is two feet three quarters, to the origin of the tail: the tail is one foot. This species inhabits the countries about the Cape of Good Hope, and probably is found as high as the line.

XIII. The Thous has a smooth crooked tail: the upper part of its body is grey, and its belly white. It is about the size of a large cat; and, according to Linnaeus, is found at Surinam; it is mentioned by no other naturalist.

XIV. The Zezza. This animal has a very point-like visage; large bright black eyes; very large ears, of a bright rose-colour, internally lined with long hairs; the orifice so small as not to be visible, probably covered with a valve or membrane: the legs and feet are like thoe of a dog; the tail is taper; colour between a straw and pale brown. Length from nofe to tail, ten inches; ears, three inches and a half long; tail, fix: height, next, five. It inhabits the vall deart of Siara, which extends beyond mount Atlas: It burrows in the sandy ground, which shows the necessity of the orifices to the ears; and is so excessively swift, that it is only rarely taken alive. It feeds on insects, especially locusts: its on its rump: is very vigilant: barks like a dog, but much fuller, and that chiefly in the night: never is observed to be sporting. We are indebted to Mr Eric Skioldebrand, the late Swedish consul at Algiers, for our knowledge of this singular animal. He never could procure but one alive, which escaped before he examined his teeth: the genus is very uncertain: the form of its head and legs, and some of its manners, determined Mr Pennant to rank it in this genus. That which was in possession of Mr Skioldebrand fed freely from the hand, and would eat bread or boiled meat. Buffon has given a figure of this animal: but from the authority of Mr Bruce attributes to it a different place, and different manners. He says that it is found to the south of the Palus Tritonis, in Libya; that it has something of the nature of the hare, and something of the squirrel: and that it lives on the palm-trees, and feeds on the fruits.

C A N I S Major, the great dog in astronomy, a constellation of the southern hemisphere, below Orion's feet, though somewhat to the westward of him; whose stars Ptolemy makes 29: Tycho observed only 13; Hevelius 21; in the British catalogue they are 31.

C A N I S Minor, the little dog, in astronomy, a constellation of the northern hemisphere; called also by the Greeks, Fraccon, and by the Latinus Antecoris and Caniceidia. The stars in the constellation canis minor, are in Ptolemy's catalogue 2; in Tycho's, 5; in Hevelius's, 13; and in the British catalogue, 14.

CANISUS, (Henry) a native of Nimeguen, and one of the most learned men of his time, was professor of canon law at Ingolstadt; and wrote a great number of books; the principal of which are. 1. Summa Iuris Canonici. 2. Antiquae lectiones, a very valuable work. He died in 1609.

CANITZ, (The baron of) a German poet and statesman, was of an ancient and illustrious family in Brandenburg, and born at Berlin in 1564, five months after his father's death. After his early studies, he travelled to France, Italy, Holland, and England; and upon his return to his country, was charged with important negotiations by Frederic II. Frederic III. employed him also. Canitz united the statesman with the poet; and was condemn'd in many languages, dead
Canker, as well as living. His German poems were published for the tenth time, 1750, in 8vo. He is said to have taken Horace for his model, and to have written purely and delicately. But he did not content himself with barely cultivating the fine arts in himself; he gave all the encouragement he could to them in others. He died at Berlin, in 1699, privy councillor of state, aged 45.

Canker, among farriers. See Farrer, §§ xx. 2.

Canna, in botany: A genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking under the eighth order, Scitamineae. The corolla is erect, and divided into five parts, with a distinct lip bipartite and rolled back; the style lanceolate, and growing to the corolla; the calyx is triphyllous.

Species. 1. The indica, or common broad-leaved flowering canna, is a native of both Indies; the inhabitants of the British islands in America call it Indian foot, from the roundness and hardnearth of the seeds. It hath a thick, flaky, tuberous root, which divides into many irregular knobs; it sends out many large oval leaves, without order. At their first appearance the leaves are like a twisted horn; but afterwards expand, and are near a foot long, and five inches broad in the middle; lengthening gradually to both ends, and terminated in a point. The stalks are herbaceous, rifting four feet high, and are encompassed by the broad leafy footstalks of the leaves; at the upper part of the stalk the flowers are produced in loose spikes, each being as first covered with a leafy hood, and turns to a brown colour. The flowers are succeeded by a fruit or capsule, oblong, rough, and crowned with three-corned emaplement of the flower which remains. When the fruit is ripe, the capsule opens lengthwise into three cells, at the rounded, flowering, hard, and black seeds.

2. The latifolia, with a pale red flower, is a native of Carolina, and some other northern parts of America. 3. The glanca, with a very large flower, is a native of South America. 4. The lutea, with obtuse oval leaves, is least common in America than the other sorts. 5. The coccinea, bath larger leaves than any of the other species, and the stalks rife much higher. The flowers are produced in large spikes; and are of a bright crimson, or rather scarlet colour.

Culture. These plants must always be kept in pots of rich earth, to be moved to shelter in winter. They are propagated by seeds sown on a hot-bed, in the spring; and in summer, when the plants are a little advanced in growth, prick them separately in small pots of rich earth, plunging them also in the hot-bed, giving shade, water, and fresh air; to which last harden them by degrees, till they bear it fully. In October they must be removed into a very good stove or green house.

Cannabis, in botany: A genus of the pentandria order, belonging to the dioecia class of plants; and in the natural method ranking under the 53d order, Scabridae. The calyx of the male is quinquepartite, with no corolla. In the female the calyx is monophyllous, entire, and gaping at the side; there is no corolla, but two styles; the fruit is a nut, bivalved, within the cloven calyx. Of this there is but one species, viz., the sativa. This is propagated in the rich sandy parts of England in great quantities, for its bark, which is useful for cordage, cloth, &c. and the seeds abound with oil. Hemp is always sown on a deep, moist, rich, soil, such as is found in Holland, Lincolnshire, the fens of the island of Ely, where it is cultivated to great advantage, as it might be in many other parts of England where there is a soil of the same kind; but it will not thrive on clayey or stiff cold land. The ground on which hemp is desired to be sown, should be well ploughed, and made very fine by harrowing. About the middle of April the seed may be sown; three bushels is the usual allowance for an acre, but two are sufficient. In the choice of the seed, the heaviest and brightest coloured should be preferred; and particular care should be had to the kernel of the seed. For the greater certainty in this manner, some of the seeds should be cracked, to see whether they have the germ or future plant perfect: for, in some places, the male plants are drawn out too soon from the female, i.e. before they have impregnated the female plants with the farina; in which case, though the seeds produced by their females may seem fair to the eye, yet they will not grow,* according to the doctrine of Linnaeus.

When the plants are come up, they should be hoed out in the same manner as is practised for turnips, &c., leaving them two feet apart; observe also to cut down all the weeds, which, if well performed, and in dry weather, will destroy them. This crop, however, will require a second hoeing, in about six weeks after the first; and, if this is well performed, the crop will require no further care. The first season for pulling hemp is usually about the middle of August, when they begin to pull what they call the finble hemp, being that which is composed of the male plants; but it would be the much better method to defer this for a fortnight or three weeks longer, until those male plants have fully shed their flowers, with which the seeds will prove only empty husks. The male plants decay soon after they have shed their farina. The second pulling is a little after Michaelmas, when the seeds are ripe. This is usually called karle hemp, and consists of the female plants which were left. This karle hemp is bound in bundles of a yard compassed, according to statute measure, which are laid in the sun for a few days to dry; and then it is stacked up, or houfed, to keep it dry till the seed can be threshed out. An acre of hemp, on a rich soil, will produce near three quarters of seed, which, together with the unwrought hemp, is worth from six to eight pounds. Hemp is esteemed very effectual for destroying weeds; but it accomplishes this by overruling the ground, and thus robbing them of their nourishment, so that a crop of it must not be repeated on the same spot.

Some seeds of a large kind of hemp growing in China were lately sent by the English East India Company to the Society for the encouragement of Arts, Manufactures, and Commerce, who distributed them to the members and other gentlemen who appeared likely to cultivate them; and from experiments made in consequence,
Cannabis. Ann., quence, the plant has been found to succeed perfectly in England. The first trials were rather unpromising, the hemp produced from the foreign seeds proving of very little value. But the Reverend Dr Hinton of Northwold, who made the above trial in 1786, having accidentally sowed some ripe seeds of that crop, sowed them in May 1787 on a spot of good land. They came up well, and attained as much as one ton of Northwold, who made the above trial in 1786, will yet, however, require a few years to determine whether this species will continue to retain its great size, or will degenerate and become the common hemp of Europe.

From the leaves of hemp pounded and boiled in water, the natives of the East Indies prepare an intoxicating liquor of which they are very fond. The plant, when fresh, has a rank narcotic smell; the water in which the stalks are soaked, in order to separate the hemp, takes on a mithridatic taste, in fact to be violently poisonous, and to produce its effects almost as soon as drank. The seeds also have some smell of the herb, and their taste is acrid and sweetish: they are recommended, boiled in milk, or triturated with water into an emulsion, against coughs, heat of urine, and the like. They are also said to be useful in incontinence of urine, and for restraining venereal appetites; but experience does not warrant their having any virtues of that kind.

Cannae, (anc. geog.) a town of Apulia in the Adriatic, at the mouth of the river Aufidus, rendered famous by a terrible overthrow which the Romans received from the Carthaginians under Hannibal. The Roman confuls Emilius Paulus and Terentius Varro, being authorized by the senate to quit the defensive plan, and stake the fortunes of the republic on the chance of a battle, marched from Canusium, and encamped a few miles east, in two unequal divisions, with the Aufidus between them. In this position they meant to wait for an opportunity of engaging to advantage; but Hannibal, whose critical situation in a desolated country, without refuge or allies, could admit of no delay, meant to inflame the vanity of Varro by some trivial advantages in skirmishes between the light horse. The Romans, elated with these successes, determined to bring matters to a speedy conclusion; but, finding the ground on the south side too confined for the operation of so large an army, crossed the river; and Varro, resting his right wing upon the Aufidus, drew out his forces in the plain. Hannibal, whose head quarters were at Canae, no sooner perceived the enemy in motion, than he forded the water below, and marshalled his troops in a line opposite to that of his adversaries.

The Romans were vastly superior in number to the Carthaginians; but the latter were superior in cavalry. The army of the former, consisting of 87,000 men, was drawn up in the usual manner; the *hastati* in the first line, the *principes* in the second, and the *triarii* in the third. The cavalry were posted on the wings. On the right, the Roman knights flanked the legions; in the left, the cavalry of the allies covered their own infantry. The two confuls commanded the two wings, Emilius the right, and Terentius the left; and the two proconsuls Servilius and Attilius the main body. On the other hand, Hannibal, whose army consisted of 40,000 foot and 10,000 horse, placed his Gaulish and Spanish cavalry in his left wing, to face the Roman knights; and the Numidian horse in his right, over against the cavalry of the allies of Rome. As to his infantry, he divided the African battalions into two bodies; one of which he posted near the Gaulish and Spanish horse, the other near the Numidians. Between these two bodies were placed on one side the Gaulish, on the other the Spanish infantry, drawn up in such a manner as to form an obtuse angle projecting a considerable way beyond the two wings. Behind this line he drew up a second which had no projection. Afdrubal commanded the left wing; Maheral the right; and Hannibal himself, with his brother Mago, the main body. He had also taken care to post himself in such a manner that the wind *vulturinus*, which rises at certain fixed times, should blow directly in the faces of the Romans during the fight, and cover them from such attacks. The onset was begun by the light-armed infantry; the Romans discharging their pikes, and the *baculares* their stones, with pretty equal success; nevertheless, the consul Emilius was wounded. Then the Roman cavalry in the right wing advanced against the Gaulish and Spanish in Hannibal's left. As they were shut in by the river Aufidus on one side, and by their infantry on the other, they did not fight, as usual, by charging and wheeling off, and then returning to the charge; but continued fighting each man against his adversary, till one of them was killed or retired. After they had made prodigious efforts on both sides to overbear each other, they all on a sudden dismissed their efforts, and fought on foot with great fury. In this attack the Gauls and Spaniards soon prevailed; put the Romans to the rout; and, purifying them along the river, strewed the ground with their dead bodies, Afdrubal giving no quarter. This action was fierce over, when the infantry on both sides advanced. The Romans first fell upon the Spaniards and Gauls, who, as already observed, formed a kind of triangle projecting beyond the two wings. These gave ground, and, purifying Hannibal's directions, sunk into the void space in their rear; by which means they instensely brought the Romans into the centre of the African infantry, and then the fugitives rallying, attacked them in front, while the Africans charged them in both flanks. The Romans, being by this artful retreat drawn into the snare and surrounded, no longer kept their ranks, but formed several platoons in order to face every way. Emilius, who was on the right wing, seeing the danger of the main body, at the head of his legionaries acted the part both of a soldier and general, penetrating into the heart of the enemy's battalions, and cutting great numbers of them in pieces. All the Roman cavalry that were left, attended the brave consul on foot; and, encouraged by his example, fought like men in despair. But, in the mean time, Afdrubal, at the head of a detachment of Gaulish and Spanish
Spanish infantry brought from the centre, attacked
Emilius's legionaries with such fury, that they were
forced to give ground and fly; the conful being all
covered with wounds, was at last killed by some of
the enemy who did not know him. In the main body,
the Romans, though inlevted on all sides, continued
to tell their lives dear; fighting in phalanx, and making
a great slaughter of those in their right. But being at length
overpowered, and disheartened by the death of the two
proconsuls Servilius and Attilius who headed them,
they dispersed and fled, some to the left, and others to
the right, as they could find opportunity; but the Numi-
nidian horse cut most of them in pieces: the whole
plain was covered with heaps of dead bodies, innume-
rous that Hannibal himself, thinking the battlecry too
terrible, ordered his men to put a stop to it. There is
a great disaffection among authors as to the number
of Romans killed and taken at the battle of Cannae.
According to Livy, the republic lost 50,000 men, in-
cluding the auxiliaries. According to Polybius, of
6000 Roman horse, only 70 escaped to Venusia with
the victorious army, and 200 of the auxiliary horse.
As to the infantry, that writer tells us, that 70,000 of
the Roman foot died on the field of battle fighting like
brave men; and that 13,000 were made prisoners.
According to Dionysius of Halicarnassus, of 6000
horse, only 370 escaped the general slaughter, and of
80,000 foot, 2000 only were left. The most moderate
computation makes the number of Romans killed to
amount to 45,000. The scene of action is marked
out to posterity, by the name of Pezzo di Sangue,
"Field of Blood."
These plains have more than once, since the Punic
war, afforded room for men to accomplish their mutual
destruction. Melo of Bari, after raising the standard
of revolt against the Greek emperors, and defeating
their generals in several engagements, was at last rout-
ed here in 1019, by the Catapan Bolanus. Out of
two hundred and fifty Norman adventurers, the flower
of Melo's army, only ten escaped the slaughter of the
day. In 1201, the archbishop of Palermo and his re-
bellious associates, who had taken advantage of the
nonage of Frederic of Swabia, were cut to pieces at
Cannae by Walter de Brienne, sent by the pope to de-
defend the young king's dominions.
The traces of the town of Cannae are very faint,
consisting of fragments of altars, cornices, gates, walls,
vaults and under-ground granaries. It was destroyed
by fire the year before the battle; but being rebuilt, became
an episcopal see in the infancy of Christianity. It was
again ruined in the sixth century, but seems to have
subsisted in an humble state many ages later; for we
read of its contending with Barletta for the territory,
which till then had been enjoyed in common by them;
and in 1284, Charles I. subdued an edict for divi-
ding the lands to prevent all future litigation. The
prosperity of the towns along the coast, which increas-
ed in wealth and population by embarkations for the
Crusades, and by traffic, proved the annihilation of the
great inland cities, and Cannae was probably abandon-
ated entirely before the end of the thirteenth century.
CANNON. In commerce, white cotton cloths
brought from the East-Indies. They are a proper
commodity for trading on the coast of Guinea, par-

CANNES, a town of France in Provence, and in
the viguerie of Graffe, seated on the coast of the Me-

CANNIBAL, a modern term for an anthropo-
phagous or man-eater, more especially in the West-Indies. See

CANNON, a military engine for throwing balls,
&c., by the help of GUNPOWDER.

The invention of brass cannon is by Laney ascribed
to J. Owen; he says, that they were first known in
England in the year 1353; but yet acknowledges,
that, in 1346, there were four pieces of cannon in the
English army at the battle of Crevy, and that these
were the first that were known in France. And Me-
zeray relates, that king Edward, by five or six pieces
of cannon struck terror into the French army, it be-
ing the first time they had seen any of these thunder-
ing machines; though others affirm that cannon were
known also in France at the same time; but that the
French king, in his hurry to attack the English, and
in confidence of victory, left all his cannon behind him
as useless incumbrances (See ARTILLERY). The Ger-
mans carry the invention further back, and attribute
it to Albertus Magnus, a Dominican monk, about the
year 1250. Volissi rejects all these opinions, and finds
the origin of cannon in China almost 1500 years ago.
According to him they were mounted by the emperor Kitye
in the year of Christ 85. For further particulars of their
history, &c., see GUNNERY.

For the casting of cannon, see FOUNDERY. For
their different parts, proportions, management, opera-
tion, and effects, see GUNNERY.

CANNON, with letter-founders and printers, the
name of the largest size of letters they use.
CANNONADE, the application of artillery to the
purposes of war, or the direction of its efforts against
some distant object intended to be seized or destroyed,
as a ship, battery, or fortresses. See GUNNERY.

Since a large ship of war may be considered as a
combination of floating batteries, it is evident that the
efforts of her artillery must be greatly superior to those
of a fortresses on the sea-coast; that is to say, in gen-
eral; because, on some particular occasions, her situ-
ation may be extremely dangerous, and her cannonading
inefficial. Her superiority confits in several circum-
stances, as the power of bringing her different batte-
ries to converge to one point; of shifting the line of her
attack so as to do the greatest possible execution
against the enemy, or to lie where she will be the least
exposed to his shot; and chiefly because, by employ-
ing a much greater number of cannon against a fort
than it can possibly return, the impression of her artil-
illery against stone-walls soon becomes decisive and irre-
futable. Besides these advantages in the attack, the is
also greatly superior in point of defense: because the
cannon-shot, passing with rapidity through her sides,
seems to do any execution out of the line of their flight,
or occasion much mischief by their splinters; whereas
they very soon shatter and destroy the faces of a para-
apet, and produce incredible havoc among the men by
the fragments of the flions, &c. A ship may also re-

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treat when she finds it too dangerous to remain longer exposed to the enemy's fire, or when her own fire cannot produce the desired effect. Finally, the fluctuating situation of a ship, and of the element on which the reef, renders the effects of bombs very uncertain, and altogether destroys the effects of the risochets, or rolling and bounding shot, which is so pernicious, and destructive in a fortress or land engagement. The chief inconvenience to which a ship is exposed, on the contrary, is, that the low-laid cannon in a fort near the brink of the sea, may strike her repeatedly on or under the surface of the water, so as to sink her before her cannonade can have any considerable efficacy.

CANNULA, in surgery, a tube made of different metals, principally of silver and lead, but sometimes of iron.

They are introduced into hollow ulcers, in order to facilitate a discharge of pus or any other substance; or into wounds, either accidental or artificial, of the large cavities, as the thorax or abdomen: they are used in cutting for the removal of the contents, as the thorax or abdomen: they are used in cutting for the introduction of cauteries, or for the application of a drain for urine.

CANNULAS are used for introducing cauteries, or for the application of a drain for urine, either external or potential, into hollow parts, in order to guard the parts adjacent to that to be cauterized, from injury. They are of various figures; some being oval, some round, and others crooked.

CANO, a kingdom of Africa, in Negroland, with a town of the same name. It is bounded by Zaara on the north, by the river Niger on the south, the kingdom of Agades on the west, and that of Caffina on the east. Some of the inhabitants are herdsmen, and others till the ground and dwell in villages. It produces corn, rice, and cotton. Here are also many deserted and mountains covered with woods, in which are wild citrus and lemon trees. The walls and houses of the town are made of clay, and the principal inhabitants are merchants.

CANOIA, a town of Italy, in the duchy of Milan, seated on the western bank of Lago Maggiore, or the Greater Lake.

CANOE, a boat of Indian origin or vehicle, formed of the trunk of a tree hollowed, and sometimes of several pieces of the bark put together.

Canoes are of various sizes, according to the uses for which they may be designed, or the countries wherein they are formed. The largest are made of the cotton tree; some of them will carry between 20 and 30 hogheads of sugar or molasses. Some are made to carry sail; and for this purpose are steeped in water till they become pliant; after which their sides are extended, and strong beams placed between them, on which a deck is afterwards laid that serves to support their sides. The other forts very rarely carry sail, unless when going before the wind: their sails are made of a sort of short filk grafs or rlufes. They are commonly rowed with paddles, which are pieces of light wood somewhat refembling a corn-thovel; and instead of rowing with it horizontally like an oar, they manage it perpendicularly. The small canoes are very narrow, having only room for one person in breath, and seven or eight lengthwise. The rowers, who are generally American savages, are very expert in managing their paddles uniformly, and in balancing the canoes with their bodies; which would be difficult for a stranger to do, how well accustomed ever to the conducting of European boats, because the canoes are extremely light, and liable to be overturned. The American Indians, when they are under the necessity of landing to avoid a water fall, or of crossing the land from one river to another, carry their canoes on their heads, till they arrive at a place where they can launch them again. This is the general construction of canoes, and method of managing them: but some nations have vessels going under the name of canoes, which differ considerably from the above; as the inhabitants of Greenland, Hudson's-bay, Otaheite, &c.

CANON, a person who possesses a prebend, or revenue allotted for the performance of divine service, in a cathedral or collegiate church.

Canons are of no great antiquity: Pauchier observes, that the name canon was not known before Charlemagne; at least the first we hear of are in Gregory de Tours, who mentions a college of canons instituted by Baldwin XVI. archbishop of that city, in the time of Clotharius I. The common opinion attributes the institution of this order to Chrodegangus, bishop of Metz, about the middle of the eighth century.

Originally canons were only priests, or inferior ecclesiastics, who lived in community; residing by the cathedral church, to assist the bishop; depending entirely on his will; supported by the revenues of the bishopric; and living in the same house, as his domestics, or counsellors, &c. They even inherited his moveables till the year 817, when this was prohibited by the council of Aix-la-Chapelle, and a new rule substituted in the place of that which had been appointed by Chrodegangus, and which was observed for the most part in the west till the twelfth century. By degrees, these communities of priests, flaking off their dependence, formed separate bodies; whereas the bishops, however, were still heads. In the tenth century, there were communities or congregations of the same kind, established even in cities where there were no bishops; these were called collegiares, as they used the terms congregation and college indiscriminately: the name chapter, now given to these bodies, being much more modern. Under the second race of the French kings, the canonical, or collegiate life, had spread itself all over the country; and each cathedral had its chapter, distinct from the rest of the clergy. They had the name canon from the Greek διακονος, which signifies three different things; a rule, a pension, or fixed revenue to live on, and a catalogue or matricula; all which are applicable to them.

In time, the canons freed themselves from their rules, the observance relaxed, and, at length, they ceased to live in community; yet they still formed bodies; pretending to other functions besides the celebration of the common office in the church; yet affirming the rights of the rest of the clergy; making themselves a necessary council of the bishop; taking upon them the administration of a fee during a vacancy, and the election of a bishop to supply it. There are even some chapters exempt from the jurisdiction of the bishop, and owning no head but their dean. After the example of cathedral chapters, collegiate ones also continued to form bodies, after they had abandoned living in community.

Canons are of various kinds; as,
C A N

Cardinal Canons, which are those attached, and, as the Latins call it, incoordinati, to a church, as a priest is to a parish.

Domical Canons, where young canons, who not being in orders, had no right in any particular chapters.

Expatriation Canons, were such as, without having any revenue or prebend, had the title and dignities of canons, a voice in the chapter, and a place in the choir; till such time as a prebend should fall.

Foreign Canons, were such as did not officiate in the canonicities to which they belonged. To these were opposed manifold canons, or canons refidentiary.

Lay, or honorary Canons, are such among the laity as have been admitted, out of honour and respect, into some chapter of canons.

Regular Canons, are canons that still live in community; and who, like religious, have, in process of time, to the practice of their rules, added the solemn profession of vows. They are called regulars, to distinguish them from those secular canons who abandon living in community, and at the same time the observance of the canons made as the rule of the clergy, for the maintenance of the ancient discipline. The canons refulted in their simplicity till the eleventh, some the twelfth century, when some of them, departing from the community, took with them the name of canons, or acapellous priests, because they declined to live in community with the bishop; and those who were left thenceforth acquired the denomination of canons regular, and adopted most of the provisions of the rule of St Augustine. This order of regular canons of St Augustine was brought into England by Adelwald, confessor to Henry I. who created a priory at Noftel in Yorkshire; and obtained for them the church of Carlisle as an episcopal see, with the privilege of choosing their own bishop. They were irregularly protected and encouraged by Henry I. who gave them the priory of Danfable in 1107, and by queen Maud, who, in the following year, gave them the priory of the Holy Trinity in London. It appears, that under the reign of Edward I. they had 53 priories.

Tertiary Canons, those who had only the third part of the revenues of the canonicate.

Canon, in an ecclesiastical sense, is a law or rule, either of doctrine or discipline, enacted especially by a council, and confirmed by the authority of the sovereign.

Canons are properly decisions of matters of religion; or regulations of the policy and discipline of a church, made by councils, either general, national, or provincial. Such are the canons of the council of Nice, or Trent, &c.

There have been various collections of the canons of the Eastern councils: but four principal ones, each ampler than the preceding. The first, according to Usher, A. D. 380, containing only those of the first oecumenical council, and the first provincial ones: they were but 164 in number. To these Dionysius E resisting, in the year 520, added the 30 canons of the apostles, and those of the other general councils. The Greek canons in this second collection end with those of the council of Chalcedon; to which are subjoined those of the council of Sardica, and the African canons. The fourth and last collection comes down as low as the second council of Nice; and it is on this that Balsamon and Zonaras have commented.

Apothetical Canons, are those which have been officially ascribed to St Clement. Bellarmine, Baronius, &c. have them to be genuine canons of the apostles: Coccinus observes, that they cannot be ascribed to the apostles or Clement, because they are not received with other books of scripture, are not quoted by the writers of the first ages, and contain many things not agreeable to the apostolical times: Hincmar, De Marca, Beveridge, &c. take them to be framed by the bishops who were the apostles' disciples in the second or third century; S. Balnage is of opinion, that they were collected by an anonymous writer in the fifth century; but Daille, &c. maintain them to have been forged by some heretic in the sixth century. The Greek church allow only 50 of them, and the Latins only 50; though there are 54 in the edition given of them in the Corpus Juris Canonici.

Canon is also used for the authorized catalogue of the sacred writings. See Bibli.

The ancient canon, or catalogue of the books of the Old Testament, was made by the Jews, and is ordinarily attributed to Ezra; who is said to have distributed them into the law, the prophets, and the hagiography, to which our Saviour refers, Luke, chap. xxiv. ver. 44. The same division is also mentioned by Josephus, cont. Appion.

This is the canon allowed to have been followed by the primitive church, till the council of Carthage; and, according to St Jerome, this consisted of no more than 22 books; answering to the number of the Hebrew alphabet; though at present they are classified into 24 divisions, containing Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Joshua, Judges, Samuel, Kings, I and II Samuel, I and II Kings, I and II Chronicles, the twelve minor prophets, the Psalms, the Proverbs, Job, Canticles, Ruth, Lamentations, Ecclesiastes, Esther, Daniel, Ezra, comprehending the book of Nehemiah and the Chronicles. However, this order is not universally observed, either among Jews or Christians: nor were all the books above enumerated admitted into the canon in Ezra's time. It is most likely, says Dr Prideaux, that the two books of Chronicles, Ezra, Nehemiah, Esther, and Malachi, were added in the time of Simon the Just, when the canon was completed. But that council enlarged the canon very considerably, taking into it the books which we call apocryphal; which the council of Trent has further enforced, enjoining all these to be received as books of Holy Scripture, upon pain of anathema, and being attested of hereby. The Romanists, in defence of this canon, say, that it is the same with that of the Council of Hippo, held in 394; and with that of the third council of Carthage, in 597; at which were present 46 bishops, and, among the rest, St Augustin; who declared that they received it from their fathers.

Their canon of the new testament perfectly agrees with ours. It consists of books that are well known; some of which have been universally acknowledged; such are the four Gospels, the Acts of the Apostles, the thirteen Epistles of St Paul, one Epistle of St Peter, and
and one Epistle of St John: and others, concerning which doubts were entertained, but which were afterwards received as genuine; such are the epistle to the Hebrews, that of James, the second of Peter, the second and third of John, that of Jude, and the Revelation. These books were written at different times, and they are authenticated, not by the decrees of councils, or infallible authority, but by such kinds of evidence as is thought sufficient in the case of any other ancient writings. They were very extensively diffused; they were read in every Christian society; they were valued and preserved with care by the first Christians; they were cited by Christian writers of the second, third and fourth century, as by Ireneaus, Clement the Alexandrian, Tertullian, Origen, Eusebius, &c. and their genuineness is proved by the testimony of those who were contemporaneous with the apostles themselves, and by tradition. The four Gospels, and most of the other books of the New Testament, were collected either by one of the apostles, or some of their disciples and successors, before the end of the first century. The catalogue of canonical books furnished by the more ancient Christian writers, as Origen about the year 210, Eusebius and Athanasius in 315, Epiphanius in 370, Jerome in 382, Austin in 394, and many others, agrees with that which is now received among Christians. For the time of writing the several books of the New Testament, see the titles of the books themselves; as the Gospel of St Matthew, Mark, &c.

Some of the fathers distinguished the inspired writings into three classes; protocanonical, deuto-canonical, and apocryphal.

**Psalchal Canon.** A table of the moveable feasts, showing the day of Easter, and the other feasts depending on it, for a cycle of 19 years.

The paschal canon is supposed to be the calculation of Eusebius of Cesarea; and to have been done by order of the council of Nice.

**Canon.** In monastic orders, a book wherein the religious of every convent have a fair transcript of the rules of their order, frequently read among them as their local statutes. This is also called regula, as containing the rule and institution of their order.

The canon differs from the missale, martyrologium, and nechrologium.

**Canon.** Again, is used for the catalogue of Saints acknowledged and canonized in the Roman church.

**Canon.** Is also used, by way of excellence in the Romish church, for the secret words of the mafs, from the preface to the Pater; in the middle of which the priest consecrates the host. The common opinion is, that the canon of the mafs commences with Teigitur, &c. The people are to be on their knees, hearing the canon; and are to rehearse it to themselves, so as not to be heard.

**Canon.** In the ancient music, is a rule or method of determining the intervals of notes.

Ptolemy rejecting the Aristoxenian way of measuring the intervals in music, by the magnitude of a tone (which was supposed to be formed by the difference between a diapente and a diatessaron), thought that musical intervals should be distinguished, according to the ratios or proportions which the sounds terminating those intervals bear to one another, when considered according to their degree of acuteness or gravity; which, before Aristoxenus, was the old Pythagorean way. He therefore made the diapason consist in a double ratio; the diapente, in a sesquialterate; the diatessaron, in a sesquiquadrate; and the tone itself, in a sesquitertuine; and all the other intervals, according to the proportion of the sounds that terminate them: wherefore taking the canon (as it is called) for a determined line of any length, he shows how this canon is to be cut accordingly, so that it may represent the respective intervals: and this method answers exactly to experiment, in the different lengths of musical chords. From this canon, Ptolemy and his followers have been called Canonicus; as those of Aristoxenus were called Muffaeus.

**Canon.** In modern music, a kind of fugue, which they call a perpetual fugue, because the different parts beginning one after another, repeat incessantly the same air.

Formerly, says Zarlino, they placed, at the head of perpetual fugues, particular directions which showed how this kind of fugues was to be sung; and these directions being properly the rules by which perpetual fugues were composed were called canonici, rules, or canons. From this custom, others taking the title for the thing signified, by a metonymy, termed this kind of composition canon. Such canons as are composed with the greatest facility, and of consequence most generally used, begin the fugue either with the octave or the unison; that is to say, that every part repeats in the same tone the melody of the preceding. In order to form a canon of this kind, it is only necessary for the composer to make an air according to his taste; to add in score as many parts as he chooses, where the voices in octave or unison repeat the same melody; then forming a single air from all these parts successively executed, to try whether this succession may form an entire piece which will give pleasure, as well in the harmony as the melody.

In order to execute such a canon, he who sings the first part begins alone, and continues till the air is signified; then recommences immediately, without any suspension of sound or interruption of time: as soon as he has ended the first couplet, ought to serve for the perpetual subject upon which the whole canon has been composed, the second part begins and repeats the same couplet, whilst the first who had begun, form the second: others in succession begin, and proceed the same way, as soon as he who precedes has reached the end of the first couplet. Thus, by incessantly recommencing, an universal close can never be found, and the canon may be repeated as long as the fingers please.

A perpetual fugue may likewise consist of parts which begin with the intervals of a fourth or fifth, or, in other words, every part may repeat the melody of the first, a fourth, or a fifth higher or lower. It is then necessary that the whole canon should be invented di prima intensione, as the Italians say; and that sharps or flats should be added to the notes, whose natural gradations do not answer exactly, by a fourth or fifth, to the melody of the preceding part, and produce the same intervals with itself. Here the composer cannot pay the least regard to modulation; his only care is, that the melody may be the same, which renders the formation of
The power of making laws was exercised by the church before the Roman empire became Christian. The canon-law that obtained throughout the West, till the 12th century, was the collection of canons made by Dionysius Exiguus in 520, the capitularies of Charlemagne, and the decrees of the popes from Sylaceus to Anaflatius.

The canon-law, even when papal authority was at its height in England, was of no force when it was found to contradict the prerogative of the king, the laws, statutes, and customs of the realm, or the doctrine of the established church.

The ecclesiastical jurisdiction of the see of Rome in England was founded on the canon-law; and this created quarrels between kings and several archbishops and prelates who adhered to the papal usurpation.

Besides the foreign canons, there were several laws and confutations made there for the government of the church: but all these received their force from the royal power; so, at any time, the ecclesiastical courts did, by their sentence, endeavor to enforce obedience to such canons, the courts at common law, upon complaints made, would grant prohibition. The authority vested in the church of England of making canons, was ascertained by a statute of Henry VIII. commonly called the act of the clergy's submissions; by which they acknowledged, that the convocation had always been assembled by the king's writ; so that though the power of making canons resided in the clergy met in convocation, their force was derived from the authority of the king's assenting to, and confirming them.

The old canons continued in full force till the reign of James I. when the clergy being assembled in convocation, the king gave them leave to treat and consult upon canons; which they did, and presented them to the king, who gave them the royal assent: these were a collection out of the several preceding canons and injunctions. Some of these canons are now obsolete. In the reign of Charles I. several canons were passed by the clergy in convocation.

Canonicæ, in the Romish church, a woman who enjoys a prebend, affixed, by the foundation, to maids, without their being obliged to renounce the world or make any vows.

Canonica, in philosophical history, an appellation given by Epicurus to his doctrine of logic. It was called canonica, as consisting of a few canons or rules, for directing the understanding in the pursuit and knowledge of truth. Epicurus's canonica is represented as a very slight and insufficient logic by several of the ancients, who put a great value on his ethics and physics. Laertius even affirms us, that the Epicureans rejected logic as a superfluous science; and Plutarch complains that Epicurus made an unskillful and preposterous use of syllogisms. But these cautions seem too severe. Epicurus was not averse to the study of logic, but even gave better rules in this art than those philosophers who aimed at no glory but that of logics. He only seems to have rejected the dialectics of the Stoics, as full of vain fabilities and deceits, and fitted rather for parade and disputation than real use. The terrors of Epicurus's canonica consists in his doctrine of the criteria of truth. All questions in philosophy are either concerning words or things; concerning things,
we seek their truth; concerning words, their signification: things are either natural or moral; and the
former are either perceived by sense or by the understand-
ing. Hence, according to Epicurus, ariste three
criteria of truth, viz. sense, anticipation or prema-
tion, and poilion. The great canon or principle of
Epicurus’s logic is, that the senses are never deceived;
and therefore, that every sensation or perception of an
appearance is true.

**Canonical**, something that belongs to, or par-
takes of, the nature of a rule or canon.  

**Canonical Hours**, are certain stated times of the
day, confined, more especially by the Romish church,
to the offices of prayer and devotion. Such are *mattins, larid, sext, ninth, vespers*. In Britain the canonical hours are from eight to twelve in the forenoon, before or after which marriage cannot be legally performed in any parish-church.  

**Canonical Obedience**, is that submission which, by the ecclesiastical laws, the inferior clergy are to pay to their bishops, and religious to their superiors.  

**Canonical Sin**, in the ancient church, those which were capital or mortal. Such especially were idolatry, murder, adultery, herefy, and schism.  

**Canonical Punishments**, are those which the church may inflict, such as excommunion, degradation, and penance; in Roman Catholic countries, also fasting, alms, whipping, &c.  

**Canonical Life**, the method or rule of living pre-
scribed by the ancient clergy who lived in community. The canonical life was a kind of medium between the monastic and clerical lives. Originally the orders of monks and clerks were chirally distinct; but pious persons, in process of time, influenced colleges of prelates and canons, where clerks brought up for the ministry, as well as others already engaged therein, might live under a fixed rule, which, though somewhat more easy than the monastic, was yet more restrained than the secular. This was called the *canonical life*, and those who embraced it *canons.* Authors are divided about the founder of the canonical life. Some will have it to be founded by the apostles; others ascribe it to pope Urban I. about the year 1230, who is said to have founded orders of canons to provide such of their clergy as were willing to live in community, with necessaries out of the revenues of the church. The generality ascribes it to St. Augustine; who, having gathered a number of clerks to devote themselves to religion, instituted a monastic within his episcopal palace, where he lived in community with them. Augustinus Panvinius brings the institution somewhat lower: according to him, pope Gelasius I. about the year 495, placed the first regular canons of St. Augustine in the Lateran church.  

**Canonical Letters**, in the ancient church, were a form of testimonials of the orthodox faith, which the bishops and clergy sent each other to keep up the catholic communion, and distinguishing orthodox Christians from Arians and other heretics. They were denominated canonical, either as being composed according to a certain rule or form, or because they were given to the *canonicis*, that is, those comprehended in the canon or catalogue of their church. When they had occasion to travel into other dioceses or countries, dimissory and recommendatory letters, also letters of peace, &c. were to many species of canonical letters.  

**Canonical** is also an appellation given to those epistles in the New Testament more frequently called *catholic or general epistles.*  

**Canonicum**, in a general sense, denotes a tax or tribute.  

**Canonick** is more particularly used in the Greek church for a fee paid by the clergy to bishops, archbishops, and metropolitan, for degrees and promotions.  

**Canonick** also denotes a due of first-fruits, paid by the Greek laity to their bishops, or, according to Du Cange, to their priests. The *canonick* is assessed according to the number of houfes or chimneyes in a place.

The emperor Isaac Comnenus made a constitution for regulating the *canonick* of bishops, which was confirmed by another made in 1086, by his nephew Alexis Comnenus. A village containing thirty fires, was to pay for its *canonick* one piece of gold, two of silver, one sheep, six bushels of barley, six of wheat flour, six measures of wine, and thirty hens.  

**Canonist**, a person skilled in or who makes pro-
| cession of the study and practice of the canon law. Ca |

| nonists and civilians are usually combined in the same |

| persons: and hence the title of *doctor juris canoniz |

| gus,* or legum doctor, usually expressed in abbrevia |

| ture, L. L. D. or J. U. D.  

**Canonization**, a ceremony in the Romish church, by which persons deceased are ranked in the catalogue of the saints. It succeeds beatification.  

Before a beatified person is canonized, the qualifica-
tions of the candidate are strictly examined into, in some consistories held for that purpose; after which, one of the consistorial advocates, in the presence of the pope and cardinals, makes the panegyric of the person who is to be proclaimed a saint, and gives a particular detail of his life and miracles: which done, the holy father decrees his canonization, and appoints the day.  

On the day of canonization the pope officiates in white, and their eminences are dress in the same colour. St. Peter’s church is hung with rich tapestry, upon which the arms of the pope, and of the prince or state requiring the canonization, are embroidered in gold and silver. An infinite number of lights blaze all round the church, which is crowded with pious souls, who wait with devout impatience till the new saint has made his public entry as it were into paradise, that they may offer up their petitions to him without danger of being rejected.  

The following maxim with regard to canonizations is now observed, though it has not been followed above a century, viz. not to enter into the inquiries prior to canoni-
zation, till 50 years, at least, after the death of the peron to be canonized. By the ceremony of canonization, it appears that this rite of the modern Romans has something in it very like the apothesis or deifica-
tion of the ancient Romans, and, in all probability, takes its rise from it; at least several ceremonies of the same nature are conspicuous in both.  

**Canonry**, the benefice filled by a canon. It differs from a prebend, in that the prebend may subsist without
without the canonical: whereas the canonical is inseparable from the prebend: again, the rights of franchises, and other privileges, are annexed to the canonical, and not to the prebend.

CANOPUS, in astronomy, a star of the first magnitude in the rudder of Argo, a constellation of the southern hemisphere.

Canopus, in Pagan mythology, one of the deities of the ancient Egyptians, and, according to some, the god of water. It is said, that the Chaldeans, who worshipped fire, carried their fancied deity thro’ other countries to try its power, in order that, if it obtained the victory over the other gods, it might be acknowledged as the true object of worship; and it having easily subdued the gods of wood, stone, brass, silver, and gold, its priests declared, that all gods did it homage. This the priests of Canopus hearing, and finding that the Chaldeans had brought their god to contend with Canopus, they took a large earthen vessel, in which they bored several holes, which they afterwards filled with water, painted it of several colours, and fitting the head of an idol to it, brought it out, in order to contend with the Chaldean deity. The Chaldeans accordingly kindled their fire all around it; but the heat having melted the wax, the water gushed out thro’ the holes, and extinguished the fire; and thus Canopus conquered the god of the Chaldeans.

Canopus, or Canopus, according to Strabo, had been Menelaus’s pilot, and had a temple erected to him in a town called Canopus, near one of the mouths of the Nile. Dionysius mentions it.

Voßius remarks, on this occasion, the vanity of the Greeks, who, as he conjectures, hearing of an Egyptian deity named Canopus, took from thence an opportunity of defying the pilot of Menelaus who bore the same name, and giving out that the Egyptian god Canopus had been a Greek. F. Monfacon gives several representations of this deity. One, in allusion to the victory abovementioned, throws out water on every side through little holes.

Canopus, or Canopus, (anc. geog.) a town of the Lower Egypt, on the Mediterranean, an hundred and twenty stadia, or fifteen miles to the east of Alexandria; as old as the war of Troy, Canopus, Canopus, Menelaus’s steersman, being there buried. Canopaei, the gentilitious name; famous for their luxury and debauchery, (Strabo, Juvenal.) See ABOUXIR.

Canopy, in architecture and sculpture, a magnificent kind of decoration, serving to cover and crown an altar, throne, tribunal, pulpit, chair, or the like. The word is formed from the barbarous Latin canopium, of canum, a net spread over a bed to keep off the gnats, canus, a gnat.

Canopies are also borne over the head in processions of state, after the manner of umbrellas. The canopy of an altar is more peculiarly called Giborion.

The Roman grandees had their canopies, or spread veils, called thenia, over their chairs: the like were also in temples over the statues of the gods. The modern cardinals still retain the use of canopies.

Canosa, a town of Puglia in Italy, occupying part of the site of the ancient Canosium. The old city was founded by Dionysius, according to Strabo. It afterwards became a Roman colony, and one of the most considerable cities of this part of Italy for extent, population, and magnificence in building. The sea of Canosium seems to have been built on a narrow flat: but this pomp only served to mark it as a capital object for the avarice and fury of the Barbarians. Genicicus, Tolitl, and Flavian, treated it with extreme cruelty. The deplorable state to which this province was reduced in 590 is concisely but strongly painted by Gregory the Great, in these terms: "On every tide we hear groans! on every tide we behold crowds of mourners, cities burnt, castles rased to the ground, countries laid waste, provinces become deserts, some citizens led away captives, and others humanly murthered." No town in Puglia suffered more than Canosa from the outrages of the Saracens; though the contest between the Greeks and Normans increased the miseries of its wretched inhabitants, which was filled by a conflagration that happened 1111. It was burnt by duke Robert. In 1195, it was assigned, by agreement, to Bohemund prince of Antioch, who died here in 1111. Under the reign of Ferdinand the Third, this estate belonged to the Grimaldus. On their forfeiture, the Affiititi acquired it, and still retain the title of marquis, though the Capeci are the proprietors of the fief.

The ancient city stood in a plain between the hills and the river Ofanto, and covered a large tract of ground. Many brick monuments, though degraded and stripped of their marble casing, still attest its ancient grandeur. Among them may be traced the fragments of aqueducts, tombs, amphitheatre baths, military columns, and two triumphal arches, which, by their position, seem to have been two city gates. The present town stands above, on the foundations of the old citadel, and is a most pitiful remnant of so great a city; not containing above three hundred houses. The church of St Sabinus, built, as is said, in the sixth century, is now without the inclosure. It is astonishing, that any part of this ancient cathedral should have withstood so many calamities. Its altars and pavements are rich in marbles; and in a small court adjoining, under an octagonal cupola, is the mausoleum of Bohemund, adorned in a minute Gothic style.

Canso, a sea-port town of Acadia, or Nova Scotia, in North America, fronting which separates Nova Scotia from Cape Breton. Near this town is a fine fishery for cod. W. Long. 62. N. Lat. 46.

Canstat, a town of Swabia, in Germany, in the duchy of Wirtemberg, situated on the river Neckar, in E. Long. 9. 9. N. Lat. 48. 51.

Cant, a quaint affected manner of speaking, adapted chiefly to the lower sort. Skinner racks his invention for the origin of this word; which he successively deduces from the German, Flemish, and Saxon tongues. According to the general opinion, Cant is originally the proper name of a Cameronian preacher in Scotland, who by exercise had obtained the faculty of talking in the pulpit in such a tone, as was understood by none but his own congregation; since Andrew Cant’s time, the word has been extended to signify all sudden exclamations, and whining unmusical tones, especially in praying and preaching. But this origin
CANTABRIA, (anc. geo.), a district of Terracottensis, on the Oceanus Cantabricus or bay of Biscay; now Biscay. The inhabitants were famous for their warlike character. In conjunction with the Asturians, they carried on desperate wars with the Romans; but were subdued by them about 25 years before Christ. Being impatient, however, of a foreign yoke, they in a few years revolted. Most of their youth had been already taken prisoners by the Romans, and sold for slaves to the neighbouring nations; but having found means to break their chains, they cut the throats of their masters; and returning into their own country, attacked the Roman garrisons with incredible fury. Agrippa marched against them with great expedition; but, on his arrival, met with so vigorous a resistance, that his soldiers began to despair of ever being able to reduce them. As the Cantabrians had waged war with the Romans for upwards of 200 years, they were well acquainted with their manner of fighting, no way inferior to them in courage, and were now become desperate; well knowing, that if they were conquered, after having so often attempted to recover their liberty, they must expect the most severe usage, and cruel slavery. Animated with this reflection, they fell upon the Romans with a fury hardly to be expressed, routed them in several engagements, and defended themselves when attacked by the enemy with such intrepidity, that Agrippa afterwards owned, that he had never, either by sea or land, been engaged in a more dangerous enterprise. That brave commander was obliged to use intrigues, menaces, and to brand some of his legionaries with ignominy, before he could bring them to enter the lists with such a formidable enemy. But having at last, with much ado, prevailed upon them to try the chance of an engagement in the open field, he so animated them by his example, that after a most obstinate dispute, he gained a complete victory, which indeed cost him dear, but put an end to that destructive war. All the Cantabrians fit to bear arms were cut in pieces; their castles and strong holds taken and razed; and their women, children, and old men (none else being left alive), were obliged to abandon the mountainous places, and settle in the plain.

Dr Wallis seems to make the Cantabrian the ancient language of all Spain: which, according to him, like the Gaulish, gave way to a kind of broken Latin called *romances, or romanfs*, which by degrees was refined into the Castilian or present Spanish. But we can hardly suppose, that so large a country, inhabited by such a variety of people, spoke all the same language. The ancient Cantabrian, in effect, is still found to subsist in the more barren and mountainous parts of the province of Biscay, Asturias, and Navarre, as far as Bayonne, much as the Britifh does in Wales; but the people only talk it: for writing, they use either the Spanish or French, as they happen to live under the one or the other nation. Some attribute this to jealousy of foreigners learning the mysteries of their language; others to a poverty of words and expressions. The Cantabrian does not appear to have any affinity with any other known language, abating that some Spanish words have been adopted in it for things whose use the Biscayens were anciently unacquainted with. Its pronunciation is not defective. The Lord's prayer, in the Cantabrian tongue, runs thus: *Cursus auter ceremoniae, sanctifica hodie nominem tuum, et veni hodie veniam, ego veni hodie veniam tibi, ut in terris, ut in coelis.*

CANTABRIA, in botany: A fynonym of a species of Convulvulus.

CANTABRUM, in antiquity, a large kind of flag used by the Roman emperors, distinguished by its peculiar colour, and bearing on it some words or motto of good omen, to encourage the soldiers.

CANTACUZENUS, (Johannes) of Confantinople, a celebrated statesman, general, and historian, was born in that city, of a very ancient and noble family. He was bred to letters; and was educated in the highest offices of the state. The emperor Andronicus loaded him with wealth and honour; made him generalissimo of his forces; and was desirous of having him join him in the government, but this he refused. Andronicus dying in 1341, left to Cantacuzenus the care of the empire, till his son John Paleologus, who was then but nine years of age, should be fit to take it upon himself. This trust he faithfully discharged; till the empress dowager and her faction forming a party against him, declared him a traitor. On this the principal nobility and the army befought him to ascend the throne; and accordingly he was crowned on the 21st of May 1342. This was followed by a civil war, which lasted five years; when he admitted John a partner with him in the empire, and their union was confirmed by his giving him his daughter in marriage. Suspicions and enmities, however, soon arising, the war broke out again, and continued till John took Confantinople in 1355. A few days after, Cantacuzenus, unwilling to continue the effusion of blood, abdicated his share of the empire and retiring to a monastery, took the habit of a monk, and the name of Joseph. His wife also retired to a nunnery, and changed her name of Irene for that of Eugenia. In this retirement he lived till the year 1411, when he was upwards of 100 years of age. Here he wrote a history of his own times, a Latin translation of which, from the Greek manuscript, was pub-
CANTALVERS, published by Pontanus at Ingolstadt, in 1603: and a splendid edition was printed at Paris in 1645, in three volumes folio, of the original Greek, and Pontanus's Latin version. He also wrote an apology for the Christian religion against that of Mahomet, under the name of Christiophorus.

CANTALVERS, in architecture, pieces of wood framed into the front or sides of a house, to suspend the mouldings and eyes over it.

CANTAR, or CANTARE, an eastern weight, of different value in different places, equal at Acre in Turkey to 603 pounds, at Tunis and Tripoli to 114 pounds.

Cantor is also an Egyptian weight, which is denominated a quintal, and consists of an hundred or of an hundred and fifty rotolos, according to the goods they are to weigh.

CANTARO is also an Egyptian weight, which at Naples is equivalent to 25 pounds, at Genoa to 150 pounds. At Leghorn there are three kinds of cantaros, one weighing 150 pounds, another 151, and a third 160 pounds.

CANTARO is also a Spanish liquid measure, in use especially at Alicante, containing three gallons.

CANTARO is also a measure of capacity, used at Cochin, containing four rubies, the rubi 12 rotolos.

CANTARINI, (Simon) a famous painter, called the Pefaro, from his being born at Pefaro, was the disciple of Guido; and copied the manner of his master so happily, that it is often difficult to distinguish between their works. He died at Verona in 1648.

CANTATA, in music, a song or composition, intermixed with recitative, airs, and different movements, chiefly intended for a single voice, with a thorough bass, though sometimes for other instruments.

The cantata, when performed with judgment, has something in it very agreeable; the variety of the movement not clogging the ear, like other compositions. It was first used in Italy, then in France, whence it passed to us.

CANTAZARO, an episcopal city of Italy, in the kingdom of Naples, and in the territory of Calabria Ulterior. It is the residence of the governor of the province, and is seated near the sea, in E. Long. 17° 0'.

CANTECROIX, a small territory of the Netherlands, in Brabant, and in the quarter of Antwerp, with the title of a principality; there is a small town of the same name, but Lirc is the capital.

CANTEMIR, (Demetrius) son of a prince of Moldavia. Disappointed by not succeeding his father in that dignity, held under the Ottoman Port, he went over with his army to the Czar Peter the great, against whom he had been sent by the Grand Signior: he signified himself in the Czar's service; and in the republic of letters, by a Latin history of the origin and decline of the Ottoman empire, &c. Died in 1725.

CANTEMIR, (Antiochus) esteemed the founder of the Ruffian poetry, was the youngest son of the preceding. Under the most ingenious professors, whom the czar had invited to Peterburgh, he learned mathematics, physics, history, moral philosophy, and polite literature; without neglecting the study of the Holy Scriptures, to which he had a great inclination. scarce had he finished his academic course, when he printed a Concordance to the Psalms in the Ruffian language, and was elected member of the academy. The affairs of state in which he was soon after engaged, did not make him neglect his literary pursuits. In order to make himself useful to his fellow-citizens, he composed his satires, to ridicule certain prejudices which had got footing among them. When but 23 years of age, he was nominated minister at the court of Great Britain; and his dexterity in the management of public affairs was as much admired as his talent for the sciences. He had the same reputation in France, whither he went in 1738, in quality of minister plenipotentiary, and soon after was invested with the character of ambassador extraordinary. The wife and prudent manner in which he conducted himself during the different revolutions which happened in Russia during his absence, gained him the confidence and esteem of three successive princes. He died of a dropy, at Paris, in 1744, aged 44. Besides the pieces already mentioned, he wrote, 1. Some fables and odes. 2. A translation of Horace's epistles into Ruffian verse. 3. A prose translation of Fontenelle's plurality of worlds; and, 4. Algarotti's dialogues on light. The abbe Guazzo has written his life in French, and translated his satires into that language.

CANTERBURY, a city of England, and capital of the county of Kent, situated in E. Long. 1° 15'. N. Lat. 51° 16'. It had the names of Durwurium and Darvurium given it by the Romans, and Durberia by Bede, which are thought to be derived from Darwich, signifying a rapid stream, such as the Stour, on which it stands, i.e. The Britons call it Caer-Kent, i.e. the city of Kent; and its present English name is of the same import, derived from the Saxon. Modern writers in Latin call it Cantuaria. Its great antiquity appears not only from Antoninus's itinerary, but from the military way which has been discovered here, and the caufeways leading to Dover and Lymme, besides the coins and other curiosities found about it. The Archbishop and metropolitical dignity seems to have been settled here very early; and to prevent its being removed, an anathema was decreed against any who should attempt it. After that, the city flourished greatly; though it suffered in common with other towns, during the Danish invasions, and at other times by the casualties of fire. The city was given entirely to the bishops by William Rufus, and was held in the utmost veneration in the Popilh times, especially after the murder of Becket in the reign of Henry II. to whose shrine so great was the respect, and so rich were the offerings, that Erasmus, who was an eye-witnefs of its wealth, says the whole church and chapel in which he was interred glittered with jewels; and at the dissolution, the plate and jewels filled two great chests, each of which required eight strong men to carry out. The cathedral was granted by Ethelbert, king of Kent, upon his conversion, to Auffin the monk, together with his palace, and the royalty of the city and its territories. This Auffin founded a monastery for monks, called from him Augustin. After the cathedral had been several times destroyed by fire and rebuilt, the present was begun about the year 1174, and augmented and embellished by the succeeding archbishops, till it was completed in the reign of Henry V. It is a noble Gothic pile, and before the reformation had 37
CANTERBURY.

CANTERBURY.

A great many kings, princes, cardinals, and archbishops, are buried in it. At the dissolution, Henry VIII. seized all the revenues both of the church and monastery, except what he allotted for the maintenance of a dean, 12 prebendaries, and six preachers, whom he established in place of the monks. During the great rebellion, it suffered much; the usurper Cromwell having made a stable of it for his draughts. After the restoration, it was repaired, and made what it now appears.

Besides the cathedral and other churches, as well as a monastery, the city had anciently a college on the south-side, and strong walls, with towers, a ditch, and rampart; it had also a mint and an exchange. As to its government, it seems to have been entirely subject to the archbishop, both in spirituals and temporals; at least from the time that William Rufus gave it solely to bishop Anselm, till the reformation. It is now a county of itself; and the corporation consists of a mayor, recorder, 12 aldermen, a sheriff, 24 common-council-men, a mace-bearer, sword-bearer, and four serjeants at arms. Every Monday a court is held at Goldhill for civil and criminal causes; and every other Tuesday for the government of the city. Here were formerly 2000 or 3000 French Protestants employed in the silk manufacture; but this branch is now greatly decayed.

The diocese of Canterbury contains 257 parishes, besides chapels, in Kent, and about 100 more in other dioceses. These are called Peculiars; it being an ancient privilege of this see, that, whereasover the archbishops had either mansors or advowsons, the place was exempted from the jurisdiction of the ordinary of the diocese where it was situated, and was deemed in the diocese of Canterbury. This see is valued in the king's books at L. 2816: 17: 92, but is reckoned to produce but is reckoned to produce but is reckoned to produce a clear revenue of L. 651: 18: 21. This see had many great privileges in the time of Popery, some of which it still retains. The archbishop is appointed prime and metropolitan of all England, and is the first peer in the realm; having the precedence of all dukes, not of the blood-royal, and all the great officers of state. In common speech, he is styled His Grace, and he writes himself Divina Providentia; whereas other bishops style themselves Divina Permissione. At coronations, he places the crown on the king's head; and, wherever the court may be, the king and queen are the proper domicile parishioners of the archbishop of Canterbury.

The bishop of London is accounted his provincial dean, the bishop of Winchester his sub-dean, the bishop of Lincoln his chancellor, and the bishop of Rochester his chaplain. This see hath yielded to the church 18 fants; to the church of Rome, 9 cardinals; to the civil state of England 12 lord chancellors, 4 lord treasurers, and 1 lord chief justice; and 9 chanellers to the University of Oxford. To this see belongs only one archdeacon, viz. of Canterbury. To the cathedral belongs an archbishop, a dean, a chan­cellor, an archdeacon, 12 prebends, 6 preachers, 6 minor canons, 6 substitutes, 12 lay clerks, 10 choristers, 2 masters, 30 scholars, and 12 alfnmen.

CANTERBURY-BELL, in botany: The English name of a species of Campanula.

CANTERUS, (William) an eminent linguist and philologist, was born at Utrecht, in 1542. He studied at Louvain and Paris; and gave surprising proofs of his progress in Greek and Latin literature. He afterwards visited the several universities of Germany and Italy; and died at Louvain, in 1575, aged 37. He understood fix languages, besides that of his native country; and, notwithstanding his dying so young, wrote several philological and critical works, among which are, Note, Scholia, Emendationes, et Explicatio­nes, in Euripide, Sophiæum, Aeschyrum, Cicororum, Properti­um, Aesopium, &c. and many translations of Greek authors.

CANTHARIDES. See CANTHARIS and MELOE.

CANTHARIS, in zoology, a genus of insects belonging to the order of Insecta Coleoptera. The feelers of this genus are fetaceons; the head is margined, and shorter than the head: the elytra, or wing-cases, are flexible; and the sides of the belly are plaited and papillous. Linnaeus enumerates 27 species of the cantharís, most of them to be found in different parts of Europe. The cantharis used in making blistering plasters, is ranked under a different genus, viz. the MELOE.

CANTHI, in anatomy, cavities at the extremities of the eye-lobes, commonly called the corners of the eye: the greater of them, or the greater canthus, is next the nose; the lesser of them, or the little canthus, lies towards the temple.

CANTICLES, a canonical book of the Old Testament, otherwise called the Song of Solomon; by the Jews the Song of Songs, Canticum Canticorum. The book of Canticles is usually supposed to be an epithalamium composed by Solomon, on occasion of his marriage with the king of Egypt's daughter. But those who penetrate farther into the mystery, find in it the marriage of Jesus Christ with human nature, the church, and good men. On this principle the Canticles is held to be a continued allegory, wherein, under the terms of a common wedding, a divine and spiritual marriage is expressed. This long contains the adventures of seven days and seven nights; the exact time allowed for the celebration of marriage among the Hebrews. The Jews themselves, apprehending the book liable to be underfooted in a gross and carnal manner, prohibited the reading of it before the age of 30, and the same usage anciently obtained in the Christian church. Among the ancients, Theodore Mopucetanus rejected the book of Canticles as not divine. Divers rabbins have also questioned its being written by inspiration. It is alleged, that the name of God is not once found in it. Mr Whitton has a different exprefs to prove that the Canticles is not a sacred book of the Old Testament. He alleges it indeed to have been written by king Solomon the son of David; but afferts that it was composed at the time when that prince, blinded by his concubines, was sunk in lust and idola­
This chiefly refers to the general character of vanity and disfigurements which reign in the Canti- tiles; in which there is not, according to W. Cilntiana, where it properly

Mr Whitton will have it to have been taken into the canon long after his landing; particularly, they made these islands, for he and his followers were both Roman camp. The Cantii did not make the same vigorous.

CANTIMARONS, or Cantimarons, and not of half in the water, there being only a place in the

CANTING, a sea-phræse, denotes the act of turning any thing about.

CANTING Language, or dialeet, is a mysterious form of jargon used by gypsies, thieves, and forlorn beggars, to express their feniments to each other, without being understood by the rest of mankind. This dialect is not founded on any rules: yet, even out of that irregularity many words seem to retain something of scholarishness; as for instance, a gown, from *toga* in the Latin; *pamnain*; bread, from *panis*; *cæfan*; cheese, from *caefus*, &c. It is observable, that, even unknown to ourselves, we have adopted some of their terms into our vulgar language: as *kite* and *lick* to cheat; *bounty*, to vapour; *bowfe*, strong drink; *fich*, to steal; *flag*, to whip; *rig*, game or ridicule; *roah*; to rally; *rhino*, money. From the same source proceed the words *fham*, *banter*, *bubble*, *billy*, *sharper*, *cutting*, *fleaffing*, *flaming*, &c. An anonymous author has given a canting dictionary, comprehending all the terms used by the several tribes of gypsies, beggars, shoplifters, highwaymen, foot-pads, and other classes of cheats and villains, with a collection of songs in the canting dialect; London, 1725, 8vo.

CANTIUM, (anc. geog.) a promontory of Brit-ain, literally denoting a head land; giving name to a territory called Cantium, now Kent; and to a people called Cantiis, (Cæfar,), commended for their great humanity and politeness. The promontory now called North Foreland. It is supposed that this was the first district in Britain which received a colony from the continent; and that it had frequently changed its masters, by new colonies coming over from time to time, and driving the inhabitants further north. In the midst of all these revolutions it still retained its ancient name (which was so agreeable to its shape and situation), and gave the name to all the succedaneous tribes by which it was inhabited. Those who polluted the time of the first Roman invasion were evidently of Belgic origin, and had come over so lately, that they differed in nothing from their countrymen on the continent. “The inhabitants of Kent (says Cæsar) are the most civilized of all the Britons, and differ but very little in their manners from the Gauls.” This great resemblance between the people of Kent and their neighbours on the continent, might be partly owing to the situation of their country, which being nearest to the continent, was most frequented by strangers from thence. It was this situation also which exposed them to the first attacks of the Romans. For Cæsar, in both his expeditions into Britain, landed in Kent; and therefore we may conclude, that the Cantii had a great share in the vigorous opposition that was made to his landing, and in the several battles and skirmishes which were fought against him after his landing; particularly, they made a very bold, but unsuccessful attempt, upon his naval camp. The Cantii did not make the same vigorous resistance to the Romans on their next invasion in the reign of Claudius. For Annius Plautius, the Roman general in that expedition, traversed their country without seeing an enemy; and as they now submitted to the power of Rome without a struggle, so they continued in a state of quiet submission to it to the very last. The situation of Cantium occasioned its being much frequented by the Romans, who generally took their way through it in their marches to and from the continent. Few places in Britain are more frequently mentioned by the Roman writers than Rutupium and Portus Rutupensis, most probably Richborough and Stonar. Rutupium was the name in those times that Dover is now: the usual place of embarking for, and landing from, the continent. Before the final departure of the Romans out of Britain, Portus Dubris, now Dover, had become a considerable place, and a well frequented harbour, where the third tert of Antoninus, and, from whence they often embarked for Gaul. Portus Lemanus, supposed to be Lime near Weft Hythe, was also a noted sea-port in these times, and the termination of the fourth tert of Antoninus. Du­robrivæ and Durovernum, now Rochester and Canterbury, were both Roman towns and itations, and are often mentioned in the itinerary and other books. Besides these, there were several other Roman stations, towns, and forts in Cantium, which need not be particular enumerated here. Cantium, in the most perfected state of the Roman government, made a part of the province which was called Flavia Caesariensis.

CANTO denotes a part or division of a poem, answering to what is otherwise called a book. The word is Italian, where it properly signifies sing. Tasso, Ari­osto, and several other Italians, have divided their longer or heroic poems into cantos. In imitation of them,
Scarron has also divided his Gigantomachia, and Boileau his Lutrin, into Cantos or songs. The like usage has been adopted by some English writers, as Butler, who divides his Hudibras, and Dr Garth his Dipin­fary, into Cantos. A late translator of part of Virgil's Aeneid has even subdivided a book of Virgil into several Cantos.

Canto, in the Italian music, signifies a song; hence canto semplice is where all the notes or figures are equal, and called alfo canto fermo; canto figurato, that where the figures are unequal, and express different motions. Canto alfo signifies the treble part of a song; hence canto concertante, the treble of the little chorus; canto ripieno, the treble of the grand chorus, or that which sings only now and then in particular places. Canto signifies the first treble, unless some other word be added to it, as secoondo; in which case it denotes the second treble.

Canton, in geography, denotes a small district or country constituting a distinct government; such are the cantons of Switzerland.

Canton, Quang-tong, or Kanton, one of the southern provinces of China; bounded on the north-east by Fokien, on the north by Kiang-fu, on the west by Quang-tung and the kingdom of Tonking, and every where else by the sea. The country is diversified with hills and plains, and the soil in general so fertile that it produces all crops usual in Europe, as well as many of the fruits of Europe, and those common in other parts of the Indies; the province of Canton produces some peculiar to itself. Abundance of valuable aromatic woods are alfo to be met with in this province, as well as eagle-wood, ebony, &c.; and in the mineral kingdom the province furnishes gold, precious stones, tin, quicksilver, and copper. Silk and sugar are alfo cultivated here, and pearls are fiill up on the coasts; so that every thing which can contribute to the pleasure or convenience of life is to be met with in Canton. One begins (says F. Premare) to have an idea of China, on entering the river Canton. Both sides of it present large fields of rice which resemble green meadows, and extend beyond the reach of flight. They are intersected by an infinite number of small canals, in such a manner that the banks which pafs and repafs in them seem at a distance, while the water which carries them is concealed, to glide along the graves. Farther inland the country appears covered with trees and cultivated along the valleys; and the whole fiene is interfereed with villages, rural seats, and fuch a variety of delightful prospects, that one is never tired of viewing them, and regrets to be obliged to pafs them so quickly.

All the coasts of this province abound with fish, and furnish vast numbers of crabs, oysters, and tortoifes of an immenfe fize. The inhabitants keep a prodigious number of tame ducks, which they hatch in ovens or dangoilfs, though it does not appear that they borrowed this custom from the Egyptians. The docility of these creatures exceeds what we fhould be apt at first to imagine. The inhabitants load a number of small banks with them, and carry them in flocks to feed on the sea-shore, while they fiind shrimps and other animals proper for their nourishment. But though the ducks from the different banks are thus unavoidably mixed together in the day-time, they are easily collected by only beating on a bason, on which they immediately collect themselves into different flocks, and each returns to its proper bark.

In this province the Chinefs have alfo a method of preserving not only the flefh of their ducks in fuch a manner that it loses nothing of its original flavour, but their eggs alfo. The latter operation is performed by covering the eggs with a coat of clay mixed with salt. When mixed in this manner, it fens that the salt has the property of penetrating through the pores of the shell, and thus impregnating the substance in the egg, which it could not do by fimple folution of water.

Canton, though it fuffered much in the Chinefe wars, is at prefent one of the most flourishing provinces of the empire; and being at a great distance from court, its government is one of the most important. A great number of fortresses, many of which are cities provided with numerous Garrifons, have been built along the coasts for the fuppreffion of pirates and robbers; for which purpofe alfo a certain number of troops are kept properly poifed in different parts of the province. It is divided into ten districts, which contain as many cities of the fìrft class, and 84 of the fècond and third. The air in general is warm but healthy, and the people are very induitrious. They poifel in an eminent degree the talent of imitation, fo that if they are only fhewn any European work they can execute others like it with furprising exactness. The moft remarkable cities in the province besides Canton the capital are, 1. Chao-tcheou-fou, chiefly noted for a monaftery of the bonzes in its neighbourhood, to which the adjacent country belongs, and the origin of which is traced back for 8 or 900 years. It has under its jurifiction fix cities of the third class; near one of these grows a reed of which feveral inlroments are made, which cannot be diftinguifhed from real ebony. The air of Chao-tcheou-fou, however, is unhealthy; and great numbers of the inhabitants are carried off annually by contagious diftempers, which prevail from the middle of October to the beginning of December.

2. Kao-tcheou-fou, situated in a delightful and plentiul country. In the neighbourhood is found a fingular kind of stone much resembaling marble, on which are natural representations of rivers, mountains, landsfapes, and trees. These stones are cut into flabs, and made into tables, &c. Crabs are alfo caught on the coasts here, which very much resembife thoufands of Europe; but, fays M. Groifter, they have this singularity, that when taken out of the water, they become petrified without lofing any thing of their natural figure. 3. Kun-tcheou-fou, the capital of the island of Hai-nan. See Hai-nan.

Canton, a large, populous, and wealthy city of China, capital of the province of that name, stands on the banks of the river Ta, or great river, which, near the city, is wide and fpiacious. The wall of the city is very high, and about fix or feven miles in circumference, though not more than one-third of the ground is occupied by buildings, the other parts being appropriated to pleafure grounds or to fish-ponds. The country is extremely pleafant, and towards the eafh hilly, fo as to command a beautiful prospect of the city and inlands, the compafs of which, together, is about ten miles.

The buildings of Canton are in general low, confifting of one story and a ground flour, which is covered with earth or red tiles in order to keep it cool; but the houses
of the most respectable merchants and mandarins are comparatively lofty and well built. In different parts of the city and suburbs are jofu houfes or temples, in which are placed the images worshipped by the Chinese; before whom are placed, at particular feaons, a vast variety of sweetmeats, oranges, great plenty of food ready dressed, and also incense, which is kept perpetually burning. The streets of Canton are long and narrow, paved with flat stones, adorned at intervals with triumphal arches, which have a pleasing effect, and much crowded with people. On both sides are shops as in London, appropriated to the sale of different commodities; and a kind of awning is extended from house to house, which prevents the sun's rays from incommoding either inhabitants or passengers. At the end of every street is a barrier, which, with the gates of the city, are shut in the evening. In China Street, which is pretty long and considerably wider than the rest, reside merchants; whose trade, so far as respects China, lacketed ware, fans, &c. is wholly confined to Europeans. Most of them speak the foreign languages tolerably well, or at least sufficiently intelligible to transact business. Besides these merchants, there is a company of twelve or thirteen, called the Cohong; who have an exclusive right by appointment from authority to purchase the cargoes from the different ships, and also to supply them with tea, raw filks, &c. in return. The establishment of the Cohong, though injurious to private trade, is admirably well adapted for the security of the different companies with which they traffic; because each individual becomes a guarantee for the whole: so that if one fail, the others consider themselves as responsible.

In Canton there are no carriages; all burdens are carried by porters across their shoulders on bamboos; as are also the principal people in reclining chairs, and the ladies always. The streets of Canton may be traversed from morning till evening without seeing a woman; those excepted who are Tartars, and even these but very seldom.

On the wharf of the river, which is commodious and pleasing, stand the factories of the different European nations, viz. the Dutch, French, Swedes, Danes, English, &c. In those reside the supercargoes belonging to their respective companies, who are appointed to dispose of the cargoes brought to market; to supply the ships with others for Europe in return; and, during their absence, to contract with the merchants for such articles as may be judged necessary for the next fleet. Between the residents of the factories the most perfect cordiality subsists; in each a common and splendid table is kept at the company's expense, and visits are reciprocally exchanged; so that nothing is wanting to make residence at Canton agreeable to an European, but the pleasure naturally resulting from the society of women.

The side of the river next the city is covered with boats, which form a kind of town or streets, in which live the poorer part of the Chinese, or rather the descendants of the Tartars. Some of the men come on shore in the morning to their respective employments, and in those sampans or boats which are not stationary, the women and also the men carry passengers from place to place in the same manner as is done by wherries on the Thames. On this river live many thousand souls who never were permitted to come on shore; whose only habitation is their boat; in which they eat, drink, sleep, carry on many occupations, keep ducks, &c. and occasionally a hog.

The manufactures of Canton are principally carried on in the suburbs; though it has been frequently supposed that they were confined to the city; and this, by some writers, has been given as a reason why Europeans are not permitted to enter within the gates. But this is a mistake; and perhaps the true reason for this very singular restraint is, that the houses in which they keep their women are chiefly within the city.

At Wampoo, a large commodious place for anchor-age, and which is about 12 or 14 miles from Canton, the European vessels lie and unload their cargoes, which are transmitted by lighters to the factories; and by the same conveyance receive their respective freights. Between this place and the city are three hoppos, or custom-houses, at which the boats palling and repassing are obliged to stop, and undergo with its passengers an examination, in order to prevent smuggling. The lighters just mentioned, and also the captain's pinnace, are, however, excepted; the former having proper officers on board for the purpose, and the latter being narrowly watched and examined at the landing.

The weather at Canton is, in summer, extremely hot; and in the months of December, January, and February, cold: the country is nevertheless pleasant and healthful, abounding with all the necessaries and delicacies of life, which may be procured on terms much cheaper than in Europe. The number of inhabitants has been estimated at one million; but later calculations have made the number considerably less. N. Lat. 23° 30'. E. Long. 113° 20'.

CANTON, (John) an ingenious natural philosopher, was born at Stroud, in Gloucestershire, in 1718; and was placed, when young, under the care of a Mr Davis, of the same place, a very able mathematician, with whom, before he had attained the age of ten years, he had gone through both vulgar and decimal arithmetic. He then proceeded to the mathematics, and particularly to algebra and astronomy, wherein he had made considerable progress, when his father took him from school, and put him to learn his own business, which was that of a broad cloth weaver. This circumstance was not able to damp his zeal for the acquisition of knowledge. All his leisure time was devoted to the avidous cultivation of astronomical science; and, by the help of the Caroline tables, annexed to "Wing's Astronomy," he computed eclipses of the moon and other phenomena. His acquaintance with that science he applied likewise to the constructing of several kinds of dials. But the studies of our young philosopher being frequently pursed to very late hours, his father, fearing that they would injure his health, forbid him the use of a candle in his chamber any longer than for the purpose of going to bed, and would himself often see that his injunction was obeyed. The son's thirst of knowledge was, however, so great, that it made him attempt to evade the prohibition, and to find means of secreting his light till the family had retired to rest, when he rode to procure undisturbed his favourite pursuits. It was during this prohibition, and at these hours,
In 1752, our philosopher was so fortunate as to be the first person in England, who, by attracting the electric fire from the clouds during a thunder-storm, verified Dr Franklin's hypothesis of the similarity of lightning and electricity. Next year, his paper intitled, "Electrical Experiments, with an attempt to account for their several Phenomena," was read at the Royal Society. In the same paper Mr Canton mentioned his having discovered, by a great number of experiments, that some clouds were in a positive, and some in a negative, state of electricity. Dr Franklin, much about the same time, made the like discovery in America. This circumstance, together with our author's constant defence of the doctor's hypothesis, induced that excellent philosopher, immediately on his arrival in England, to pay Mr Canton a visit, and gave rise to a friendship which ever after continued without interruption or diminution. In the "Lady's Diary for 1756," our author answered the prize question that had been proposed in the preceding year. The question was, "How can we call the shooting of stars be best accounted for; what is the substance of this phenomenon; and in what state of the atmosphere doth it most frequently show itself?" The solution, though anonymous, was so satisfactory to his friend, Mr Thomas Simpson, who then conducted that work, that he sent Mr Canton the prize, accompanied with a note, in which he said, he was sure that he was mistaken in the author of it, as no one besides, that he knew of, could have answered the question. Our philosopher's next communication to the public was a letter in the "Gentleman's Magazine for September 1759," on the electrical properties of the tornatull, in which the laws of that wonderful stone are laid down in a very concise and elegant manner. On December 17th, in the same year, was read at the Royal Society, "An attempt to account for the regular diurnal variation of the Horizontal Magnetic Needle; and also for its irregular variation at the time of an Aurora Borealis." A complete year's observations of the diurnal variations of the needle are annexed to the paper. On Nov. 5, 1761, our author communicated to the Royal Society an account of the Transit of Venus, June 6, 1761, observed in Spital-square. Mr Canton's next communication to the Society, was a letter addressed to Dr Benjamin Franklin, and read Feb. 4, 1762, containing some remarks on Mr Delaval's electrical experiments. On Dec. 16, in the same year, another curious addition was made by him to philosophical knowledge, in a paper, intituled, "Experiments to prove that water is not incompletable." These experiments are a complete refutation of the famous Florentine experiment which so many philosophers have mentioned as a proof of the incompletabillity of water. On St Andrew's day 1763, our author was the third time elected one of the council of the Royal Society; and on Nov. 8, in the following year, were read, before that learned body, his farther "Experiments and observations on the completablility of water, and some other fluids." The establishment of this fact, in opposition to the received opinion, formed on the hasty decision of the Florentine academy, was thought to be deserving of the Society's gold medal. It was accordingly moved for in the council of 1764; and after several invidious delays, which terminated much
much to the honour of Mr Canton, it was presented to him November 30, 1765.

The next communication of our ingenious author to the Royal Society, which we shall take notice of in this place, was on Dec. 22, 1768, being "An easy method of making a Phosphorus that will imbibe and emit light like the Bolognian stone; with experiments and observations." When he first showed to Dr Franklin the instantaneous light acquired by some of this phosphorus from the near discharge of an electriﬁed bottle, the doctor immediately exclaimed, "And God said, let there be light, and there was light." The dean and chapter of St Paul's having, in a letter to the president, dated March 6, 1769, requested the opinion of the Royal Society relative to the best and most effective method of ﬁxing electrical conductors to preserve that cathedral from damage by lightning, Mr Canton was one of the committee appointed to take the letter into consideration, and to report their opinion upon it. The gentlemen joined with him in this business were, Dr Watson, Dr Franklin, Mr Delaval, and Mr Willon. Their report was made on the 8th of June following; and the mode recommended by them has been carried into execution. The last paper of our author's, which was read before the Royal Society, was on Dec. 21, 1769; and contained "Experiments to prove that the Luminousness of the Sea arises from the putrefaction of its animal substances." In the account now given of his communications to the public, we have chiefly confounded ourselves to such as were the most important, and which threw new and distinguished light on various objects in the philosophical world. Besides these, he wrote a number of papers, both in earlier and in later life, which appeared in several different publications, and particularly in the Gentleman's Magazine.

The close and sedentary life of Mr Canton, arising from an unremitted attention to the duties of his profession, and to the prosecution of his philosophical enquiries and experiments, probably contributed to shorten his days. The disorder in which he fell, and which carried him off, was a dropy. His death happened on March 22, 1772, in the 54th year of his age.

CANTONING, in the military art, is the allotting distinct and separate quarters to each regiment, so that the town where they are quartered being divided into as many cantons as there are regiments.

CANTRED, or CANTREF, signifies an hundred villages. It is a British word, compounded of the adjective cant, i. e. hundred; and tref, a town or village. In Wales some of the counties are divided into cantreds, as in England into hundreds.

CANTRE, (from Cantire, signifying a headland); the southern division of the shire of Argyll in Scotland. It is a peninsula, stretching 37 miles from north to south, and seven miles in breadth. It is mostly plain, arable, and populous; inhabited promiscuously by Highlanders and Lowlanders; the latter being invited to settle in this place by the Argyll family, that the lands might be the better cultivated. It gives the title of marquess to the duke, and is by Lochlynn divided from Argyll Proper. This loch is an inlet from the sea, about 60 miles in length and four in breadth, affording heretoof an excellent herring ﬁshery. There are many paltry villages in this country, but no town of any conformation except Campbelltown.

Cantyre was granted to the house of Argyle after a suppression of a rebellion of the Macdonalds of the Isles (and it is suppos'd of this peninsula) in the beginning of the last century, and the grant was afterwards ratified by parliament. The ancient inhabitants were the Macdonals, Mac-eachrains, Mac-kays, and Macmaths.

Mull of CANTREF, the south cape or promontory of the peninsula. There is here a light-house 253 feet above the sea at high-water, situated on the rocks called the Merchants, Lat. 55. 22. Long. 5. 42. west of London. The sound of Ila from the light-house bearing, by the compass, N. by E. distant 27 miles; the south end of Ila N. N. W. distant 25 miles; the north end of Rathlin island, N. W. by W. one half W.; the Maidens Rocks, S. by W. one half W. distant 16 miles; Copeland light, S. by W. one half W. distant 31 miles. The lantern is seen from N. N. E. on S. by W. 1 4th W. and intermediate points of the compass N. of these points.

CANTZ, a town of Silesia in Germany. E. Long. 16. 36. N. Lat. 51. 6.

CANVAS, in commerce, a very clear unbleached cloth of hemp, or flax, woven regularly in little squares. It is used for working tapestry with the needle, by putting the threads of gold, silver, silk, or wool, through the intervals or squares.

CANVAS is also a coarse cloth of hemp, unbleached, somewhat clear, which serves to cover women's stays, also to stiffen men's clothes, and to make some other of their wearing apparel, &c.

CANVAS is also used among the French for the model or first words whereon an air or piece of music is composed, and given to a poet to regulate and ﬁnish. The canvas of a song contains certain notes of the composer, which show the poet the measure of the verses he is to make. Thus Du Lozay says, he has canvas for ten sonnets against the mufic.

CANVAS is also the name of a cloth made of hemp, and used for ship-fails.

CANS, among painters, is the cloth on which they usually draw their pictures; the canvas being smoothed over with a ﬂick-stone, then linned and afterwards whitened over, makes what the painters call their primed cloth, on which they draw their ﬁrst sketches with coal or chalk, and afterwards ﬁnish with colours.

CANUSIUM, (anc. geog.) a town of Apulia, on the right or south side of the Aufidus, to the west of Cannes; whether the Romans ﬂed after the defeat sustained there. It was famous for its red ﬁshing wool; whence those who wore clothes made of it were called Canusineti. Now called CANOSA; which see.

CANUTE, the ﬁrst Danish king of England after Ironside. He married Emma widow of king Eadward; and put to death several persons of quality who stood in his way to the crown. Having thus settled his power in England, he made a voyage to his other kingdom of Denmark, in order to repel the attacks of the king of Sweden; and he carried along with him a great body of the English under the command of the earl of Gwino. This nobleman had here an opportunity of performing a service by which he both reconciled the
C A N

king's mind to the English nation, and, gaining to himself the friendship of his sovereign, laid the foundation of that immense fortune which he acquired to his family. He was stationed next the Swedish camp; and, observing a favourable opportunity which he was obliged suddenly to seize, he attacked the enemy in the night, drove them suddenly from their trenches, threw them into disorder, pursued his advantage, and obtained a decisive victory over them. Next morning, Canute, seeing the English camp entirely abandoned, imagined that these disaffected troops had deserted to the enemy; and he was agreeably surprised to find that they were at that time engaged in pursuit of the discomfited Swedes. He was so pleased with this success, and the manner of obtaining it, that he bestowed his daughter in marriage upon Godwin, and treated him ever after with the most entire confidence and regard.

In another voyage which he afterwards made to Denmark, Canute attacked Norway, and expelled the jot but unwarlike Olans from his kingdom, of which he kept possession till the death of that prince. He had now by his conquests and valor attained the utmost height of his ambition; and having left war and intrigues, he felt the unsatisfactory nature of all human enjoyments; and, equally weary of the glory and turmoils of this life, he began to cast his view towards that future existence which is so natural for the human mind, whether fattied by prosperity or disfigured with adversity, to make the object of its attention. Unfortunately the spirit which prevailed in that age gave a wrong direction to his devotion; and, instead of making atonement to those whom he had formerly injured by his acts of violence, he entirely employed himself in those exercises of piety which the monks represented as most meritorious. He built churches; he endowed monasteries; he enriched ecclesiastics; and he bestowed revenues for the support of chantries at Aflington and other places, where he appointed prayers to be said for the souls of those who had there fallen in battle against him. He even undertook a pilgrimage to Rome, where he founded a considerable church; and, besides obtaining some privileges for the English school erected there, he engaged all the princes through whose dominions he was obliged to pass, to defiit from those heavy impositions and tolls which they were accustomed to exact from the English pilgrims. By this spirit of devotion, no less than by his equitable and politic administration, he gained in a good measure the affections of his subjects.

Canute, who was the greatest and most powerful prince of his time, sovereign of Denmark and Norway as well as of England, could not fail to meet with adulation from his courtiers; a tribute which is liberally paid even to the meanest and weakest of princes. Some of his flatterers breaking out one day in admiration of his grandeur, exclaimed, that every thing was possible for him: upon which the monarch, it is said, ordered a chair to be set on the sea-shore while the tide was making; and, as the waters approached, he commanded them to retire, and to obey the voice of him who was lord of the ocean. He resigned to sit some time in expectation of their submilion; but when the sea still advanced towards him, and began to wash him with its billows, he turned to his courtiers, and remarked to them, That every creature in the universe was frile and impotent, and that power refided with one Being alone, in whose hands were all the elements of nature, who could say to the ocean, “Thus far shalt thou go, and no farther,” and who could level with his nod the most towering piles of human pride and ambition. From that time, it is said, he never would wear a crown. He died in the 20th year of his reign; and was interred at Winchester, in the old monastery.

CAZONE, in music, signifies, in general, a song, where some little fugues are introduced; but it is sometimes used for a sort of Italian poem, usually pretty long, to which music may be composed in the style of a cantata. If this term be added to a piece of instrumental music, it signifies much the same as canzona: if placed in any part of a sonata, it implies the same meaning as allegro, and only denotes that the part to which it is prefixed is to be played or sung in a brisk and lively manner.

CAZONE, a diminutive of canzone, denoting a little short song. The canzonette neapolitanne has two strains, each whereof is sung twice over, as the vaudevilles of the French: The canzonette flaccida is a species of jig, the measure whereof is usually twelve-eighths, and fix-eighths, and sometimes both, as rondeaus.

CAORLO, a small island in the gulf of Venice, on the coast of Friuli, 20 miles south-west of Aquileia, subject to Venice. It has a town of the same name, with a bishop's see.

CAOUTCHOUC, Elastic Resin, or India Rubber, a substance produced from the fyingare-tree of Cayenne, and other parts of South America, and possessed of the most singular properties. No substance is yet known which is so pliable, and at the same time so elastic; and it is farther a matter of curiosity, as being capable of resisting the action of very powerful menstrua. From the account of M. de la Condamine, we learn, that this substance oozes out, under the form of a vegetable milk, from incisions made in the tree: and that it is gathered chiefly in time of rain, because, though it may be collected at all times, it flows then most abundantly. The means employed to infiltrate and insinuate it, M. de la Borde says, are kept a profound secret. M. Bomare, and others, affirm, that it thickens and hardens gradually by being exposed to the air; and as soon as it acquires a solid consistence, it manifests a very extraordinary degree of flexibility and elasticity. Accordingly the Indians make boots of it, which water cannot penetrate, and which, when smoked, have the appearance of real leather. Bottles are also made of it, to the necks of which are fastened hollow reeds, so that the liquor contained in them may be squirited through the reeds or pipes by preasure. One of these filled with water is always preferred to each of the gueftas at their entertainments, who never fail to make use of it before eating. This whimfical custom led the Portuguese in that country to call the tree that produces this resin pa di xirina, and hence the name of siringat is given both to the tree and to its resinous production. Flambeaux, an inch and a half in diameter, and two feet long, are likewise made of this resin, which give a beautiful light, have no bad smell, and burn twelve hours. A kind of cloth is also prepared from it, which the
the inhabitants of Quito apply to the same purposes as our oil-cloth and fail-cloth. It is formed, in fine, by means of moulds, into a variety of figures for use and ornament; and the process is said to be thus:—The juice, which is obtained by incision, is spread over pieces of clay formed into the desired shape, and as fast as one layer is dry, another is added, till the vehicle be of the proper thickness; the whole is then held over a strong smoke of vegetables on fire, whereby it hardens into the texture and appearance of leather; and before the finishing, while yet soft, is capable of having any impression made on the outside, which remains ever after. When the whole is done, the inside mould is picked out.

Ever since this resin has been known in Europe, its chemical qualities, and other interesting properties, have been very diligently investigated. In particular, it has been endeavored to discover some method of dissolving it in such a manner that it would assume different figures with equal facility, and elegance, and other solvents, render it extremely fit for the construction of tubes, catheters, and other instruments, in which these properties are wanted. In order to form this resin into small tubes, M. Macquer prepared a solid cylindrical mould of wax, of the desired size and shape; and then dipping a pencil into the ethereal solution of the resin, dabbed the mould with it, till he had covered it with a coat of resin of a sufficient thickness. The whole piece is then thrown into boiling water; by the heat of which the wax is soon melted, and rises to the surface, leaving the resinous tube completely formed behind.

A resin similar to this was some years ago discovered by M. Poivre, in the isle of France; and there are various milky juices extracted from trees in America and elsewhere, which by previous mixtures and preparations are formed into an elastic resin, but of an inferior quality to that of Cayenne: such, for instance, are the juices obtained from the Cecropia peltata, the Ficus religiosa and indica, etc.

Of the genuine trees, those growing along the banks of the river of the Amazonas are described by M. Condamine as attaining a very great height, being at the same time perfectly straight, and having no branches except at top, which is but small, covering no more than a circumference of ten feet. Its leaves bear some resemblance to those of the manioc: they are green on the upper part, and white beneath. The seeds are three in number, and contained in a pod consisting of three cells, not unlike those of the ricinus or palma Christi; and in each of them there is a kernel, which being stripped and boiled in water produces a thick oil or fat, answering the purposes of butter in the cookery of that country.

A method of dissolving this elastic gum without ether, for the purposes of a varnish or the like, is as follows: Take one pound of the spirit of turpentine, and a pound of the gum cut into very small pieces; pour the turpentine into a long-necked matrass, which must be placed in a sand-bath; throw in the gum, not all at once, but by little and little according as it is perceived to dissolve: When it is well dissolved, pour into the matrass a point of nut or linseed oil, or oil of poppies, rendered diffusive in the usual manner with litharge: Then let the whole boil for a quarter of an hour, and the preparation is finished. This would make an excellent varnish for air-balloons, were it not so expensive on account of the price of the gum. Another method, invented by Mr Baldwin, is as follows. Take any quantity of the caoutchouc, as two ounces avoidopis: cut it into small bits with a pair of scissors. Put a strong iron ladle (such as plumbers or glaziers melt their lead in) over a common pot-coal or other fire. The fire must be gentle, glowing, and without smoke. When the ladle is hot, much be-
low a red heat, put a single bit into the ladle. If black smoke issues, it will presently flame and disappear; or it will evaporate without flame; the ladle is then too hot. When the ladle is less hot, put in a second bit, which will produce a white smoke. This white smoke will continue during the operation, and evaporate the caoutchouc: therefore no time is to be lost; but little bits are to be put in, a few at a time, till the whole are melted. It should be continually and gently stirred with an iron or brass spoon. Two pounds, or one quart, of the best drying oil (or of raw linseed oil which, together with a few drops of neats foot oil, which, together with a few drops of neats foot oil, will make the caoutchouc: therefore no time is to be lost; and evaporation of the allcient Romans, was to denote that they had acquired full liberty, and were no longer subject to the rod of their superiors; in imitation of the ancient Romans, who gave a pileus, or cap, to their slaves, in the ceremony of making them free: whence the proverb, Vocare ferues ad pileum. Hence, also, on medals, the cap is the symbol of liberty, whom they represent holding a cap in her right hand, by the point.

The Romans were many ages without any regular covering for the head: when either the rain or sun was troublesome, the lappet of the gown was thrown over the head; and hence it is that all the ancient statues appear bareheaded, excepting sometimes a wreath, or the like. And the same usage obtained among the Greeks, where, at least during the heroic age, no caps were known. The form of caps or covers of the head in use among the Romans on divers occasions, were the pileus, pileus, cucullus, galerus, and palladium; the differences between which are often confounded by ancient as well as modern writers.

The French clergy wear a shallow kind of cap, called calotte, which only covers the top of the head, made of leather, satin, worsted, or other stuff. The red cap is a mark of dignity allowed only to those who are raised to the cardinalate. The peculiar clergy are distinguished by black leathern caps, the regulars by knot and worsted ones.

Churchmen, and the members of univeristies, students in law, physic, &c. as well as graduates, wear square caps. In most universities doctors are distinguished by peculiar caps, given them in assuming the doctorate. Wickliff calls the canons of his time bisfercati, from the caps. Pasquier observes, that in his time, the caps worn by the churchmen, &c. were called square caps; though, in effect, they were round yellow caps.

The Chinese have not the use of the hat, like us; but wear a cap of a peculiar structure, which the laws of civility will not allow them to put off: it is different for the different feasons of the year: that used in summer is in form of a cone, ending at top in a point. It is made of a very beautiful kind of mat, much valued in that country, and lined with satin: to this is added, at top, a large lock of red silk, which falls all round as low as the bottom; so that in walking, the silk fluctuating regularly on all sides, makes a graceful appearance: sometimes, instead of silk, they used a kind of blackish red hair, the luffre whereof no weather efficaces. In winter they wear a plash cap, bordered with marlcat's or fox's skin: as to the rest, like those for the summer. These caps are frequently fold for eight or ten crowns: but they are so short, that the ears are exposed.

The cap is sometimes used as a mark of infamy; in Italy the Jews are distinguished by a yellow cap; at Lucca by an orange one. In France, those who had been bankrupts were obliged ever after to wear a green cap, to prevent people from being imposed on in any future commerce. The French heart (arts in 1564, 1622, 1628, 1688, it was decreed, that if they were at any time found without their green cap, their protection should
should be null, and their creditors impoverished to call them into prison: but the sentence is not now executed.

**Cap of Maintenance**, one of the regalia, or ornaments of state belonging to the kings of England, before whom it was carried at the coronation and other great solemnities. **Caps of Maintenance** are also carried before the mayors of the several cities in England.

**Cap**, in ship building, a strong, thick, block of wood, used to confine two masts together, when one is erected at the head of the other in order to lengthen it. It is for this purpose furnished with two holes perpendicular to its length and breadth, and parallel to its thickness: one of these is square, and the other round; the former being solidly fixed upon the upper end of the lower mast, whilst the latter receives the mast employed to lengthen it, and secures it in this position.

**CAPACIO**, an episcopal town of Italy, in the kingdom of Naples, and in the Hither Principato. E. Long. 15. 18. N. Lat. 40. 40.

**CAPACITY**, in a general sense, an aptitude or disposition to hold or retain any thing.

**CAPACITY**, in geometry, is the solid contents of any body; also our hollow measure for wine, beer, corn, salt, &c. are called **measures of capacity**.

**CAPACITY**, in law, the ability of a man, or body politic, to give or take lands or other things, or fix actions.

**English law** allows the king two capacities: a natural, and a political: in the first, he may purchase lands to him and his heirs; in the second, to him and his successors. The clergy of the church of England have the like.

**CAPARASON**, or **CAPARISON**, the covering or clothing laid over an horse; especially a sumptuous horse, or horse of state. The word is Spanish, being an augmentative of **cape**, **caput**, head.

Anciently the caparasons were a kind of iron armour, wherewith horses were covered in battle.

**CAPE**, in geography, an high land running out with a point into the sea, as Cape-Nord, Cape-Horn, the Cape of Good Hope, &c.

**CAPE-Elk.** See CERVUS.

**CAPE-Bret.** See BRETON.

**CAPE-Coafl Caffle.** See COAST.

**CAPE-Goode Hope.** See GOOD HOPE.

**CAPE-Verd.** See VERC

**CAPELL, (Edward)** a gentleman well known by his indefatigable attention to the works of Shakespeare, was a native of the county of Suffolk, and received his education at the school of St. Edmund's Bury. In the dedication of his edition of Shakespeare, in 1768, to the duke of Grafton, he observes, that "his father and the grandfather of his grace were friends, and to the patronage of the deceased nobleman he owed the leisure which enabled him to bestow the attention of 20 years on that work." The office which his grace bestowed on Mr Capell was that of Deputy-Inspector of the plays, to which a salary is annexed of 200l. a-year. So early as the year 1745, as Mr Capell himself informs us, shook at the licentiously of Hanmer's plan, he first projected an edition of Shakespeare, of the strictest accuracy, to be collated and published, in due time, ex fide codicem. He immediately proceeded to collect and compare the oldest and rarest copies; noting the original excellencies and defects of the rarest quartos, and distinguishing the improvements or variations of the first, second, and third folios: and, after many years labour, produced a very beautiful small octavo, in 10 volumes, with "an Introduction." There is not, the authors of the Monthly Review observe, among the various publications of the present literary era, a more singular composition than that "Introduction." In style and manner, it is more obsolete and antique than the age of which it treats. It is Lord Herbert of Cherbury, walking the new pavement in all the trappings of romance: but, like Lord Herbert, it displays many valuable qualities accompanying this air of extravagance, much found lovely, and appropriate erudition. In the title-page of "Mr William Shakespeare his Comedies, Histories, and Tragedies," it was also announced and promulgated, "Whereunto will be added, in some other volumes, notes critical and explanatory, and a body of various readings entire." "The Introduction" likewise declared, that these "notes and various readings" would be accompanied with another work, disclosing the sources from which Shakespeare "drew the greater part of his knowledge in mythological and classical matters, his fable, his history, and even the seeming peculiarities of his language—to which," says Mr Capell, "we have given for title, The School of Shakespeare." Nothing surely could be more properly conceived than such designs, nor have we ever met with any thing better grounded on the subject of "the learning of Shakespeare" than what may be found in the long note to this part of Mr Capell's Introduction. It is more solid than even the popular "Eddy" on this topic. Certain quaintnesses of style, and peculiarities of printing and punctuation, attended the whole of this publication. The outline, however, was correct; and the critic, with unremitting toil, proceeded in his undertaking. But while he was diving into the classics of Caxton (to continue the Reviewers account), and working his way underground, like the river Mole, in order to emerge with all his glories; while he was looking forward to his triumphs; certain other active spirits went to work upon his plan, and, digging out the promised treasures, laid them prematurely before the public, defeating the effect of our critic's discoveries by anticipation. Steevens, Malone, Farmer, Percy, Reed, and a whole host of literary ferrets, burrowed into every hole and corner of the warrens of modern antiquity, and overran all the country, whose map had been delineated by Edward Capell. Such a contingency nearly staggered the steady and unshaken perseverance of our critic, at the very eve of the completion of his labours, and as his editor informs us—for, alas! at the end of near 40 years, the publication was posthumous, and the critic himself no more!—he was almost determined to lay the work wholly aside. He persevered, however, by the encouragement of some noble and worthy persons: and to such their encouragement, and his perseverance, the public was, in 1783, indebted for three large volumes in 4to, under the title of "Notes and various readings of Shakespeare; together with the School of Shakespeare, or Extracts from divers English Books,
CAPERNAUM, a town of Galilee, was the home of Jesus Christ. It was a center for commerce and trade, and it was the place where Jesus taught and performed miracles. The town was located on the Sea of Galilee, and it was a hub of activity for the early Christian church. It was also known for its strategic location, making it a point of contention for control during the Roman Empire. The town was later abandoned and became a ruin until it was rediscovered and studied by archaeologists in the 19th century.

CAPEROLANS, a congregation of religious in Italy, so called from Peter Caperole, their founder, in the 13th century.

The Milanci and Venetians being at war, the enemies occasioned thereby spread itself to the very confines. The superiors of the province of Milan, of minor brothers, which extended itself as far as the territories of the republic of Venice, carried it so haughtily over the Venetians, that those of the convicts of Brescia resolved to shake off a yoke which was grown infupportable to them. The superiors, informed of this, expelled out of the province those whom they considered as the authors of this design; the principal of whom were Peter Capero, Matthew de Tharvillo and Bonaventure of Brescia. Peter Capero, a man of an enterprising genius, found means to separate the convents of Brescia, Bergamo, and Cremona, from the province of Milan, and subject them to the conventuals. This occasioned a law-suit between the vicar-general and these convents, which was determined in favour of the latter; and these convents, in 1475, by the authority of Pope Sixtus IV, were erected into a difficult vicariate, under the title of Brescia. This not satisfying the ambition of Capero, he obtained, by the interposition of the Doge of Venice, that this vicariate might be erected into a congregation, which was called from him Capero. This congregation still subsists in Italy, and is composed of 24 convents, situated in Brescia, Bergamo, and Cremona.

CAPERQUIN, a town in Ireland, in the county of Waterford, and province of Munster, situated on the river Blackwater. W. Long. 7. 50. N. Lat. 52. 5.

CAPESTAN, a town of France, in Lower Languedoc, in the diocese of Narbonne, and near the royal canal. E. Long. 3. 5. N. Lat. 43. 35.

CAPH, a Jewish measure of capacity for things estimated by Kimchi at the 20th part of the log, by Arbuthnot at the 16th part of the hin, or 22d of the shea, amounting to five-eighths of an English pint. The caph does not occur in Scripture as the name of any measure.

CAPHAR, a duty which the Turks raise on the Christians who carry or send mercantile from Aleppo to Jerusalem and other places in Syria.

This duty of caphar was first imposed by the Christians themselves, when they were in possession of the Holy Land, for the maintenance of the troops which were planted in difficult passes to observe the Arabs and prevent their incursions. It is still continued, and much increased by the Turks, under pretence of defending the Christians against the Arabs; with whom, nevertheless, they keep a secret intelligence, favouring their excursions and plunderings.

CAPHTOR, (anc. geog.) a town or district of Higher Egypt; and hence the people called Caphtorim or Caphtorati. — Caphtor is an island of Egypt, At Caphtor, (Jeremiah); probably one of those in the Nile. Dr Wells supposes it to be Copa, which floods in a small island. Thence came the Caphtorim or Caphtarati, in Palestine; who with the Philistines confined to extirpate the Hevaei; and whose name was swallowed up in that of the Philistines.

CAPI-A-GA, or CAPI-AGA, a Turkish officer who is governor of the gates of the seragli, or grand master of the seragli.
C'apilla­ment, lIlent of his table, and allows him at the rate of tabcvt fixty judgment in an french is very moderate; the grand abundance of
is of divers kinds; as, itops his hand. The capi­aga cannot be balhaw when he
an original is
qntis his pofl.

£ftten afpel's which the

CAPIAS

CAPIA$ Ut!egatum,

CAPIGI,

Cuccicapigi-Baffa,

capiga, in law, a writ of two forts; one before

CAPIAS pro Fine, is a writ lying where a person is

CAPIAS in Withernam, a writ that lies for cattle in

CAPIG1, a porter or door-keeper of the Turkish

CAPILLARY Tubes, in physics, are small pipes of glafs, whose canals are extremely narrow, their diameter being

The accent of water, &c. in capillary tubes, is a phenomenon that has long embarrasfed the philosophers:

In order to account for this phenomenon, it will be necessary first to premife, that the attraction between

Now these particles form a periphery contiguous to the surface, the upper part of which attracts and raises the surface, while the lower part, which is in contact with it, supports it: so that neither the thickness nor length of the tube is of any confequence here; the periphery of particles only, which is always proportionable to the diameter of the bore, is the only acting power. The quantity of the fluid raised will therefore be as the surface of the bore which it fills, that is, as the diameter; for otherwise the effect would not be proportional to the cause, since the quantities are always as the ratio of the diameters; the heights therefore to which the fluids will rise, in different tubes, will be inversely as the diameters.

Some doubt whether the law holds throughout, of the accent of the fluid being always higher as the tube is smaller: Dr Hook's experiments, with tubes almost as fine as cobwebs, seem to shew the contrary. The water in these, he observes, did not rise so high as one would have expected. The highest he ever found it, was at 21 inches above the level of the water in the basin; which is much short of what it ought to have been by the law abovementioned. See Cohesion.

CAPILLARY Vejfels. Many small veffels of animal bodies have been discovered by the modern invention of injecting the veffels of animals with a coloured fluid which
CAPILLUS VENERIS. See A DIANTHUM.

CAPILPUS, or CAPILPUS, (Camillus), a native of Mantua, in the 16th century. He wrote a book, entitled, The Stratagem; in which he relates not only what was perpetrated at Paris during the massacre on St. Bartholomew's day, but also the artful preparations which preceded that horrid massacre. It is, however, blended with a great number of falsities.

CAPILPUS, (Lechus) an Italian poet, brother to the former, made himself famous by his Centos of Virgil. The manner in which he applied Virgil's expressions to represent things which the poet never dreamt of, is admirably. His Cento again! but answering had the superintendency of the choir, or band of music, to perform their duty.

The capilpus is also called 

CAPISTCOLUS, in ecclesiastical writers, denotes a dignitary in certain cathedrals, who had the superintendency of the choir, or band of music, answering to what in other churches is called chanter or precentor. The word is also written cabifcola, and capitahola, q. d. the head of the school, or band of music.

The capilpus is also called iosalicnus, as having the instruction of the young clerks and choristers, how to perform their duty.

CAPITA, (distribution by) in law, signifies the appointing to every one an equal share of a personal estate; when all the claimants claim in their own rights, as in equal degrees of kindred, and not due representation.

CAPITA, (succession by), where the claimants are next in degree to the ancestor, in their own right, and not by right of representation.

CAPITAL, of the Latin caput, "the head," is used on various occasions, to express the relation of a head, chief, or principal: thus,

CAPITAL City, in geography, denotes the principal city of a kingdom, state, or province.

CAPITAL Stock, among merchants, bankers, and traders, signifies, the sum of money which individuals bring to make up the common flock of a partnership when it is first formed. It is also said of the flock which a merchant at first puts into trade for his account. It likewise signifies the fund of a trading company or corporation, in which the word flock is generally added to it. Thus we say, the capital flock of the bank, &c. The word capital is opposed to that of profit or gain, though the profit often increases the capital, and becomes of itself part of the capital, when joined with the former.

CAPITAL Crime, such a one as subjects the criminal to capital punishment, that is, to loss of life.*

CAPITAL Punishment, in painting, denotes one of the finest and most excellent pieces of any celebrated master.

CAPITAL Letters, in printing, large or initial letters, wherein titles, &c. are composed; with which all periods, verbes, &c. commence; and wherewith also all proper names of men, kingdoms, nations, &c. begin. The practice which, for some time, obtained among our printers, of beginning every sublative with a capital, is now justly fallen into disrepute; being a manifest perversion of the design of capitals, as well as an offence against beauty and distinctness.

CAPITAL, in architecture, the uppermost part of a column or pillar, serving as the head or crowning, and placed immediately over the shaft, and under the entablature. See ARCHITECTURE.

CAPITANA, or CAPTAIN Galley, the chief or principal galley of a state, not dignified with the title of a kingdom. The capitana was anciently the denomination of the chief galley of France, which the commander went on board of. But since the suppression of the office of captain-general of the galleys in 1669, they have no capitana, but the first galley is called reale, and the second parere.

CAPITANATA, one of the 12 provinces of the kingdom of Naples, in Italy, bounded on the north by the Gulph of Venice, on the east by the Terra di Barri, on the south by the Basilicata and the Farther Principato, and on the west by the county di Molife and a small part of Hither Abruzzo. It is a level country, without trees; the soil sandy, the air hot; the land, however, near the rivers is fertile in pastures. The capital town is Manfredonia.

CAPITANEATE, in a general sense, the same with capitania. Capitanes, in Prussia, are a kind of noble-fends, or serjeants, which, besides their revenue, raise their owners to the rank of nobility. They are otherwise called serjes.

CAPITANEUS, in ancient law writers, denotes a tenant in capite, or chief.

CAPITANEUS Ecclesiae, the same with advocate.

CAPITANIA, in geography, an appellation given to the 12 governments established by the Portuguese in the Brails.

CAPITATION, a tax or imposition raised on each person, in proportion to his labour, industry, office, rank, &c. It is a very ancient kind of tribute. The Latins call it tributum, by which taxes on persons are distinguished from taxes on merchandise, which were called verbilia.

Capitations are seldom practised but in great exigencies of state. In France the capitation was introduced by Louis XIV. in 1669; and is a tax very different from the taille, being levied from all persons, whether they be subject to the taille or not. The clergy pay no capitation, but the princes of the blood are not exempted from it.

CAPITAE, in law, (from capas; i.e. rent; whence tenere in capite, is to hold of the king, the head or lord paramount of all the lands in the kingdom): an ancient tenure of land, held immediately of the king, as of his crown, either by knight's service, or by socage. It is now abolished. See TENURE.

CAPITE Cons, in antiquity, the lowest rank of Roman citizens, who in public taxes were rated the least of all, being such as never were worth above 365 asses. They were supposed to have been thus called, because they
they were rather counted and marshalled by their heads
than by their effects. The capite consilii made part of the
sixth class of citizens, being below the proletarii, who
formed the other moiety of that class. They were not
enrolled in the army, as being judged not able to support
the expense of war; for in those days the soldiers
maintained themselves. It does not appear, that before
Caesar Marius any of the Roman generals lifted
the capite consilii in their armies.

CAPITOL, CAPITOLIUM, in antiquity, a famous
fort or castle, on the Mons Capitolinus at Rome, where-
in was a temple dedicated to Jupiter, thence also de-
nominated Capitolinus, in which the senate anciently
assembled; and which still serves as the city-hall, or
town-house, for the meeting of the conferrators of the
Roman people.—It had its name capitol, from caput, a
man's head, said to have been found fresh, and yet
bleeding, upon digging the foundation of the temple
built in honour of Jupiter. Arnobius adds, that the
fort or citadel of the Roman people.—It had its name
tempeemenai, the year of Rome 139. His successor Servius
was called the other moiety of the temple to Jupiter; and two wings; the one consecrated to Juno,
his sceptre, and the other to Minerva:

The capitol consisted of three parts; a nave sacred
to Jupiter; and two wings, where the Senate, the
frontispiece and sides were surrounded with galleries, in
which those who were honoured with triumphs
entered the senate at a magnificent banquet, after the fa-
crifices had been offered to the gods.

Both the inside and outside were enriched with an in-
finity of ornaments, the most distinguished of which
was the statue of Jupiter, with his golden thunderbolt,
his sceptre, and crown. In the capitol also were a
temple to Jupiter the guardian, and another to Juno,
with the mint; and on the summit of the hill was the
temple of Concord. This beautiful edifice contained
what passed in his tithing, and to inform the inhabitants
of the Sybil's, &c.

The capitol was burnt under Vitellius, and rebuilt
under Vespasian. It was burnt a second time by light-
ing under Titus, and restored by Domitian.

Anciently the name capitol was likewise applied to
all the principal temples, in most of the colonies
throughout the Roman empire; as at Constantinople,
Jerusalem, Carthage, Ravenna, Capua, &c.—That of
Thoulofle, has given the name of capitaus to its sche-
vis or citizens.

CAPITOLINE GAMES, annual games instituted by
Camillus, in honour of Jupiter Capitolinus, and in com-
memoration of the capitol's not being taken by the
Gauls. Plutarch tells us, that a part of the ceremony
confisted in the public criers putting up the Hieramis
fale by auction: they also took an old man, and try-
ing a golden bulla about his neck, exposed him to the
public derision. Pausanias says they also dressed him in a
prize. In the year of another kind of Capitoline games
instituted by Domitian, wherein were rewards
and crowns bestowed on the poets, champions, orators,
historians, and musicians. These last Capitoline games
were celebrated every five years, and became so famous,
that instead of calculating time by idraa, they began
to count by Capitoline games, as the Greeks did by O-
ympia. It appears, however, that this custom was
not of long continuance.

CAPITOLINUS, (Julius) an historian in the begin-
going of the fourth age under Dioecletian, to whom
he ascribed the Lives of Venus, Antoninus Pius, Clod-
ianus Balbinus, Macrinus, the Maximi, and the Gor-
dians. He wrote other lives, which are most of them
lost.

CAPITOUL, or CAPITOL, an appellation given
to the chief magistrates of Thoulofle, who have the ad-
ministration of justice and policy both civil and mer-
cantile in the city. The capitouls at Thoulofle are
much the same with the chevins at Paris, and with the
consuls, bailiffs, burger-masters, mayors, and aldermen,
&c. in other cities. In the ancient acts they are called
confules capitularii or capitouls, and their body capitou-
lim. From this last come the words capitularii and
capitolus. The appellation was derived from hence,
that they have the charge and custody of the town-hou-
se which was ancienlly called capitol.

The office only lasts one year, and ennobles the bear-
ers. In some ancient acts they are called capitulum no-
itum Toulouse. Those who have borne it, flyle them-
seif afterwards burgesses. They are called to all gen-
eral councils, and have the justimagnum; that is, that,
when the year of their administration is expired, their pic-
ures are drawn in the town-house: a custom which
they have retained from the ancient Romans, as may
be seen in Sigeinus.

CAPITOULATE, an appellation given to the
several quarters or districts of the city of Thoulofle,
each under the direction of a capitoul; much like the
wards of London, under their aldermen. Thoulofle
is now divided into eight capitoulates or quarters, which
are subdivided into musterus, each of which has its
ating-man, whose business is to inform the capitoul of
what passes in his tithing, and to inform the inhabitants
of the tithing of the orders of the capitoul.

CAPITULAR, or CAPITULARY, denotes an act
passed in a chapter, either of knights, canons, or reli-
gious.

The capitularia, or capitularies of Charlemagne, Charles
the Bald, &c. are the laws, both ecclesiastical and ci-
vil, made by those emperors in the general councils
or assemblies of the people; which was the way in which
the constitutions of most of the ancient princes were
made; each person present, though a plebeian, lefing
his hand to them.

Some distinguish these from laws; and say, they
were only supplements to laws. They had their name,
capitulars, because divided into capitula, chapters, or
sections. In these capitulars did the whole French
government of the clergy, and the French jurisprudence
anciently consist. In process of time, the name was changed for that of ordinances.

Some distinguish three kinds of capitulars, according
to the difference of their subject-matter: those on ec-
clesiastical affairs, are really canons, extracted from
councils; those on secular affairs, real laws; those re-
ating to particular persons, or occasions, private reg-
ulations.

CAPITULATION, in military affairs, a treaty
made between the inhabitants or garrison of a place
besieged
 CAP [ 138 ]

Cappadocia, a considerable town of Italy, in Istria, on the gulf of Trieste, with a bishop’s see, and subject to the Venetians. The air is wholesome and temperate; its principal revenue consists in wine and salt. E. Long. 14. 0. N. Lat. 45. 48.

CAPON, a cock-chicken, gilded as soon as left by the dam, or as soon as he begins to crow. They are of use either to lead chickens, ducklings, pheasants, &c. and defend them from the kites and buzzards; or to feed for the table, they being reckoned more delicate than either a cock or a hen.

CAPONIERE, or CAPONIERE, in fortification, a covered lodgement, sunk four or five feet into the ground, encompassed with a little parapet about two feet high, serving to support several planks covered with earth. The caponiere is large enough to contain 15 or 20 soldiers; and is usually placed in the glacis on the extremity of the counter-scarp, and in dry moats; having little embrasures for the soldiers to fire through.

CAPPADOCIA, an ancient kingdom of Asia, comprehending all that country which lies between Taurus and the Euxine sea. It was divided by the Persians into two satrapics or governments; by the Macedonians into two kingdoms, the one called Cappadocia ad Taurus; the other, Cappadocia ad Pontum, and commonly Pontus; for the history, &c. of which last, see the article Pontus.

CAPPADOCIA Magna, or Cappadocia properly so called, lies between the 38th and 41st degrees of north latitude. It was bounded by Pontus on the north, Lycaonia and part of Armenia Major on the south, Galatia on the west, and Euphrates and part of Armenia Minor on the east. The first king of Cappadocia we read of in history was Pharnaces, who was preferred to the crown by Cyrus king of Persia, who gave him his sister Atossa in marriage. This is all we find recorded of him, except that he was killed in a war with the Hyrcanians. After him came a succession of eight kings, of whom we know scarce any thing but that they continued faithful to the Persian interest. In the time of Alexander the Great, Cappadocia was governed by Ariarathes II. who, notwithstanding the vast conquests and fame of the Macedonian monarch, continued unshaken in his fidelity to the Persians. Alexander was prevented by death from invading his dominions; but Perdiccas marching against him with a powerful and well disciplined army, dispersed his forces, and having taken Ariarathes himself prisoner, crucified him, with all those of the royal blood whom he could get into his power. Diódorus tells us that he was killed in the battle. He is said to have reigned 82 years. His son Ariarathes III. having escaped the general slaughter of the royal family, fled into Armenia, where he lay concealed, till the civil divisions which arose among the Macedonians gave him a fair opportunity of recovering his paternal kingdom. Amynates, at that time the governor of Cappadocia, opposed him; but being defeated in a pitched battle, the Macedonians were obliged to abandon all the strong holds. Ariarathes, after a long and peaceable reign, left his kingdom to his son Ariarathes II. He applied himself more to the arts of peace than war, in consequence of which Cappadocia flourished greatly during his reign. He was succeeded by his son Ariarathes IV. who
CAPPADOCIA, who proved a very warlike prince, and having overcome Artsaces, founder of the Parthian monarchy, considerably enlarged his own dominions.

He was succeeded by Ariarathes V. who marrying the daughter of Antiochus the Great, entered into an alliance with that prince against the Romans: but Antiochus being defeated, the king of Cappadocia was obliged to sue for peace, which he obtained, after having paid 200 talents by way of fine, for taking up arms against the people of Rome. He afterwards offered the republic with men and money against Peripius king of Macedon, on which account he was by the senate honoured with the title of the friend and ally of the Roman people. He left the kingdom in a very flourishing condition to his son Mithridates, who on his accession took the name of Ariarathes VI.

This prince (furnamed Philotas, from the filial respect and love he showed his father from his very infancy) immediately renewed the alliance with Rome. Out of mere good-nature he restored Mithrobuzanes to Ladiades king of Lesser Armenia to his father's kingdom, though he foresaw that the Armenians would lay hold of that opportunity to join Artaxias, who was then on the point of invading Cappadocia. These differences, however, were settled before they came to an open rupture, by the Roman legates; and Ariarathes seeing himself thus delivered from an impending war by the mediation of the republic, permitted the senate with a golden crown, and offered his service wherever they thought proper to employ him. The senate in return sent him a staff, and chair of ivory; which were presents usually bestowed on those only whom they looked upon as attached to their interest. Not long before this, Demetrius Soter king of Syria had offered Ariarathes his sister in marriage, the widow of Peripius king of Macedon: but this offer the king of Cappadocia was obliged to decline for fear of offending the Romans; and his做得 was in the highest degree acceptable to the republic, who reckoned him among the chief of her allies. Demetrius, however, being, greedy immunity at the flight put upon his sister, set up a pretender to the throne, one Orophernes, a sophist, or, as others call him, a natural son of the deceased king. The Romans ordered Eumenes king of Pergamus to assist Ariarathes with all his forces: which he did, but to no purpose: for the confederates were overthrown by Demetrius, and Ariarathes was obliged to abandon the kingdom to his rival. This happened about 155 years before Christ, and the usurper immediately dispatched embassadors to Rome with a golden crown. The senate declined accepting the present, till they heard his pretensions to the kingdom; and this Orophernes, by falsified witnesse, made appear so plain, that the senate decreed that Ariarathes and he should reign as partners; but next year, Orophernes was driven out by Attalus brother to Eumenes, and his successor to the kingdom of Pergamus.

Ariarathes, being thus restored, immediately demanded of the Priennians 400 talents of gold which Orophernes had deposited with them. They honestly replied, that as they had been trusted with the money by Orophernes, they could deliver it to none but himself, or such as came in his name. Upon this, the king entered their territories with an army, destroying all with fire and sword. The Priennians, however, still persevered in their integrity; and though the city was besieged by the united forces of Ariarathes and Antiochus, not only made an obstinate defence, but found means to restore the fine to Orophernes. At last they applied to the Romans for assistance, who enjoined the two kings to raise the siege, under pain of being declared enemies to the republic. Ariarathes immediately obeyed; and marching his army into Assyria, joined Alexander Zephyrius against Demetrius Soter, by whom he had been formerly driven out of his kingdom.

In the very first engagement Demetrius was slain, and his army entirely dispersed, Ariarathes having on that occasion given uncommon proofs of his courage and conduct. Some years after, war breaking out between the Romans and Artilbonicus, who claimed the kingdom of Pergamus in right of his father, Ariarathes joined the former, and was slain in the same battle in which P. Grassus proconsul of Asia was taken, and the Roman army cut in pieces. He left six sons by his wife Laodice, on whom the Romans bestowed Lycaonia and Cilicia. But Laodice, fearing left her children when they came of age, should take the government out of her hands, poisoned five of them; the youngest only having escaped her cruelty by being conveyed out of the kingdom. The queen herself was soon after put to death by her subjects, who could not bear her cruel and tyrannical government.

Laodice was succeeded by Ariarathes VII. who soon after his accession, married another Laodice, daughter of Mithridates the great, hoping to find in that prince a powerful friend to support him against Nicomedes king of Bithynia, who laid claim to part of Cappadocia. But Mithridates instead of assisting, procured one Gordius to poison his unhappy son-in-law; and, on his death, feizd the kingdom, under pretence of maintaining the rights of the Cappadocians against Nicomedes, till the children of Ariarathes were in a condition to govern the kingdom. The Cappadocians at first fancied themselves obliged to their new protector; but, finding himamong whom they were in a condition to make head against them; but, contrary to his expectation, he was met on the frontiers by the king of Cappadocia with an army no way inferior to his own. Hereupon he invited Ariarathes to a conference; and, in sight of both armies, flayed him with a dagger, which he had concealed under his garment. This struck such terror into the Cappadocians, that they immediately dispersed, and gave Mithridates an opportunity of poising himself of the kingdom without the least opposition. The Cappadocians, however, not able to endure the tyranny of his preceptors, soon
Pharnaces restored the king of Cappadocia, and empire, resigned zanes of all his dominions; but eas of pirates who greatly infested the coasts of Cappadocia. Before Mithridates invaded the kingdom at the head of a very numerous army, and having drawn Ariarathes to a battle, defeated his army with great slaughter, and obliged him to abandon the kingdom. The unhappy prince soon after died of grief; and Mithridates befoothed the kingdom on his son, who was then but eight years old, giving him also the name of Ariarathes. But Nicomedes Philopater king of Bythynia, fearing left Mithridates, having now got possession of the whole kingdom of Cappadocia, should invade his territories, fuborned a youth to pass himself for the third son of Ariarathes, and to present to them a petition in order to be restored to his father's kingdom. With him he went to Rome, Laodice, sister of Mithridates, whom he had married after the death of her former husband Ariarathes. Laodice declared before the senate that she had three sons by Ariarathes, and that the petitioner was one of them; but that the had been obliged to keep him concealed, lest he should undergo the same fate with his brothers. The senate assured him that they would at all events reinstate him in his kingdom. But, in the meantime, Mithridates having notice of these transactions, dispatched Gordius to Rome, to undeceive the senate, and to persuade them that the youth to whom he had resigned the kingdom of Cappadocia was the lawful son of the late king, and grandson to Ariarathes who had left his life in the service of the Romans against Arilonicus. This unexpected embassy put the senate upon enquiring more narrowly into the matter, whereby the whole plot was discovered; upon which Mithridates was ordered to resign Cappadocia, and the kingdom was declared free. The Cappadocians, however, in a short time sent ambassadors to Rome, acquainting the senate that they could not live without a king. This greatly farried the Romans, who had such an aversion to royal authority; but they gave them leave to elect a king of their own nation. All the family of Pharmacides was now extinct, the Cappadocians chose Ariobarzanes; and their choice was approved by the senate, he having on all occasions shewn himself a steady friend to the Romans.

Ariobarzanes had scarce taken possession of his kingdom when he was driven out by Tigranes king of Armenia; who resigned Cappadocia to the son of Mithridates, in pursuance of an alliance previously concluded between the two parties. Ariobarzanes fled to Rome; and, having engaged the senate in his cause, he returned into Asia with Sylla, who was enjoined to restore him to his kingdom. This was easily performed by Sylla, who, with a small body of troops, routed Gordius who came to meet him on the borders of Cappadocia at the head of a numerous army. Sylla, however, had scarce turned his back, when Ariobarzanes was again driven out by Ariarathes the son of Mithridates, on whom Tigranes had befoothed the kingdom of Cappadocia. This obliged Sylla to return into Asia, where he was attended with his usual successes; and Ariobarzanes was again placed on the throne. After the death of Sylla, he was the third time forced by Mithridates to abandon his kingdom; but Pompey, having entirely defeated Mithridates near mount Stella, restored Ariobarzanes to his throne, and rewarded him for his services during the war, with the provinces of Phrygia, Cilicia, and part of Cappadocia. The king, however, being now advanced in years and desirous of spending the remainder of his life in ease, resigned the crown to his son Ariobarzanes, in presence of Pompey; and never afterwards troubled himself with affairs of state.

Ariobarzanes II. proved no less faithful to the Romans than his father had been. On the breaking out of the civil war between Cæsar and Pompey, he sided with the latter; but after the death of Pompey, he was received into favour by Cæsar, who even bestowed upon him great part of Armenia. While Cæsar was engaged in a war with the Egyptians, Pharnaces king of Pontus invaded Cappadocia, and stripped Ariobarzanes of all his dominions; but Cæsar, having defeated Pharnaces, restored the king of Cappadocia, and honoured him with new titles of friendship. After the murder of Cæsar, Ariobarzanes, having refused to join Brutus and Cassius, was by them declared an enemy to the republic, and soon after taken prisoner and put to death. He was succeeded by his brother Ariobarzanes III., who was by Marc Anthony deprived both of his kingdom and life; and in him ended the family of Ariobarzanes.

Archelaus, the grandson of that general of the same name who commanded against Sylla in the Mithridatic war, was by Marc Anthony placed on the throne of Cappadocia, though nowise related either to the family of Pharnaces or Ariobarzanes. His preferment was entirely owing to his mother Glaphyra, a woman of great beauty, but of loose behaviour, who, in return for her compliance with the desires of Anthony, obtained the kingdom of Cappadocia for her son. In the war between Augustus and Anthony, he joined the latter; but at the intercession of the Cappadocians, was pardoned by the emperor. He afterwards received from him Armenia the Lesser, and Cilicia Tachis, for having affiliated the Romans in clearing the seas of pirates who greatly infested the coasts of Asia. He contrived a strict friendship with Herod the Great, king of Judea; and even married his daughter Glaphyra to Alexander, Herod's son. In the reign of Tiberius, Archelaus was summoned to appear before the senate; for he had always been hated by that emperor, because in his retirement at Rhodes he had paid him no sort of respect. This had proceeded from no averlion in him to Tiberius, but from the warning given Archelaus by his friends at Rome. For Caius Cæsar, the presumptive heir to the empire, was then alive, and had been sent to compose the differences of the caesars, whence the friendship of Tiberius was then looked upon as dangerous. But when he came to the empire, Tiberius, remembering the disrespect shown him by Archelaus, enticed the latter to Rome by means of letters from Livia, who promised him her son Tiberius's pardon, provided he came in person to implore it. Archelaus obeyed the summons, and, hastened to Rome, where he was received by the emperor with great wrath and contempt, and soon after accused as a criminal in the senate. The crimes of which he was accused were mere fictions; but his concern at seeing himself treated as a malefactor was so great, that he died soon after of grief; or, as others say, laid vio
CAPPARIS, a name given by some authors to a worm that adheres to and gnaws the bottoms of ships; to which it is extremely pernicious, especially in the East and West Indies: to prevent this several ships have been lately hathed with copper; the first trial of which was made on a British frigate the Alarm.

CAPPARIS, in botany: A genus of the monogyne order, belonging to the polyandria class of plants; and in the natural method ranking under the 25th order, Patamineae. The calyx is tetraphyllum and coriaceous; their petals are four; the stigmas are long; the fruit is a berry, carnose, unilocular and pedunculated, or furnished with a footstalk.

There are seven species. The spinosa, or common caper, is a low shrub, generally growing out of the joints of old walls, the fissures of rocks, and among rubbish, in most of the warm parts of Europe: it hath woody stalks, which fend out many lateral slender branches, under each of these are placed two short croaked spines, between which and the branches come out the footstalks of the leaves, which are finge, short, and content a round smooth entire leaf. At the intermediate joints, between the branches, come out the flowers on long foot-stalks; before these expand the bud, with the impalement is gathered for pickling. Those which are last expanded in form of a single rose, having five large white petals, which are roundish and concave; in the middle are placed a great number of long stigmas, surrounding a fyle which rises above them, and crowned with an ovall gemmata, which afterwards becomes a capsule filled with kidney-shapped seeds.

Culture. This plant is very difficultly preferred in Britain: it delights to grow in crevices of rocks, old walls, &c. and always thrives best in an horizontal posture: so that when planted either in poits or in the full ground, they seldom thrive, though they may be kept alive for some years. They are propagated by seeds in the warm parts of Europe, but very seldom in Britain.

Uses. The buds, pickled with vinegar, &c. are brought to Britain annually from Italy and the Mediterranean. They are supposed to excite appetite and all digestion; and to be particularly useful as detention and apertents in obstructions of the liver and spleen.

CAPRA, or GOAT, a genus of quadrupeds belonging to the order of pectora. The horns are hollow, turned upwards, erect, and scabrous. There are eight fore-teeth in the under jaw, and none in the upper; and they have no dog-teeth. This genus consists of 14 species, viz.

I. The Hircus, or common goat, with arched carinated horns, and a long beard. It is a native of the eastern mountains.

The goat is an animal of more fagacity than the sheep. Instead of having an antipathy at mankind, they voluntarily mingle with them, and are easily tamed. Even in uninhabited countries, they betray no savage dispositions. In the year 1698, an English vessel having put in to the island of Bonavista, two negroes came aboard, and offered gifts to the captain as
many goats as he pleased. The captain expressed his astonishment at this offer. But the negroes replied, that there were only 12 persons on the island; that the goats had multiplied to such a degree, that they became extremely troublesome; and that, instead of having any difficulty in catching them, they followed the men wherever they went, and were so obstinately officious, that they could not get quit of them upon any account whatever.

Goats are sensible of carelessness and capable of a considerable degree of friendship. They are stronger, more agile, and less timid, than sheep. They have a lively, capricious, and wandering vivacity; for which reason, they are become extremely liable to so many diseases; and frequently leap upon the very points of rocks. They are more easily supported than any other animal of the same size; for there is hardly an herb, or the bark of a tree, which they will not eat with pleasure. Neither are they so particular as sheep, as to be confined to the very points of rocks. They are more adapted for the glove factory, especially that of the kid: abroad it is drest and made into stockings, bed-ticks, bed-hangings, sheets, and even shirts. In the army it covers the horsemans arms, and carries the foot-soldier's provisions. As it takes a

The buck will copulate when he is a year old, and the female when she is seven months. But as this is rather premature, they are generally restrained till they be 18 months or two years. The buck is bald, beautiful, and vigorous; one is sufficient to serve 150 females. A buck for propagation should be large, handsome, and about two years of age; his neck should be short and sandy; his head slender; his ears pendant: his thighs thick; his limbs firm; his hair black, thick, and soft; and his beard should be long and bushy. The females are generally in season from September to the end of November. At that time the males drive whole flocks of the females continually from place to place, and fill the whole atmosphere around them with their strong disagreeable odour; which, though as disagreeable as affenfetia itself, yet may be conducive to prevent many distempers, and to cure nervous and hysterical ones. Horseflesh is supposed to be much refreshed by it; on which account many people keep a he-goat in their fields or stables.

Goats go with young four months and an half, and bring forth from the latter end of February to the latter end of April; having only two teats, they generally bring forth but one or two young; sometimes three; and in good warm pastures there have been instances, tho' rare, of their bringing forth four at a time. They continue fruitful till they are seven years of age; but a buck goat is seldom kept after he is five. Both young and old are affected by the weather; a rainy season makes them thin, a dry sunny one makes them fat and blithe: their excellen venery prevents their longevity; for in our climate they seldom live above 11 or 12 years.

Though the food of this animal cofts next to nothing, as it can support itself even upon the most barren mountains, their produce is valuable. In Britain the whitef wigs are made of their hair; for which purpose that of the he-goat is moft in request; the whitef and clearest is selected from that which grows on the haunches, where it is longest and thickest: a good skin well haired is fold for a guinea: though a skin of bad hue, and so yellow as to baffle the barber's skill to bleach, will not fetch above 18d. or 2s. The Welsh goats are far superior in size, and in length and finenes of hair, to those of other mountainous countries. Their usual colour is white: those of France and the Alps are short-haired, reddish, and the horns small. Boilers made from the hair of a goat were in use in the days of Saul, as appears from 1 Samuel xix. 13. The species very probably was the Angora goat, which is only found in the East; and whose soft and silky hair supplied a most luxuriant couch.

The first of the goat is in great esteem as well as the hair. Many of the inhabitants of Caernarvonshire suffer these animals to run wild on the rocks in winter as well as in summer; and kill them in October for the sake of their fat, either by shooting them with bullets, or by running them down with dogs like deer. The goats killed for this purpose are about four or five years old. Their fat will make candles far superior in whiteness and goodness to those made from that of the sheep or ox, and accordingly brings a much greater price in the market; nor are the horns without their use, the country people making of them excellent handles for tucks and pen-knives. The skin is peculiarly well adapted for the glove manufactory, especially that of the kid: abroad it is drest and made into stockings, bed-ticks, bed-hangings, sheets, and even shirts. In the army it covers the horsemans arms, and carries the foot-soldiers provisions. As it takes a dye better than any other skin, it was formerly much used for hangings in the houses of people of fortune, being susceptible of the richest colours, and when flowered and ornamented with gold and silver became an elegant and superb furniture.

The flesh is of great use to the inhabitants of those countries which abound with goats; and affords them a cheap and plentiful provision in the winter-months, when the kids are brought to market. The haunches of the goat are frequently salted and dried, and supply all the uses of bacon: this by the Welch is called coch yr weden, or hung venison. The meat of a fplayed goat of six or seven years old (which is called byfr) is reckoned the best; being generally very fat and sweet. This makes an excellent pottage; goes under the name of rock venison; and is little inferior to that of the deer.

The milk of the goat is sweet, nourishing, and medicinal. It is an excellent foucedancum for a's milk; and has (with a tea-spoonful of hardhorn drank warm in bed in the morning, and at four in the afternoon, and repeated for some time) been a cure for phthisical people before they were gone too far. In some of the mountainous parts of Scotland and Ireland, the milk is made into whey, which has done wonders in this and other cafes where coolers and refinatives are necessary; and to many of those places there is as great a retort of patients of all ranks, as there is in England to the Spas or baths. It is not suprising that the milk of this animal is so salutary, as it browes only on the tops, tendrils, and flowers, of the mountain shrubs, and medicinal herbs; rejecting the grosser parts.
The Angora goat is a variety that is found only in the tract that surrounds Angora and Belbazar, towns in Asia Minor. For the diffusion of three or four days journey. Strabo seems to have been acquainted with this kind; for speaking of the river Halys, he says, that there are goats found near it that are not known in other parts. In the form of their body they differ from the common goat, being shorter; their legs too are shorter, their sides broader and flatter, and their horns straighter; but the most valuable characteristic is their hair, which is soft as silk, of a glossy silvery whiteness, and curled in locks of eight or nine inches in length. This hair is the basis of the fine British camletts, and imported to England in form of thread; for the Turks will not permit it to be exported raw, lest it supports a multitude of poor, who live by spinning it. The goat-herds of Angora and Belbazar are extremely careful of their flocks, frequently combing and washing them. It is observed, that if they change their climate and pasture, they lose their beauty; we therefore suspect that the delin of Baron Alstroemer, a patriotic Swede, turned out fruitlessly, who imported some into his own country, to propagate the breed for the sake of their hair.

b. The Capricorn of Buffon is another variety, having short horns, the ends turned forwards, their sides annulated, and the rings more prominent before than behind.

II. The ibex, or wild-goat, is the flock from whence the tame species sprung. It has large knotty horns reclined upon its back, is of a yellowish colour, and its beard is black. The females are lefs, and have smaller horns, more like those of a common he-goat, and with few knobs on the upper surface: they bring one young offspring when he is an year old; the males are larger. The chamois is of a yellowish colour, and its back is a little divided. It inhabits the Alps of Dauphine, Switzerland, and Italy; the Pyrenean mountains; Greece, and Crete: does not dwell so high in the hills as the ibex, and is found, in greater numbers.

The chamois is of the size of a domestic goat, and its hair is as soft as that of a hind. His vivacity is delightful, and his agility truly admirable. These animals are very social among themselves: we find them going in pairs, or in little flocks of from three to twenty; and sometimes we see from 60 to 100 of them dispersed in different flocks along the declivity of the same mountain. The males keep at a distance from the rest except in the mating season, when they join the females, and beat off all the young. At this period, their air is still stronger than that of the wild, bucks. They bleat often, and run from one mountain to another. Their feeding is in the month of October and November, and they bring forth in March and April. A young female takes the male at the age of 18 months. The females bring forth one, but rarely two at a time. The young follow their mothers till October, if not dispersed by the hunters or the wolves. We are assured that they live between 20 and 30 years. Their flesh is very good. A fat chamois will yield from 10 to 12 pounds of flesh, which is harder and better than that of the goat. The blood of the chamois is extremely hot, and it is said, to have qualities and virtues nearly equal to those of the wild goat. The hunters sometimes mix the blood of the wild and chamois goat: at other times they fell the blood of the wild goats for that of the chamois. The voice of the chamois is a very low and almost imperceptible kind of bleating, resembling that of a hoarse domestic goat. It is by this bleating that they collect together, particularly the mothers and their young. But, when alarmed, or when they perceive their enemy, or any thing the nature of which they cannot distinguish, they advertize one another by a kind of whistling noise. The sight of the chamois is very penetrating, and his sense of smelling is acute. When the fees a man distinctively, he stops for some time, and flies off when he makes a nearer approach. His sense of hearing is equally acute as that of smelling; for he hears the smallest noise. When the wind blows in the direction between him and a man, he will perceive the scent at the distance of more than half a league. Hence, when he foresees or hears any thing which he cannot see, he whistles or blows with such force, that the rocks and forests re-echo the sound. If there are many of them near, they all take the alarm. This whistling is as long as the animal can blow without taking breath. It is first sharp, and turns flat at the end. The chamois then stops for a moment, looks round on all sides, and begins whistling afresh, which he continues from time to time. His agitation is extreme. He strikes the earth with his feet; he leaps upon the highest stones he can find; he again looks round, leaps from one eminence to another; again, when he discovers any thing, he flies off. The whistling of the male is sharper than that of the female. This whistling is performed through the nostrils, and consists of a strong blowing, similar to the sound which a man may make by fixing his tongue to the palate, with his teeth nearly shut, his lips open, and somewhat extended, and blowing long and with great force. The chamois feeds on the finest herbs. He selects the most delicate parts of plants, as the flowers and the tenderest buds. He is very fond of some aromatic herbs, particularly of the carline thistle and genipay, which are
are the hottest plants that grow in the Alps. When he eats green herbs, he drinks very little. He is very fond of the leaves and tender buds of shrubs. He resembles like the common goat. The food he likes seems to announce the heat of his constitution. This animal is admired for his large round eyes, whose size corresponds with the vivacity of his disposition. His head is adorned with two small horns, from half a foot to nine inches in length. Their colour is a fine black, and they are placed on the front nearly between his eyes; and, instead of being reflected backward, like those of other animals, they advance forward above the eyes, and bend backward at the points, which are extremely sharp. He adjusts his ears most beautifully to the points of his horns. Two tufts of black hair defend from his horns to the sides of his face. The rest of the head is of a yellowish white colour, which never changes. The horns of the chamois are used for the heels of canes. Those of the female are smaller and less crooked. The skin of the chamois, when dressed, is very strong, nervous, and supple, and makes excellent riding-breeches, gloves, and vests. Garments of this kind last long, and are of great use to manufacturers. The chamois goats are so impatient of heat, that, in summer, they are only to be found under the shades of caverns in the rocks, among masses of congealed snow and ice, or in elevated forests on the northern declivities of the most drearful mountains, where the rays of the sun seldom penetrate. They suffer in the mornings and evenings, and seldom during the day. They traverse the rocks and precipices with great facility, where the dogs dare not follow them. There is nothing more worthy of admiration than to see these animals climbing or descending inaccessible rocks. They neither mount nor descend perpendicularly, but in an oblique line. When descending, particularly, they throw themselves down across a rock which is nearly perpendicular, and of 20 or 30 feet in height, without having a single prop to support their feet. In descending, they strike their feet three or four times against the rock, till they arrive at a proper resting-place below. The spring of their tendons is so great, that, when leaping about among the precipices, one would imagine they had wings instead of limbs. It has been alleged by some, but without foundation, that the chamois, in climbing and descending rocks, supports himself by his horns. It is by the strength and agility of his limbs that the chamois is enabled to climb and descend rocks. His legs are very fine and tall; those behind are somewhat longer, and always crooked, which favours their springing to a great distance; and, when they throw themselves from a height, the hind legs receive the shock, and perform the office of two springs in breaking the fall. In great snows, and during the rigour of winter, the chamois goads inhabit the lower forests, and live upon pine leaves, the buds of trees, buxus, and fuch green or dry herbs as they can find by scratching off the snow with their feet. The forests that delight them most, are those which are very full of rocks and precipices. The hunting of the chamois is very difficult and laborious. The mode most in use is to kill them by surplice. The hunters conceal themselves behind rocks or large fiones, taking care that the wind blows opposite to them, and, when a favourable opportunity occurs, shoot them with musket-balls. They are likewise hunted in the same manner as flags and other animals, by pelting some of the hunters in narrow passages, while others beat about to raise the game. Men are preferable for this purpose to dogs; for dogs too quickly difperfe the animals, who fly off suddenly to the distance of four or five leagues. V. The DEPRESSA is an African goat, with small depressed horns, bent inwards, lying on the head. It is about the size of a kid; and the hair is long and pendulous. VI. The REVERSA is likewise an African goat, with erect horns, and curved a little forwards. It is about the size of a kid of a year old. It inhabits Juba or Whidaw in Africa. VII. The GAZELLA has long, erect, cylindrical horns, annulated near the base. It inhabits Egypt, the Cape, Arabia, the Levant, and India, dwelling in the plains. VIII. The CERVICAPRA, with plated cylindrical horns, inhabits Barbary. The hair near the horns is longer than in any other part of the body. The females want horns. Mr Halleques gives the following account of this species: "The cervicapra is larger swifter, and wilder, than the common rock-goat, and can fiercely be taken without a falcon. It is met with near Aleppo. I have seen a variety of this which is common in the East, and the horns appear different; perhaps it is a distinct species. This animal loves the smoke of tobacco; and, when caught alive, will approach the pipe of the huntsman, though otherwise more timid than any animal. This is perhaps the only creature, besides man, that delights in the smell of a poisonous and flaming plant. The Arabians hunt it with a falcon (faiilus gentilis, Lin.) I had an excellent opportunity of seeing this sport near Nazareth in Galilee. An Arab, mounted on a swift courser, held the falcon in his hand, as huntsmen commonly do: when he elided the rock-goat on the top of the mountain, he let loose the falcon, which flew in a direct line like an arrow, and attacked the animal; fixing the talons of one of his feet into the chest of the creature, and the other into its throat, extending his wings obliquely over the animal; spreading one towards one of its ears, and the other to the opposite hip. The animal, thus attacked, made a leap twice the height of a man, and freed himself from the falcon: but being wounded, and losing his strength and speed, he was again attacked by the falcon; which fixed the talons of both its feet into the throat of the animal, and held it fast, till the huntsman coming up, took it alive, and cut its throat; the falcon drinking the blood as a reward for his labour. A young falcon, which was learning, was likewise put to the throat of the goat; by this means are young falcons taught to fix their talons in the throat of the animal, as being the proper part; for should the falcon fix them in the creature's hip, or some other part of the body, the huntsman would not only lose his game, but his falcon also: for the animal, rosted by the wound, which could not prove mortal, would run to the dens and the tops of the mountains, whither its enemy, keeping its hold, would be obliged to follow; and, being separated from its master, must of course perish." IX. The
Capra. 

IX. The *bezoartica*, or bezoar goat, is bearded, and has cylindrical, arched, and wholly annulated horns. It is a native of Persia. The bezoar is found in one of its flames, called *abomasus*. See *Bezoar* and *Abomasus*.

X. The *tartarea*, or saiga of Buffon, has cylindrical, straight, annulated horns; the points inclining inward, the ends smooth; the other part furrowed with very prominent annuli; of a pale yellow colour, and the greatest part fempellucid; the cutting teeth are placed to loose in their sockets, as to move with the leaf touch. The male is covered with rough hair like the he-goat, and has a very strong smell; the female is smooth. The hair on the bottom of the fides and the throat is long, and reembles wool; that on the sides of the neck and head is hoary; the back and sides of a dirty white; the beard, belly, and inside of the thighs, of a thinning white. The females are defigurate of horns. These animals inhabit all the defects from the Danube and Dnieper to the river Irtith, but not beyond. Nor are they ever seen to the north of 54 or 55 degrees of latitude. They are found therefore in Poland, Moldavia, about Mount Caucasus, and the Caspian Sea, and Siberia. In the dry and open deferts, where falt-springs abound, feeding on the falt, the a - crid and aromatic plants of those countries, and grow in the fummer-time very fat: but their fides are penetrated by worms. The fat reembles that of mutton; in shape, like that of a buck: the head is reckoned the most delicate part.

XI. The *ammon*, has femicircular, plain, white horns, and no beard. It is about the fize of a ram, and is a native of Siberia.

XII. The *aegagrus* of Pallas, or Caucasian goat, has smooth black horns, tharply ridged on their upper parts, and hollowed on their outward fides. No velutins of knots or rings, but on the upper surface are some heavy flining; bend much back, and are much hooked at the end, approaching a little at the points. On the chin is a great beard, duky, mixed with chefit. The fore-part of the head is black, the fides mixed with brown: there is no beard of the animal grey, or grey mixed with roft-colour. Along the middle of the back, from the neck to the tail, it is a black lift; and the tail is black. The female is either diftitute of horns, or has very short ones. In fize it is superior to the large he-goats, but in form and agility refembles a flag: yet Monardus compares it to the he-goat, and fays that it has the fect of the goat. They inhabit the lower mountains of Caucasus and Taurus, all Asia Minor, and perhaps the mountains of India. They abound on the inhospitable hills of Laar and Khorazan in Persia; and according to Monardus are also found in Africa. It is an animal of vast agility. Monardus was witness to the manner of its faving itself from injury by falling on its horns; for he faw that which he describes leapt from a high tower, precipitating itself on its horns; then springing on its legs, and leaping about, without receiving the least harm. This is one of the animals which yields the once-valued alexipharmic, the Bezoar-flame; which is a concretion formed of many coats, incrufing a nucleus of small pebble, ftones of fands, bits of straw, or buds of trees. The incrufing coats are created from the vegetable food of the acme, especially the rich, dry, and hot herbs of the Persian and Indian mountains. Its virtues are now expolled, and it is reckoned only an absorbent, and that of the weakest kind.

XIII. *Gno*, with fearchful horns, and thick at the base, bending forward close to the head, then suddenly reverting upwards. The mouth is square; the noftils covered with broad flaps. From the nose, half way up the front, is a thick oblong-square brush of long flufh-black hairs reflected upwards, on each side of which the other hairs are long, and point closely down the neck. Round the eyes are defipated in a radiated form, several frong hairs. The nose is flat, and a little arched. On the top a strong and upright mane, reaching from the horns beyond the shoulders. On young, they may easily be made tame; but if caught when at full age, are fo wild and fo-obstinate as to refuse all food. When they die, their noftils are quite flicced.

They are hunted for the fake of their flesh, horns, and skins, which are excellent for gloves, belts, &c. The hunters always approach them against the wind, lealt they should smell their enemy; they also avoid putting on red or white clothes, or any colours which might attract their notice. They are either fhot, or taken by dogs; or by the black eagle, which is trained to this species of falconry. Their belt feafon is in September: at other times, the skins are penetrated by worms. The fat reembles that of mutton; in shape, like that of a buck: the head is reckoned the most delicate part.
the chin is a long white beard; and on the gullet a very long pendulous bunch of hair. On the breast, and between the fore-legs, the hairs are very long and black. The tail reaches to the first joint of the legs, and is full of hair like that of a horse, and quite white. The body is thick; and covered with smooth short hair of a rust brown colour tied with white. The legs are long, elegant, and slender, like those of a flag. On each foot is only a single spur or hind hoof.—

It is a strange compound of animals: having a vaft head like that of an ox; body and tail, like a horse; legs like a flag; and the fimus lacrymales of an antelope. The ordinary size of it is about that of a common galloway; the length of it being somewhat above five, and height of it rather more than four feet.—These animals inhabit in great numbers the fine plains of the great Namaqua, far north of the Cape of Good Hope, extending from S. lat. 25, to 28. 42, where Africa seems at once to open its vast treasures of hoofed quadrupeds. It is an exceedingly fierce animal: on the flight of any body it usually drops its head and puts itself into an attitude of offence; and will dart with its horns against the pales of the inclosure towards the persons on the outside; yet it will afterwards take the bread which is offered. It will often go upon its knees, run swiftly in that singular posture, and furrow the ground with its horns and legs. The Hottentots call it Cewau from its voice. It has two notes, one resembling the bellowing of an ox, the other more clear. It is called an ox by the Europeans.

XIV. The Dorcas, or antelope, has cylindrical annulated horns, bent backward, contorted, and arising from the front between the eyes. It is a native of Africa and Mexico. These animals are of a moft elegant and active make; of a restless and timid disposition; extremely watchful; of great vivacity; remarkably swift; exceedingly agile; and molt of their boundings so light, so elatic, as to strike the spectator with astonishment. What is very singular, they will flop in the middle of their course, for a moment gaze at their pursuers, and then resume their flight.

As the chase of these animals is a favourite diversion with the eastern nations, from that may be collected proofs of the rapid speed of the antelope tribe. The grey-hound, the fleetest of dogs, is unequal in the course; and the sportsman is obliged to call in the aid of the falcon trained to the work, to seize on the animal and impede its motions, to give the dogs time to overtake it. In India and Perfia a fort of leopard is made use of in the chase: this is an animal that takes its prey, not by swiftness of foot, but by the greatness of its springs, by motions similar to that of the antelope; but should the leopard fail in its first essay, the game escapes. The fleetness of this animal was proverbial in the country it inhabited even in the earliest times: the speed of Ahabel is beautifully compared to that of the tzebi; and the Gadites were said to be as swift as the roes upon the mountains. The sacred writers took their similes from such objects as were before the eyes of the people they addressed themselves to. There is another instance drawn from the same subject: the disciple raised to life at Joppa was supposed to have been called Tabitha, i.e. Dorcas, or the Antelope; from the beauty of her eyes; and this is still a common comparison in the calf: Aine el Cazaz, or, "You have eyes of an Antelope," is the greatest compliment that can be paid to a fine woman.

Some species of the antelopes form herds of 2000 or 3000, while others keep in small troops of five or six. They generally reside in hilly countries; though some inhabit plains: they often browse like the goat, and feed on the tender shoots of trees, which give their flesh an excellent flavour. This is to be understood of those that are taken in the chase; for those that are fattened in houses are far less delicious. The flesh of some species are said to taele of musc, which perhaps depends on the qualities of the plants they feed on.

Mr Pennant makes the antelope a distinct genus of animals, forming a link between the goat and the deer; with the frift of which they agree in the texture of the horns which have a core in them, and they never cast them; with the tail, in the elegance of their form, and great swiftness. He distinguishes several species, among which he ranks the gazella, the cervicapra, the bezoar-tica, and the tartaria of Linnaeus, described above, VII. VIII. IX. X. with the moschus grimmius of the same author. See Moschus.

The other species of antelopes distinguished by zoologists are:

1. The Kevella of Pallas, or flat-horned antelope, has horns twelve inches long, flattened on their sides, inclining first backwards, bending in the middle, and then reverting forwards, at their ends, and annulated with from fourteen to eighteen rings: the upper side of the body is reddish brown; the lower part and buttocks are white: the size equal to a small roebuck. They inhabit Senegal; where they live in great flocks, are easily tamed and are excellent meat.

2. The corine antelope, with very slender horns, six inches long, surrounded with circular rages: on each side of the face is a white line; beneath that, is one of black: the neck, body, and flanks are tawny; belly and infide of the thighs white, on the knees is a tuft of hair. It is less than a roebuck, and inhabits Senegal.

3. The nagor, or red antelope, with horns 5½ inches long; one or two flight rings at the base: ears much longer than the horns: hair stiff and bright; in all parts of a reddish colour, palest on the cheeks: tail very short. Inhabits Senegal and the Cape; where it is very frequent, and is a common food.

4. The dams or swift antelope (le Nanguer, Buff), with round horns, eight inches long, reverting at their ends. The general colour is tawny; but this species varies in that particular. It inhabits Senegal; and is easily tamed. It is very swift; Elkan compares its flight to the rapidity of a whirlwind.

5. The elk-antelope of Sparrman (Indian antelope of Pennant), has thick straight horns, marked with two prominent spiral ribs near two-thirds of their length, smooth towards their end; some above two feet long. The head is of a reddish colour, bounded on the cheeks by a dusky line. The forehead is broad; the nose pointed. On the forehead is a stripe of long loose hairs; and on the lower part of the dewlap, a large tuft of black hair. Along the neck and back, from head to tail, is a black short mane: the rest of the body is of a bluish grey, tinged with red. The tail does not reach to the first joint of the leg; is covered with short ci-
The legs are short, surrounded at their junction with the legs by a circle of black hairs. The height to the shoulders is five feet. It is thick bodied and strongly made; but the legs are slender. It wants the finus laebranantis. The females are horned like the males.—The Caffres call this species empusos and poffo. The Dutch of the Cape call it the eland or elk. M. de Buffon, by mistake, calls this the conudos, which he ought to have befalse on his conudos. It inhabits India, Congo, and the other parts of Africa. They live in herds; but the old males are often solitary. They gallop seemingly with a heavy pace, yet go swiftly. They drop on their knees to be discerned. This Mr Shaw makes his descriptions, as he supposes from the dried skins of this animal. He informs us, that in this animal there is a pore one line in diameter, an inch or an inch and a half below and before the internal angle of the eye. From this pore, which is the aperture of a caruncle that lies below, there is secreted a matter almost like car-wax, which he observed the Hottentots kept in a piece of skin as a rare and excellent medicine; on the dried skin of the animal, this pore is easily to be discerned. This Mr Sparman supposes is the reason why so great and accurate a zoologist as M. Pallas (who describes it in his Speleologia under the denomination of Antelope bubalis) makes no mention of this pore, as he made his descriptions chiefly from the dried skins of this animal. The use of this pore, which is also found in the deer, is for affording free respiration, a circumstance of essential to beasts of this species.

7. The springer, with slender horns, annulated half way, and twice contorted. The ears very long and dusky. The face, cheeks, nose, chin, and throat, are white. The whole upper side of the neck, part of the lower, the back, the sides, and outside of the limbs, are of a pale yellowish brown. The chest, belly, and infide of the limbs, are white; the sides and belly divided by a broad band of chestnut, which runs down part of the shoulders. The tail reaches to the first joint of the leg; the upper part white; the lower black, and furnished with long hair. The buttocks are white; and from the tail half way up the back is a stripe of white, expansible at pleasure. This elegant species weighs about fifty pounds, and is rather less than a roebuck. It inhabits the Cape of Good Hope, where it is called the spring-bok, from the prodigious leaps it takes on the light of any body. When alarmed, it has the power of expanding the white face about the tail into the form of a circle, which returns to its linear form when the animal is tranquil. These animals migrate annually from the interior parts in small herds, and continue in the neighbourhood of the Cape for two or three months; then join companies, and go off in troops consisting of many thousands, covering the great plains for several hours in their passage. They are attended in their migrations by numbers of hyenas, and other wild beasts, which make great destruction among them. They are excellent eating, and with other antelopes are the venison of the Cape. Mr Maffen informs us, that they also make periodical migrations, in seven or eight years, in herds of many hundreds thousands, from the north, as he supposes from vol. ixvi. of Terra de Natal. They are compelled to it by the excessive drought which happens in that region, when sometimes there does not fall a drop of rain for two or three years. These animals in their course defolate Caffraria, spreading over the whole country, and not leaving a blade of grass. Lions attend them; where one of these beasts of prey are, his place is known by the void visible in the middle of the timorous herd.

8. The striped antelope, has smooth horns, twisted spirally, and compressed sideways, with a ridge on one side following the wreathe: they consist of three bends; and are sometimes four feet and a half long measured in a straight line. They are naturally of a dusky colour, and wrinkled; but are generally brought over highly polished. The females are destitute of horns. In the upper jaw is a hard horny substance, dilated in ridges. The length of the animal is nine feet; the legs are slender; the general colour is of a reddish cast, mixed with grey; and from the tail, along the top of the back, to the shoulders, is a white stripe; from which are seven others, four pointing towards the thighs, and three towards the belly; but they vary in number of stripes. On the upper part of the neck is a short mane; beneath the neck, from the throat to the breast, are some long hairs hanging down. It inhabits the Cape of Good Hope, where it is called coelotes, and is said to leap to a most astonishing height. This species wants the finus laebranantis.

9. The bosh-bok, or wood-goat of the Cape, a species of antelope, according to Mr Sparman, unknown to all the cultivators of natural history, whether ancient or modern, till it was described in the memoirs of the Swedish academy for the year 1780, quarter 3d, by the name of antelope fylvetica. This animal has
Capra. has obtained the name it goes by, in consequence of its being the only one among the gazelles in Africa, which may be properly said to live in the woods and groves. In size, the bosch-bok is somewhat above two feet and a half high. The horns are ten inches and a half long; the ears half the length of the horns, or five inches. The horns are black, in some measure triangular, and at the same time wreathed, so that both the sides and angles have somewhat of a spiral turn. At bottom they are rather rough, in consequence of a set of almost innumerable wavy-rings; which, however, are not elevated much above the surface. At top they are conical and sharp-pointed, and in that part as smooth as though they had been polished. The teeth of this animal are like those of other antelopes. It has no fore-teeth or incisors except in the lower jaw, where it has eight. There is no porous corneus in this, as there is in some other antelopes. The hairs on the head are very short and fine; afterwards they become more rough and rugged, resembling goats hair more than that of gazels or harts. Forwards on the neck, breast, sides, and belly, they are an inch and a half or two inches long. On the ridge of the neck, and on all along that of the back, they are three or four inches in length, so as to form a kind of mane there, terminating in a tail about a finger's breadth long. On the hind part of the thighs and buttocks like wife, the hairs are eight inches long; the legs and feet are slender, and covered with short hairs; the fetlock-joints are small; the nose and under-lip are decorated with black-whiskers about an inch long. The predominant colour in this animal is dark-brown, which occupies the principal part of the sides, the back, the upper part of the tail, the upper part of the chest and fore-ribs, and the fore-part of the belly. A still darker brown, bordering upon black, is discoverable on the outside of the shoul ders, and some part of the fore-ribs. The fore-part of the nose, from the eyes to the muzzle, is of a foot colour. The ears are likewise as black as foot on the outside, but on the inside grey; and both outwards and inwards covered with hairs still shorter than those of the head; excepting half the fore-part of the lower edge, where the hairs are white and half an inch long. Divers small white spots, from nine to twelve in all, are seen on each of the haunches and on the sides near them. A narrow line of long white hairs extends from the neck all along the back and tail, in the middle of the long brown hairs already described. From the chine of the back to the sides run five white parallel streaks, which, however, are only discoverable by a close inspection.

This creature does much mischief to the vineyards and kitchen-gardens of the Cape colonists; and it shows a great deal of craft and artifice in avoiding the snares and traps set for it, as well as the ambuscades of the sportmen. As the bosch-bok runs but slowly, it sometimes happens that he is caught by dogs. When he sees there is no other resource, he puts himself into a posture of defence; and when he is going to butt, kneels down, like the white-footed antelope and the hartbeest. The colonists are not very fond of hunting him in this manner, the sport on this occasion generally falls his life at a very dear rate, by gor ring and killing some of their loot and most spirited boundls. This creature's horns, which are its chief defence, sometimes also prove its bane, by being entangled in the bushes and small branches of trees, which thus stop the beast in its flight. In some measure to avoid this, it carries its nose horizontally and straight forward while it runs; so that its horns lie, as it were, directly on its neck: notwithstanding which, their horns are generally worn away a little on the fore-part, and thus acquire some degree of polish.—This species of antelope is monogamous, or keeps in pairs. It is swifter in woodlands than the dogs, which likewise sooner lose scent of him there. The female, which is without horns, and on that account runs about in the forest more free and unimpeded, does not suffer herself so easily to be hunted out of the woods, having there, as well as on the plains, a more certain defence against the dogs in her legs, than the male has in his horns, especially as she is not so bulky and heavy as the male. Her breast is said to be very plump and smooth, but the flesh in general is not very tender.

10. The leucoryx with the nose thick and broad, like that of a cow; the ears somewhat fleshy; body clumsy and thick: The horns long, very slightly incurvated, slender, annulated part of the way: black, pointed. The tail reaching to the frill joint of the legs, and tufted. The colour is in all parts a flo wy whiteness, except the middle of the face, sides of the cheeks, and limbs, which are tinged with red.—This species is about the size of a Welch rant; and inhabits Gom Bahrein, a nile in the gulph of Baflora.

11. The picta, white-footed antelope, or nyl-ghaub; with short horns, bending a little forward; ears large, marked with two black stripes; a small black mane on the neck, and half way down the back; a tuft of long black hairs on the fore-part of the neck; above that, a large spot of white; another between the forelegs on the chest; one white spot on each foot; two on each hind-foot; the tail is long, tufted with black hairs. The colour of the male is a dark grey. The female is of a pale brown colour; with a mane, tuft, and striped ears, like the male; on each foot three transverse bands of black and two of white: It is destitute of horns. The height to the top of the shoulders is four feet and an inch; the length from the bottom of the neck to the anus, four feet. The head is like that of a flag; the legs are delicate. These animals inhabit the desert and interior parts of India, remote from the settlements. They are brought down as curiosities to the Europeans, and have of late years been frequently imported into England. In the days of Aurengzebe, they abounded between Delhi and Lahore, on the way to Cashmire. They were called nyl-gaeb, or blue or grey bulls; and were one of the objects of chase, with that mighty prince, during his journey. They were inclosed by his army of hunters within nets, which being drawn closer and closer, at length formed a small precinct; into this the king, his omrahs, and hunters, entered, and killed the beasts with arrows, spears or muskets; and sometimes in such numbers, that Aurengzebe used to send quarters as presents to all his great people. They are usually very gentle and tame, will feed readily, and lick the hands which give them food. In confinement they will eat oats, but prefer grass and hay; are very fond of wheaten bread; and when thirsty, they will drink
two gallons at a time. They are said to be at times very vicious and fierce. When the males fight, they drop on their knees at a distance from one another, make their approaches in that attitude, and when they come near, spring and dart at each other. They will often, in a state of confinement, fall into that posture without doing any harm. They will, notwithstanding, attack mankind unprovoked. A labourer, who was looking over some pales which included a few of them, was alarmed by one of the males flying at him like lightning; but he was saved by the intervention of the woodwork, which it broke to pieces, and at the same time one of its horns—They have bred in England, they are supposed to go nine months with young, and have sometimes two at a birth.

12. The scripta, or harnessed antelope (legniq, Buff.) has straight horns nine inches long, pointing backwards, with two spiral ribs. The general colour is a deep tawny; but the sides are more light-colored marked with two transverse bands of white, crossed by two others from the back to the belly; the rump with three white lines pointing downwards on each side; and the thighs are spotted with white. The tail is ten inches long, covered with long rough hairs.—It inhabits the plains and woods of Senegal, living in large herds. It is frequent at the Cape, where it is called the bonte-bok, or spotted goat.

Capra-Saulta, in meteorology, a fiery meteor or exhalation sometimes seen in the atmosphere. It forms an inflected light, resembling in some measure the caperings of a goat; whence it has its name.

CAPRICES, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, perenn. The calyx is quinquepartite; the corolla campanulated, quinquefoil, with acute segments; the capsule bivalved, bicocular, and polysemous. There is but one species, the bifoliata, which is a native of the warm parts of America. Being a troublesome weed, and without beauty, it is never cultivated, except in botanic gardens for the sake of variety.

CAPRAROLA, one of the most magnificent places in Italy, seated on a hill, in Ronciglione, whose foot is watered by the river Tircia. It was built by cardinal Farreze; and has five fronts, in the middle of which is a round court, though all the rooms are square, and well proportioned. It is 27 miles north-west of Rome.

CAPRAE. See CAPRI.

CAPREOLUS (Elias), an excellent civilian, and learned historian, born in Brescia, in Italy, wrote an history of Brescia, and other works: died in 1579.

CAPRI, (anciently Caprea), a city and island at the entrance of the gulph of Naples, E. Long. 14° 50'. N. Lat. 40° 45'.—The island is only four miles long and one broad; the city is a bishop's see, situated on a high rock at the west end of the island. Caprea was anciently famous for the retreat of the emperor Tiberius for seven years, during which he indulged himself in the most scandalous debaucheries.* Before Tiberius came hither, Capri had attracted the notice of Augustus as a most eligible retreat, though in sight of populous cities, and almost in the centre of the empire. His successor preferred it to every other residence; and in order to vary his pleasures, and enjoy the advantages as well as avoid the inconveniences of each revolving season, built twelve villas in different situations, dedicated to the twelve greater gods: the ruins of some of them are still to be seen; at Santa Maria are extensive vaults and refectories; and on an adjoining brow are the remains of a light-house; two broken columns indicate the entrance of the principal court. According to Dion Cassius, this island was wild and barren before the Caesars took it under their immediate protection: at this day a large portion of its surface is uncultivated and impracticable; but every spot that will admit the hoe is industriously tilled, and richly laden with the choicest productions of agriculture. The odium attached to the memory of Tiberius proved fatal to his favourite abode; hence was his death proclaimed at Rome, when the senate issued orders for the demolition of every fabric he had raised on the island, which by way of punishment was thenceforward destined to be a state prison. The wife and sister of Commodus were banished to its inhospitable rocks, which were soon stained with their blood. In the middle ages Capri became an appendage of the Amalfitan republic, and after the downfall of that state, belonged to the duchy of Naples. There flourished this island, which, a few days before the death of Tiberius, was overthrown by an earthquake.

CAPRIATA, (Peter John) a civilian and historian, was born at Genoa. He wrote in Italian, the history of the wars of Italy; an English translation of which was printed in London in 1665.

CAPRICORN, in astronomy, one of the 12 signs of the zodiac. See ASTRONOMY, no. 404.

The ancients accounted Capricorn the tenth sign; and when the sun arrived thereat, it made the winter solstice with regard to our hemisphere: but the stars having advanced a whole sign towards the east, Capricorn is now rather the 11th sign; and it is at the sun's entry into Sagittarius that the solstice happens, though the ancient manner of speaking is still retained.

This sign is represented on ancient monuments, medals, &c. as having the fore-part of a goat and the hind-part of a fish, which is the form of an Ægipian; sometimes simply under the form of a goat.

Tropic of Capricorn, a terrestrial circle of the sphere, which is parallel to the equinoctial, and at 23° 50' distance from it southwards; passing through the beginning of Capricorn.

CAPRIFICATION, a method used in the Levant, for ripening the fruit of the domestic fig-tree, by means of infects bred in that of the wild fig-tree.

The most ample and satisfactory account of this curious operation in gardening are those of Tournesfort and Pontedera: the former, in his Voyage to the Levant, and in a Memoir delivered to the academy of sciences at Paris in 1705; the latter, in the Anthologia. The substance of Tournesfort's account follows, "Of the thirty species or varieties of the domestic fig-tree which are cultivated in France, Spain, and Italy, there are
are but two cultivated in the Archipelago. The first species is called ormis, from the old Greek ermos, which answers to caprificus in Latin, and signifies a wild fig-tree, or fig in the garden or gareded in. The former bears successively, in the same year, three sorts of fruit, called fornite, craterites, and orni, which, though not good to eat, are found absolutely necessary towards ripening those of the garden-fig. These fruits have a sleek even skin; are of a deep green colour; and contain in their dry and mealy inside several male and female flowers placed upon distinct foot-falves, the former above the latter. The fornite appear in August, and continue to November without ripening; in these are bred small worms, which turn to a sort of gnats, the latter fruit, called orni, is called forts offruit, called former above the latter. The tree. The second is the domestic fig, which is called the fig of the garden-fig. These fruits begin to open, and enclose the eggs deposited by the gnats when they pricked them. In May, the third sort of fruit called orni, begins to be produced by the wild fig-trees. This is much bigger than the other two; and when it grows to a certain size, and its bud begins to open, it is pricked in that part by the gnats of the craterites, which are strong enough to go from one fig to another to deposite their eggs. In sometimes happens that the gnats of the craterites are flown to come forth in certain parts, while the orni in those very parts are disposed to receive them. In this case, the husbandman is obliged to look for the craterites in another part, and fix them at the end of the branches of those fig-trees whose orni are in a fit disposition to be pricked by the gnats. If they mis the opportunity the orni fall, and the gnats of the craterites fly away. None but those that are well acquainted with the culture know the critical moment of doing this; and in order to know it, their eye is perpetually fixed on the buds of the fig; for that part not only indicates the time that the prickers are to infuse forth, but also when the fig is to be successfully pricked: if the bud is too hard and compact, the gnat cannot lay its eggs; and the fig drops when the bud is too open.

The use of all these three sorts of fruit is to ripen the fruit of the garden fig-tree, in the following manner. During the months of June and July, the peasants take the orni, at the time their grans are ready to break out, and carry them to the garden fig-trees: if they do not nick the moment, the orni fall; and the fruit of the domestic fig-tree, not ripening, will in a very little time fall in like manner. The peasants are so well acquainted with these precious moments, that, every morning, in making their inspection, they only transfer to their garden fig-trees such orni as are well conditioned, otherwise they lose their crop. In this case, however, they have one remedy, though an indifferent one; which is, to flrew over the garden fig-trees another plant in whose fruit their is also a species of gnats which answer the purpose in some measure."

The caprisiation of the ancient Greeks and Romans, described by Theophrastus, Plutarch, Pliny, and other authors of antiquity, corresponds in every circumstance with what is practiced as this is done in the Archipelago and in Italy. These all agree in declaring that the wild fig-tree, caprificus, never ripened its fruit; but was absolutely necessary for ripening that of the garden or domestic fig, over which the husbandmen suspended its branches. The reason of this fact, as has been formerly said, is that the punctures of these insects the visles of the fruit are laceraied, and thereby a greater quantity of nutritious juice derived thither. Perhaps, too, in depositing their eggs, the gnats leave behind them some spot of liquor proper to ferment gently with the milk of the figs, and to make their flesh tender. The figs in Provence, and even at Paris, ripen much sooner for having their buds pricked with a straw dipped in olive-oil. Plums and pears likewise pricked by some insects, ripen much the faster for it; and the flesh round such puncture is better tafted than the rest. It is not to be disputed, that considerable changes happen to the contexture of fruits so pricked, just as the same as to parts of animals pierced with a sharp instrument. Others have supposed that these insects penetrated the fruit of the tree to which they were brought, and gave a more free admission to the air, and to the sun. Linnaeus explained the operation, by supposing that the insects brought the farina from the wild fig, which contained male flowers only, to the domestic fig, which contained the female ones. Hasselquinst, from what he saw in Palestine, seemed to doubt of this mode of fructification. M. Bernard, in the Memoirs of the Society of Agriculture, opposes it more decidedly. He could never find the insect in the cultivated fig; and, in reality, it appeared to leave the wild fig, after the stamens were mature and their pollen diluted: besides, he adds, what they may have brought on their wing must be rubbed away, in the little aperture which they would form for themselves. At Malta, where there are seven or eight varieties of the domestic fig, this operation is only performed on thee which ripen latest; the former are of a proper size, fine flavour, and in great abundance without it, so that he thinks the caprisiation only hastens the ripening. He examined the parts of fructification of the fig; and he observes, if this operation be made previous to the ripening, that round the eye of the fig, and in the substance of its covering, may be seen triangular dentated leaves, pressed one against another; and under these leaves are the stamens, whose pollen is destined for the impregnation of the grains, which fill the rest of the fruit. These male organs are much more numerous in the wild fig than in the domestic; and the stamens are found to contain a yellow dust which may be collected when it is ripe. The wild figs, when ripe, are not succulent, and have no taste, though the grains are disposed in the same manner as in the other kind. The pith of the grain of the wild fruit serves as food to a species of the cynips, whose larva is white, till the moment of its transformation; and it is by an opening, in the direction of the pitif, that the insect penetrates the grain. From this account it is thought probable, that the insect is only communicated by accident to the domestic fig, and that the flowers of this genus are sometimes hermaphrodites. But the number of hermaphrodite flowers being fewer on the cultivated than on the wild fig, the seeds are fecundated more certainly and quickly by the caprisiation; and every botanist knows, that when the pistil of the orange flower withers, while if by any accident it is delayed, it continues in bloom much longer. This view of the subject, therefore,
CAPRIMULGUS, GOAT-SUCKER, or FERN-owl, in ornithology, a genus of birds belonging to the order of passerines. The beak is incurvated, small, tapering, and depressed at the base; the mouth opens very widely.

The European, with the tubes of the nostrils hardly visible. It feeds on moths, gnats, darts, or chafers; from which Charleton calls it a dorr-bawk, its food being entirely of that species of beetle during the month of July, the period of that insect’s flight in the country. This bird migrates. It makes but a short flight in Britain: appears the latter end of May; and disappears, in the northern parts of Britain, the latter end of August; but, in the southern, stays about a month later. It inhabits all parts of Britain from Cornwall to the county of Ross. Mr. Scopoli seems to credit the report of their sucking the teats of goats, an error delivered down from the days of Aristotle. Its notes are sensible vibration to any little building it spots, and continues at intervals very short, and produces several kinds of fruits; but the black and orange, and ferruginolls, disposed in lines, bars, and spots. The male is distinguished from the female by a great oval white spot near the end of the three first quill-feathers, and another on the outermost feathers of the tail. This is the only one of the genus which is found in Europe. A variety lies in size, being only eight inches in length, inhabits Virginia, in summer: arrives there towards the middle of April, and frequents the mountainous parts, but will frequently approach the hоuses in the evening, where it lingers on a rail or post, and cries for several times together very loud, somewhat like the word whispering, or whisper-will, the first and last syllables pronounced the loudest. After continuing in one place for some time, it flies to another, and does the same; sometimes four or five cry all together: this noise it begins just after sun-set, and continues at intervals till just before sun-rise. It does not catch insects always on the wing; for it frequently sits upon a convenient place, and leaps up after them as they fly by, and returns to the same spot again. It makes no nest, but lays the eggs, which are two in number, and of a dull green with dusky spots and streaks, on the bare ground in the open fields. Kalm says that the flesh is good to eat. Another variety, larger, inhabits Virginia and Carolina; where it is called the rain-bird, because it seldom appears in the day-time, except when the sky, being obscured with clouds, betokens rain. It is said to lay the eggs on the ground, and that they are not unlike those of the Lapwing.

2. The Americanus, has the tubes of the nostrils very conspicuous. It is a night bird, and is found in America.

There are several other species or varieties inhabiting different countries, and differently marked, but all nearly similar in their manners.

CAPRIOLES, in the manege, leaps that a horse makes in the same place without advancing, in such a manner, that, when he is at the height of the leap, he jerks out with his hinder legs even and near. It is the most difficult of all the high manege. It differs from a croupade, in this, that, in a croupade, a horse does not show his shoes; and from a balladade, because in this he does not jerk out. To make a horse work well at caprioles, he must be put between two pillars, and taught to raise first his fore-quarters, and then his hind-quarters while his fore ones are yet in the air; for which end you must give him the whip and the poinfons.

CAPSA, (anc. geog.) a large and strong town of Numidia, situated amidst vast deserts, waffe, uncultivated, and full of serpents, where Jugurtha kept his treasures. In his time it was taken and razed by Marius, the Roman general, who put to death all the citizens capable of bearing arms, and sold the rest for slaves. It was, however, afterwards rebuilt by the Romans, and strongly fortified; but, on the decline of their empire, was taken and demolished a second time, by Océbana famous Arab general. The walls of the citadel are still remaining, and are monuments of the ancient glory and strength of Capşa. They are 24 feet in height, and five in thickness, built of large square stones, and have now acquired the solidity and firmness of a rock. The walls of the town were rebuilt by the inhabitants since their first demolition; but were afterwards destroyed by Jacob Almanzar, who sent a governor and troops into the province. In Marmol’s time Capşa was very populous, and abounded with fatly moisques and other strutures of superb and elegant workmanship: but at present it is occupied by a poor and indigent people, fleeced and oppressed by the Tunesian government. In the very centre of the city stands an inclosed fountain, which both supplies the people with drink, and affords them an agreeable bath. The adjacent country is now cultivated, and produces several kinds of fruits; but the climate is unhealthy. The inhabitants are remarkable for their peculiarities of temper. Both men and women dress handomely except their feet, which they cover with coarse shoes of bungling workmanship, and made of the rough skins of wild beasts, equally inconvenient and unbecoming. E. Long. 9. 3. N. Lat. 33. 15.

CAPSARIUS, from capsa, fatchel, in antiquity, a servant who attended the Roman youth to school, carrying a fatchel with their books in it, sometimes also called librarian.

CAPSARIUS was also an attendant at the baths, to whom persons committed the keeping of their clothes.

CAPSARIUS, (from capsa, "a cheff," among the Roman bankers, was he who had the care of the money-cheff or coffer.

CAPSICUM, or Guinea-pepper: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 28th order, Luride. The corolla is verticillated, and the fruit a fuplefs berry.
Capicium. Species. 1. The annuum, with oblong fruit, is the common long-podded capicium commonly cultivated in the gardens. Of this there is one kind with red, and another with yellow fruit: and of these there are several varieties, differing only in the size and figure of their fruit. 2. The tetragonum, commonly called bell-pepper. The fruit of this is red, and is the only kind proper for pickling, the skin being tender; whereas those of the other sorts are thin and tough. The pods are from an inch to an inch and a half or two inches long; are very large, swelling, and wrinkled, flattened at the top, where they are angular, and sometimes fland erect, at others grow downward. 3. The cerasiforme, with a round smooth fruit, doth not grow so tall as the other sorts, but spreads near the ground; the leaves come out in clusters, are of a shining green, and stand on long footstalks. The fruit is of a beautiful red, and of the size of a cherry. 4. The pyramidal, is a native of Egypt, and hath much narrower leaves than the other sorts. The pods always grow erect, and are produced in great plenty, so that the plants make a good appearance for three months in the winter. 5. The minimum, commonly called bird-pepper, rises with a shrubby stalk four or five feet high; the leaves are of a lucid green; the fruit grows on the division of the branches, flanding erect; these are small, oval, and of a bright red; they are much more sharp and biting than those of the other sorts. Besides these species, botanists describe as many more; viz. the cordiforme, with heart-shaped fruit; the angulorum, with angular heart-shaped fruit; the olivaforme, with oval fruit; the conoide, commonly called ben-pepper, with a conical red fruit growing erect; and the zuifecenes, with small pyramidal fruit growing erect; commonly called Barbary pepper. These, however, have no remarkable properties different from the others.

Culture. The three first species are annual plants, and must be propagated by seeds sown on a hot-bed in the spring, and treated in the same manner with other exotics; they will however bear the open air, after being inured to it by degrees. The plants of the second sort, whose fruit is used for pickling, should be taken from the hot-bed, and planted in a rich spot of ground in a warm situation about a foot and an half asunder. They must be shaded till they have taken root, and afterwards duly watered in dry weather, which will greatly promote their growth and cause them to be more fruitful, and likewise enlarge the size of the fruit. By this management, three or four crops of fruit for pickling may be obtained the same year. The other sorts are more tender; and therefore must be planted in pots plunged in a moderate hot-bed, and sheltered under a frame.

Uses, &c. The second sort, as already observed, produces fruit fit for pickling; for which purpose they must be gathered before they arrive at their full size, while their rind is tender. They must be flit down on one side to get out the seeds, after which they should be soaked two or three days in salt and water; when they are taken out of this and drained, boiling vinegar must be poured on them in a sufficient quantity to cover them, and closely floped down for two months; then they should be boiled in the vinegar to make them green; but they want no addition of any spice, and are the wholesomest and best pickle in the world. The tenth species is used for making what is called cayenne-butter, or pepper-pots, by the inhabitants of America, and which they esteem the best of all the spices. The following is a receipt for making of a pepper-pot:

"Take of the ripe seeds of this sort of capicium, and dry them well in the sun; then put them into an earthen or stone pot, mixing flour between every stratum of pods; and put them into an oven after the baking of bread, that they may be thoroughly dried: after which they must be well cleansed from the flour; and if any of the stalks remain adhering to the pods, they should be taken off, and the pods reduced to a fine powder; to every ounce of this add a pound of wheat-flour, and as much leaven as is sufficient for the quantity intended. After this has been properly mixed and wrought, it should be made into small cakes, and baked in the same manner as common cakes of the same size: then cut them into small parts, and bake them again, that they may be as dry and hard as difficult; which being powdered and sifted, is to be kept for use." This is prodigiously hot and acrimonious, setting the mouth as it were on fire. It is by some recommended as a medicine for flatulencies; but it is greatly to be doubted whether all these hot irritating medicines are not productive of more harm than good, in England at least. If the ripe pods of capicium are thrown into the fire, they will raise strong and noisome vapours, which occasion vehement sneezing, coughing, and often vomiting, in those who are near the place, or in the room where they are burnt. Some persons have mixed the powder of the pods with snuff, to give to others for diversion: but where it is in quantity, there may be danger in using it; for it will occasion such violent fits of sneezing, as may break the blood-veins of the head.

Capsquares, strong plates of iron which come over the trunnions of a gun, and keep it in the carriage. They are fastened by a hinge to the prize-plate, that they may lift up and down, and form a part of an arch in the middle to receive a third-part of the thickens of the trunnions: for two-thirds are let into the carriage, and the other end is fastened by two iron wedges called the fore-locks and keys.

Capstan, or Capstern, a strong massive column of timber, formed like a truncated cone, and having its upper extremity pierced with a number of holes to receive the bars or levers. It is let perpendicularly down through the decks of a ship; and is fixed in such a manner, that the men, by turning it horizontally with their bars, may perform any work which requires an extraordinary effort.

A capstern is composed of several parts, where A is Plate the barrel, B the whelps, C the drum-head, and D the CXXVII. spindle. The whelps rise out from the main body of the capstern like butteftes, to enlarge the sweep, so that a greater quantity of cable, or whatever rope encircles the barrel, may be wound about it at one turn, without adding much to the weight of the capstern. The whelps reach downwards from the lower part of the drum-head to the deck. The drum-head is a broad, cylindrical piece of wood resembling a mill-stone, and fixed immediately above the barrel and whelps, the outside of this piece are cut a number of square holes parallel to the deck to receive the bars. The spindle or pivot D, which is fixed with iron, is the axis or
CAPTAIN, or foot upon which the captern rests, and turns round in the uancer, which is a fort of iron socket let into a wooden stock or standard called the flap, resting upon and bolted to the beams.

Besides the different parts of the captern above explained, it is furnished with several appendages, as the bars, the pins, the pawls, the flat, and the sacker, already described. The bars are long pieces of wood or arms, thrust into a number of squared holes in the drum-head all round, in which they are as the radius of a circle, or the spokes in the knave of a wheel. They are used to heave the captern round, which is done by the men setting their breasts against them, and walking about, like the machinery of a horse-mill, till the operation is finished. — The pins, small bolts of iron thrust perpendicularly through the holes of the drum-head, and through a correspondent hole in the end of the bar, made to receive the pins when the bars are fixed. They are used to confine the bars, and to prevent them from working out as the men heave, or when the ship labours. Every pin is fastened to the drum-head with a small iron chain; and that the bars may exactly fit their respective holes, they are all numbered.

— The pawls, no. 1, are situated on each side the captern, being two short bars of iron, bolted at one end through the deck to the beams close to the lower part of the whelps; the other end, which occasionally turns round the deck, being placed in the intervals of the whelps, as the captern turns round, prevents it from recolling or turning back by any sudden jerk of the cable, as the ship rises on the sea, which might greatly endanger the men who heave. There are also hanging pawls, no. 3, used for the same purposes, reaching from the deck above to the drum-head immediately below it. The twister is a rope passed horizontally through holes in the outer end of the bars, and drawn very tight; the intent of this is to keep the men steady as they walk round when the ship rocks, and to give room for a greater number of sailors by pulling upon the twister itself.

The most frequent use of the captern is to heave in the cable, and thereby remove the ship or draw up the anchor. It is also used to wind up any weighty body, as the masts, artillery, &c. In merchant-ships it is likewise frequently employed to discharge or take in the cargo, particularly when confiitting of weighty materials that require a great exertion of mechanical powers to be removed.

There are commonly two capterns in a man of war, the main and the gear captern; the former of which has two drum-heads, and may be called a double one. This is represented in no. 3. The latter is represented in no. 2. Formerly the bars of the captern went entirely thro' the head of it, and consequently were more than double the length of the present ones; the holes were therefore formed at different heights, as represented in no. 1. But this machine had several inconveniences, and has long been entirely diffused in the navy. Some of these fort of capterns, however, are still retained in merchant-ships, and are usually denominated crabs. The situation of the bars in a crab, as ready for heaving, is represented in no. 4.

To Rig the Captern, is to fix the bars in their respective holes, and thrust in the pins, in order to confine them. — To heave the Captern, is the order to slacken the rope heaved round upon it, of which there are generally two turns and a half about the barrel at once, and sometimes three turns. — To heave the Captern, is to go round with it heaving on the bars, and drawing in any rope of which the purchase is created. — To rock the Captern, is to go the rope upon which they have been heaving. — To pawl the Captern, is to fix the pawls to prevent it from recolling during any pause of heaving.

CAPSULE, in a general sense, denotes a receptacle or cover in form of a bag. Capsule, among botanists, a dry hollow seed-vefsel or pericarpium, that cleaves or splits in some determinate manner. See PERICARP.

This species of seed veffel is frequently flibby and succulent, like a berry, before it has attained maturiti; but, in ripening, becomes dry, and often so elastic as to dart the seeds from their departments with considerable velocity. This elasticity is remarkably conficuous in wood-sorfel; balsam, impatiens; African hips, peum, madagascanum; frankia, wisteria, hableria, lathrea; and many others. The general aptitude or disposition of this species of seed-vefsel to cleave or separate for the purpose of dispersing its seeds, distinguishes it not less remarkably than its texture from the pulpy or succulent fruits of the apple, berry, and cherry kind. This opening of the capsule for discharging its seeds when the fruit is ripe, is either at the top, as in moss plants; at the bottom, as in triglochin; at the side through a pore or small hole, as in campanula and orchis; horizontally, as in platanus, amaranthus, and angalis; or longitudinally, as in convolvulus. All fruit that is jointed opens at every one of the joints, each of which contains a single seed. Capsules, in splitting, are divided, externally, into one or more pieces, called by Linnaeus valves. The internal divisions of the capsules are called cells, locumenta: these, in point of number, are exceedingly diversified; some having only one cell, as the primrose; and others many, as the water-lily. Hence a capsule is termed unilocular, bilocular, trilocular, &c. according as it has one, two, three, &c. cells or cavities.

CAPSULE ATRIBARIAE, called also glandula renales, and renes florifcenturiae. See ANATOMY, no. 100.

CAPTAIN, a military officer, whereof there are several kinds, according to their commands.

CAPTAIN of a Troop or Company, an inferior officer who commands a troop of horse or a company of foot, under a colonel. The duty of this officer is to be careful to keep his company full of able bodied soldiers; to visit their tents and lodgings, to see what is wanting; to pay them well; to caufe them keep themselves neat and clean in their clothes, and their arms bright. He has power in his own company of making jerjeys, corporals, and lanpedefades. In the horfe and foot guards, the captains have the rank of colonels.

CAPTAIN-General, he who commands in chief.

CAPTAIN-Lieutenant, he who with the rank of captain, but the pay of lieutenant, commands a troop or company in the name and place of some other person who is dispenced with on account of his quality from performing the functions of his post.

Thus the colonel being usually captain of the first company

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CAPTAIN of a Ship of War, the officer who commands a ship of the line of battle, or a frigate carrying 20 or more cannon. The charge of a captain in the British navy is very comprehensive, in as much as he is not only answerable for any bad conduct in the military government, navigation, and equipment of the ship he commands, but also for any neglect of duty or ill management in his inferior officers, whose several charges he is appointed to superintend and regulate.

On his first receiving information of the condition and quality of the ship he is appointed to command, he must survey her condition, and make the necessary preparations to fit her for sea. So strict, indeed, are the injunctions laid on him by the lord high admiral, or commissioners of the admiralty, that he is forbid to lie out of his place, unless by particular leave from the admiralty, or from his commander in chief. He is enjoined to draw a laudable example of honour and virtue to the officers and men; and to discontinue all disolute, immoral, and disorderly practices, and such as are contrary to the rules of subordination and discipline; as well as to correct those who are guilty of such offences as are punishable according to the usage of the sea. He is ordered particularly to survey all the military stores which are sent on board, and to return whatever is deemed unfit for service. His diligence and application are required to procure his complement of men; observing carefully to enter only such as are fit for the necessary duty, that the government may not be put to unnecessary expence. When his ship is fully manned, he is expected to keep the established number of men complete, and superintend the muster himself. If there is no clerk of the check at the port, when his ship is employed on a cruising station, he is expected to keep a book of the whole length of time previously appointed; but if he is compelled by some unexpected accident to return to port sooner than the time limited, he ought to be very cautious in the choice of a good situation for anchoring, ordering the master or other careful officer to find and discover the depths of water and dangers of the coast. Previous to any possibility of an engagement with the enemy, he is to quarter the officers and men to the necessary stations according to their office and abilities, and to exercise them in the management of the artillery, that they may be more expert in time of battle. His station in the time of an engagement is on the quarter-deck; at which time he is expected to take all opportunities of annoying his enemy, and improving every advantage over him; to exhibit an example of courage and fortitude to his officers and crew; and to place his ship opposite to his adversary in such a position that every cannon shall do effectual execution.

At the time of his arrival in port, after his return from abroad, he is to assemble his officers, and draw up a detail of the observations that have been made during the voyage, of the qualities of the ship as to her trim, ballast, flowage, manner of sailing, for the information and direction of those who may succeed him in the command; and this account is to be signed by himself and officers, and to be returned to the resident commissioner of the navy at the port where the ship is discharged.

CAPTAIN of a Merchant-ship, who has the direction of the ship, her crew, and lading, &c. In small ships and short voyages, he is more ordinarily called the master. In the Mediterranean, he is called the patronus.

The proprietor of the vessel appoints the captain or master; and he is to form the crew, and choose and hire the pilots, mates, and seamen; though, when the proprietor and master reside on the same spot, they generally act in concert together.

CAPTAIN Bajhaw, or Capundan Bajhaw, in the polity of the Turks, signifies the Turkish high admiral. He possesses the third office of the empire, and is invested with the same power at sea that the vizir has on shore. Solomon II. instituted this office in favour of the famous Barbaroossa, with absolute authority over the officers of the marine and arsenal, whom he may punish, cashier, or put to death, as soon as he is without the Dardanelles. He commands in chief in the maritime countries, cities, castles, &c. and, at Constantinople, is the first magistrate of police in the villages on the side of the port, and the canal of the Black-Sea. The mark of his authority is a large seal, which he carries in his hand, both in the arsenal and with the army. The captain-bajhaw enjoys two sorts of revenues; one fixed, the other casual. The first arise from a capitation of the islands in the Archipelago, and certain governments in Notolia and Galipoli. The latter consist in the pay of the men who die during a campaign; in a fifth of all prizes made by the bogs; in the profits accruing from the labour of the slaves, whom he hires as rowers to the grand signor; and in the contributions he exacts in all places where he passes.

CAPTION, in Scots law, a writ issuing under his majesty's signet, in his majesty's name, obtained at the instance of a creditor in civil debt, commanding messengers at arms and other officers of the law to apprehend and imprison the person of the debtor until he pay the debt. It is also the name of a writ issued by the court of Session against the agents of the court, to return papers belonging to processes or law-suits, or otherwise to go to prison.

CAPTIVE, a slave, or a person taken from the enemy.

Formerly captives in war became the slaves of those who took them; and though slavery, such as obtained among the ancients, is now abolished, some shadow of it still remains in respect of prisoners of war, who are accounted the property of their captors, and have no right to liberty but by concession from them.

The Romans used their captives with great severity; their necks were exposed to the soldiers to be trampled on, and their persons afterwards sold by public auction. Captives were frequently burnt on the funeral piles of the ancient warriors, as a sacrifice to the infernal.
fernal gods. Those of royal or noble blood had their heads shaven, and their hair sent to Rome to serve as decorations for female toys, &c. They were led in triumph loaded with chains through Rome, in the emperor's train, at least as far as the foot of the Capitoline mount, for they were not permitted to ascend the sacred hill, but carried thence to prison. Those of the freedmen were honoured with golden chains on their hands and feet, and golden collars on their necks. If they made their escape, or killed themselves, to avoid the ignominy of being carried in triumph, their images or effigies were frequently carried in their place.

CAPTIVITY, in a general sense, the state or condition of a captive.

CAPTIVITY, in sacred history, a punishment which God inflicted upon his people for their vices and infidelities. The first of these captivities is that of Egypt, from which Moses delivered them; after which, are reckoned the greatest and most remarkable were those of Judah and Jerusalem, which happened under the kings of each of these kingdoms. It is generally believed, that the ten tribes of Israel never came back again after their dispersion; and Josephus and St Jerome are of this opinion: nevertheless, when we examine the wranglings of the prophets, we find the return of Israel from captivity pointed out in a manner almost as clear as that of the tribes of Benjamin and Judah: See Hosen i. 10, 11. Amos ix. 14. The captivities of Judah are generally reckoned four; the fourth and last of which fell in the year of the world 3416, under Zedekiah: and from this period begins the 70 years captivity foretold by Jeremiah.

Since the destruction of the temple by the Romans, the Hebrews bore that they have always had their heads or particular princes, whom they call princes of the captivity, in the east and west. The princes of the captivity in the east governed the Jews that dwelt in Babylonia, Assyria, and Persia; and the princes of the captivity in the west governed those who dwelt in Judea, Egypt, Italy, and in other parts of the Roman empire. He who reigned in Judea commonly took up his abode at Tiberias, and assumed the name of Reg. chaboth, " head of the fathers or patriarchs. He presided in assemblies, decided in cases of concurrence, levied taxes for the expenses of his visits, and had officers under him who were dispatched through the provinces for the execution of his orders. As to the princes of the captivity at Babylon, or the east, we know neither the original nor succession of them. It only appears that they were not in being before the end of the second century.

CAPTURE, a prize or prey; particularly that of a ship taken at sea. Captures made at sea were formerly held to be the property of the captors after a possession of twenty-four hours; but the modern authorities require, that before the property can be changed, the goods must have been brought into port, and have continued a night inira presidia, in a place of safe custody, so that all hope of recovering them was lost.

CAPTURE also denotes an arrest or seizure of a criminal, debtor, &c. at land.

CAPUA, (anc. geog.) a very ancient city of Italy, in Campania, and capital of that district. It is famous for the abode of Hannibal the Carthaginian general after the battle of Cannae, and where Livy accuses him, but unjustly, of having erenvered himself with pleasures*.

The history of Capua is thus shortly deduced by Mr Swinburne. "It was a settlement of the Ofici known before the foundation of Rome; as the amazing fertility of the land and lucrative commerce poured immense wealth upon its inhabitants, it became one of the most extensive and magnificent cities in the world. With riches excessive luxury crept in, and the Capuans grew inefete; but by their inefficiency they soon lost the power of repelling those neighbouring nations which their inelence had exasperated: For this reason Capua was continually exposed to the necessity of calling in foreign aid, and endangering its safety by the uncommon temptations it offered to needy auxiliaries. The Roman soldiers sent to defend Capua were on the point of making it their prey; and their lives and property were saved by the office of Rome; so that they were the only thing of having enervated the power of the Capuans warmly censured the quarrel of Carthage: Hannibal made Capua his winter-quarters after the campaign of Cannae; and there, if we are to believe historians, his rough and hitherto invincible soldiers were enraptured by pleasure and indolence.

"When through a failure of supplies from Carthage Hannibal was under a necessity of remaining in Britain, and leaving the Capuans to defend themselves, this city, which had been long invetted, was rendered at discretion to the consul Appius Claudius and Q. Fulvius Flaccus. The senators were put to death, the nobles imprisoned for life, and all the citizens fold and dispersed. Vibius, the chief of Hannibal's friends, avoided this ignominious fate, and escaped from the cruel vengeance of the Romans by a voluntary death.

—When the mob insatiate on the gates being thrown open to the enemy, Vibius assembled his steady associates, and sat down with them to a superb banquet, after which each of the guests swallowed a poisonous draught, and expired in full possession of their freedom. The buildings were spared by the victor; and Capua was left to be merely a harbour for the husbandmen of the plain, a warehouse for goods, and a granary for corn: but so advantageous a situation could not long be neglected: colonies were sent to inhabit it, and in process of time it regained a degree of importance.

"Generic the Vandal was more cruel than the Roman conquerors had been; for he massacred the inhabitants, and burnt the town to the ground. Narfes rebuilt it; but in 841 it was totally destroyed by an army of Saracens, and the inhabitants driven into the mountains. Some time after the retreat of these savage invaders, the Lombards ventured down again into the plain, but not deeming their force adequate to the defence of so large a circuit as the old city, they built themselves a smaller one on the river, and called it Capua.—They chose the site of Casilinum, famous in the second Po-
Capuchins

Anciently an outlawed felon was said to have *caput lupinum*, and might be knocked on the head like a wolf, by any one that should meet him; because, having renounced all law, he was to be dealt with as in a state of nature, when every one that should find him might slay him: yet now, to avoid such inhumanity, it is held that no man is entitled to kill him wantonly and wilfully; but in so doing he is guilty of murder, unless it is done in the endeavour to apprehend him.
Caracci. and Xiphilin represent the emperor Caracalla as the inventor of this garment, and hence suppose the appellation Caracalla was first given him. Others, with more probability, make the caracalla originally a Gallic habit, and only brought to Rome by the emperor abovementioned, who first enjoined the soldiers to wear it. The people called it antoninian, from the same prince, who had borrowed the name of Antonius. The caracalla was a sort of caftock, or surtout, Salmafius, Scaliger, and after them Du-Cange, even take the name caftague to have been formed from that of caracque, for caracalla. This is certain from St. Jerome, that the caracalla, with a retrenchment of the capuchin, became an ecclesiastical garment. It is described as made of several pieces cut and sewed together, and hanging down to the feet; but it is more than probable there were some made shorter, especially out of Rome, otherwise we do not see how it could have fitted the soldiers purposes.

Caraccas, a district of Terra Firma in South America, belonging to the Spaniards. The coast is rocky and mountainous, interferred with small fertile valleys; subjected at certain seasons of the year to dry north-wet winds, but blest in general with a clear air and wholesome climate. A very great illicit trade is carried on by the English and Dutch with this province, notwithstanding all the vigilance of the Spaniards, who have courts perpetually employed, and breach-work raised in all the valleys. A vast number of cacao-trees are cultivated in this province; and it is reckoned that the crop of cacao produced here amounts to more than 100,000 fanegas of 110 pounds each. The country of Santa Fe confines 20,000; Mexico a little more; the Canaries a considerable; and Europe from 50 to 60,000. The cultivation of the plant employs 10 or 12,000 negroes. Such of them as have obtained their liberty have built a little town called Nirva, into which they will not admit any white people. The chief town is likewise called Caraccas, and is situated in Lat. 10. 10. Dampier says it stands at a considerable distance from the sea; is large, wealthy, and populous; and extremely difficult of access, by reason of the steep and craggy hills over which an enemy must take his route. The commerce of this town, to which the port of Guaira at two leagues distance serves for a harbour, was, for a long time open to all the subjects of the Spanish monarchy, and is still so to the Americans; but the Europeans are not so well treated. In 1728 a company was formed at St. Sebastian, which obtained an exclusive right of maintaining connections with this part of the new world. Four or five ships, which they dispatch every year, fail from thence, but they return to Cadiz.

Caracci, (Lewis, Augustin, and Hannibal), three celebrated painters of the Lombard school, all of Bologna. Lewis was born in 1555, and was confraternal to Augustin and Hannibal who were brothers, the sons of a tailor, who was yet careful to give them a liberal education. They were both disciples of their cousin Lewis. Augustin gained a knowledge of mathematics, natural philosophy, music, poetry, and most of the liberal arts; but, though painting was his principal pursuit, he learned the art of engraving from Cornelius Cort, and surpassed all the masters of his time. Hannibal, again, never deviated from his pencil. These three painters, at length, having reaped all the advantages they could by contemplation and practice, formed a plan of association, continued always together, and laid the foundation of that celebrated school which has ever since been known by the name of Caracci's academy. Neither all the young students, who had a view of becoming masters, refrained to be instructed in the rudiments of painting; and here the Caracci taught freely, and without reserve, all that came. Lewis's charge was to make a collection of antique statues and bas-reliefs. They had designs of the bel corps, and a collection of curious books on all subjects relating to their art; and they had a skilful anatomist always ready to teach what belonged to the knitting and motions of the muscles, &c. There were often disputations in the academy; and not only painters, but men of learned professions, proposed questions, which were always decided by Lewis. Every body was well received; and though stated hours were allotted to treat of different matters, yet improvements might be made at all hours by the antiquities and the designs which were to be seen.

The fame of the Caracci reaching Rome, the cardinal Farnefe sent for Hannibal thither, to paint the gallery of his palace. Hannibal was the more willing to go, because he had a great desire to see Raphael's works, with the antique statues and bas-reliefs. The gusto which he took there from the ancient sculpture, made him change his Bolognian manner for one more learned but less natural in the design and in the colouring. Augustin followed Hannibal, and left in his understanding of the Farnefe gallery; but the brothers not rightly agreeing, Farnefe sent Augustin to the court of the duke of Parma, where he died in the year 1602, being only 45 years of age. His most celebrated piece of painting is that of the communion of St. Jerome, in Bologna.

In the mean while, Hannibal continued working in the Farnefe gallery at Rome; and, after inconceivable pains and care, finished the paintings in the perfection in which they are now to be seen. He hoped that the cardinal would have rewarded him in some proportion to the excellence of his work, and the time it took him up, which was eight years; but he was disappointed. The cardinal, inflamed by an ignorant Spaniard his domestic, gave him but a little above 200l. though it is certain he deferred more than twice as many thousands. When the money was brought him, he was so surprized at the injustice done him that he could not speak a word to the person who brought it. This confirmed him in a melancholy to which his temper naturally inclined, and made him resolve never more to touch his pencil; which resolution he had undoubtedly kept, if his necessities had not compelled him to break it. It is said that his melancholy gained so much upon him, that at certain times it deprived him of the use of his senses. It did not, however, put a stop to his amours; for he immediately fell in love with the nunes, which he had retired for the recovery of his health, brought a dispute upon him of which he died in 1609, when he was 40 years of age. His veneration for Raphael was so great, that it was his deathbed request to be buried in the same tomb with him; which was accordingly done, in the pantheon or rounda at Rome. There are extant several
Several prints of the blessed Virgin, and some other subjects etched by the hand of this incomparable artist. He is said to have been a friendly, plain, honest, and open-hearted man: very communicative to his scholars: and so extremely kind to them, that he generally kept his money in the same box with his colours, where they might have recourse to either as they had occasion.

While Hannibal Caracci worked at Rome, Lewis was courted from all parts of Lombardy, especially by the clergy, to make pictures in their churches; and we may judge of his capacity and facility, by the great number of pictures he made, and by the preference that was given him to other painters. In the midst of these employments Hannibal solicited him to come and assist him in the Farnese gallery: and so earnestly, that he could not avoid complying with his request. He went to Rome; corrected several things in that gallery; painted a figure or two himself; and then returned to Bologna, where he died in 1619, aged 64.

CARACOL, in the manage, the half turn which an horsemans makes, either to the right or left.—In the army, the horse always makes a caracol after each discharge, in order to pass the rear of the squadron.

CARACOL, in architecture, denotes a stair-case in a helix or spiral form.

CARACOLI, a kind of metal of which the Caribbees, or natives of the Leiffer Antilles, make a sort of ornament in the form of a crescent, which they also call caracoli.—This metal comes from the main land: and the common opinion is, that it is a compound of silver, copper, and gold, something like the Corinthian bras among the ancients. These metals are so perfectly mixed and incorporated together, that the compound which results from them, it is said, has a colour that never alters, how long ever it remains in the sea or under ground. It is somewhat brittle; and they who work at it are obliged to mix a large proportion of gold with it, to make the compound more tough and malleable.

CARACT, or CARAT, the name of that weight which expresses the degree of fineness that gold is of. The word is also written, carrat, karrat, and karat. Its origin is contestible: But the most probable opinion is that of Kennet, who derives it from caratta, a term which anciently denoted any weight, and came not till of later days to be appropriated to that which expresses the fineness of gold and the gravity of diamonds.

These carats are not real determinate weights, but only imaginary. The whole mals, or the weight what it will, is conceived to be divided into 24 carats; and as many 24ths parts as it contains of pure gold, it is called gold of so many carats, or so many carats fine. Thus, gold of 18 carats is a mixt, of which 18 parts is pure gold, and the other fix an inferior metal, &c. This is the common way of reckoning in Europe, and at the gold mines in the Spanish West Indies, but with some variation in the subdivision of the carat: among us, it is divided into four grains; among the Germans, into 72 parts; and by the French, according to Mr Heliot, into 52. The Chinese reckon by a different division called touches, of which the highest number, or that which denotes pure gold, is 100, so that 100 touches correspond to our 24 carats, &c.

CARACT is also a certain weight which goldsmiths and jewellers use wherewith to weigh precious stones and pearls.—In this sense, the word is by some supposed to be derived from the Greek σηχής, a fruit which the Latins call filique, and we cárab bean; each of which may weigh about four grains of wheat, whence the Latin filique has been used for a weight of four grains. This carat weighs four grains, but they are something lighter than the grains of other weights. Each of these grains is subdivided in 1, 2, 3, 4, &c.

CARACTACUS, a renowned king of the ancient Briton people called Silures, inhabiting South Wales. Having valiantly defended his country seven years against the Romans, he was at length defeated; and flying to Carismonda, queen of the Brigantes (inhabitants of Yorkshire), was by her treacherously delivered up to the Romans, and led in triumph to the empire, weighing nine drachms. It goes at Confiantinople for 120 spers. There are four sorts of them, which are all equally current and of the same value.

CARAITES, in the ecclesiastical history of the Jews, a religious sect among that people, whereof there are still some subsisting in Poland, Russir, Confiantinople, Cairo, and other places of the Levant, whose distinguishing tenet and practice it is, to adhere closely to the words and letter of the scripture, exclusive of allegories, traditions, and the like.

Leo of Modena, rabbin of Venice, observes, that of all the heresies among that people, before the destruction of the temple, there is none now left but that of the Caraim, a name derived from Miera, which signifies the pure text of the Bible; because of their keeping to the Pentateuch, observing it to the letter, and rejecting all interpretations, paraphrases, and constitutions of the rabbins. Aben Ezra, and some other rabbins, treat the Caraites as Sadducees; but Leo de Juda calls them, more accurately, Sadducees reformed; because they believe the immortality of the soul, paradise, hell, reformation, &c. which the ancient Sadducees denied. He adds, however, that they were doubtless originally real Sadducees, and springing from among them.

M. Simon, with more probability, supposes them to have risen hence; that the more knowing among the Jews opposing the dreams and reveries of the rabbins, and using the pure texts of scripture to refute their groundless traditions, had the name of Caraim given them; which signifies as much as the barbarous Latin, Scripturarit, i.e. people attached to the text of scripture. The other Jews give them the odious name Sadducees, from their agreement with those sectaries on the head of traditions. Scaliger, Vollius, and Spanheim, rank the Caraites among the Sabians, Magi, Manichees, and Mussulmans, but by mistake: Wolfgang, Fabricius, &c. say the Sadducees and Esseni were called Caraites, in opposition to the Pharisees: others take them for the doctors of the law so often mentioned in the gospel; but these are all conjectures. Josephus and Philo make no mention of them; which shows...
CARAITES. In all probability, this sect was not formed till after the collection of the second part of the Talmud, or the Gemara; perhaps not till after the compiling of the Mishna in the third century. The Caraites themselves pretend to be the remains of the ten tribes led captive by Shalmanezer. Wolfius, from the Memoirs of Mardochaeus, a Carait, refers their origin to a massacre among the Jewish doctors, under Alexander Jannæus, their king, about 100 years before Christ; because Simeon, son of Schelach, and the queen's brother, making his escape into Egypt, there forged his pretended traditions; and, at his return to Jerusalem, published his visions; interpolating the law after his own fancy, and supporting his novelties on the notices which God, he said, had communicated by the mouth of Moses, whose depollary he was: he gained many followers; and was opposed by others, who maintained, that all which God had revealed to Moses was written. Hence the Jews became divided into two sects, the Caraites and the Rabbinists; among the first, Judas, son of Tabbai, distinguished himself; among the latter, Hillel. Wolfius reckons not only the Sadducees, but also the Scribes, in the number of Caraites. But the addres of the Pharisees prevailed against them all; and the number of Caraites decreased: Anan, indeed, in the eighth century, retrieved their credit a little; and rabbi Schalomon in the ninth. They succeeded pretty well till the fourteenth; but since that time they have been declining.

The Caraites are but little known; their works coming only into very few hands, even among the greatest Hebrews. Buxtorf never saw more than one; Selden two; but Mr Trigland says, he has recovered enough to speak of them with allowance. He afferts, that soon after the prophets had ceased, the Jews became divided on the subject of works, and supererogation: some maintaining their necessity from tradition; whilst others keeping close to the written law, set them aside; and it was from these last that Caraitism commenced. He adds, that after the return from the Babylonish captivity, the observance of the law being to be reestablisht, there were severall practices found proper for that end; and these once introduced, were looked upon as essential, and appointed by Moses; which was the origin of Pharisaism; as a contrary party, continuing to keep close to the letter, founded Carasitism.

The modern Caraites, Leo of Modena observes, have their synagogues and ceremonies; they pretend to be the sole proper Jews, or observers of the laws of Moses; calling the rest by the term Rabbanim, or followers of the Rabbins: these hate the Caraites mortally; refusing to ally or even converse with them, and treating them as manznerim, or baffards; because of their rejecting the constitutions of the rabbins relating to marriages, repudiations, purifications of women, &c. This aversion is so great, that if a Carait would become a rabbinist, he would never be received by the other Jews.

The Caraites, however, do not absolutely reject all kind of traditions; but only such as do not appear well-grounded. Selden, who is very express on this point, in his Uxor Hebraica, observes, that besides the mere text, they have certain interpretations, which they call hereditary, and which are proper traditions.
There are four regular caravans which go yearly to Mecca; the first from Damascus, composed of the pilgrims from Europe and Asia; the second from Cairo, for the Mahometans of Barbary; the third from Zibith, a place near the mouth of the Red Sea, where those of Arabia and India meet; the fourth from Babylon, where the Persians assemble. Most of the inland commerce of the East is carried on by caravans. The late czar Peter the Great established a trade between Russia and China by means of a caravan. M. Bougnon, geographer to the duke of Lorraine, has given a treatise of the caravans of merchants in Asia; wherein he shews what they are composed of, how many forts there are, the several uses of the different forts of animals in them; the prices given for them, the officers and men appointed to conduct them, and the pay of each, with their manner of marching, halting, fighting, retreating, &c. Caravans of this kind are large as the caravan bachi, or chief, of a caravan, viz. the caravan bachi, or chief; the captain-guide; captain of ret; and captain of distribution. The first has absolute command over all the ret; the second is absolute in the march; the office of the third only comprises when the caravan stops and makes a stay; to the fourth it belongs to dispose of every part of the corps, in case of an attack or battle; he has also the inspection over the distribution of provisions, which is made under him by several distributors, who give security to the master of the caravan, and have each of them a certain number of persons, elephants, dromedaries, &c., to take care of at their own peril. The treasurer of the caravan makes his account as the caravan bachi, or chief of the caravan, and has under him several agents and interpreters, who keep journals of all that passes, for the satisfaction of those concerned in fitting out the caravan.

Any dealer is at liberty to form a company, in order to make a caravan. He in whose name it is raised, is considered as the caravan bachi, or chief of the caravan, unless he appoint some other in his place. If there are several merchants equally concerned, they elect a caravan bachi; after which, they appoint officers to conduct the caravan and decide all controversies that may arise during the journey. There are also fea caravans; establishe on the same footing, and for the same purposes: such is the caravan of vellies from Constantinople to Alexandria.

CARAVANSERA, or CARAVANSEERA, a place appointed for receiving and loading the caravans. It is commonly a large square building, in the middle of which there is a very spacious court; and under the arches or piazzas that surround it there is a bank raised some feet above the ground, where the merchants, and those who travel with them in any capacity, take up theirlodgings as well as they can; the beasts of burden being tied to the foot of the bank. Over the gates that lead into the court, there are sometimes little rooms, which the keepers of the caravanseras let out at a very high price to fuch as have a mind to be private. The caravanseras in the East are something of the nature of the inns in Europe; only that you meet with little accommodation either for man or beast, but are obliged to carry almost every thing with you; there is never a caravansera without a well, or spring of water. These buildings are chiefly owing to the charity of the Mahometans; they are esteemed sacred dwellings, where it is not permitted to insult any person, or to pillage any of the effects that are deposited there. There are also caravanseras where most things may be had for money; and as the profits of these are considerable, the magistrates of the cities to whose jurisdiction they belong, take care to flourish them well. There is an inspector, who, at the departure of each caravan, fixes the price of the night's lodging, from which there is no appeal.

CARAVANSEERASKIER, the steward or keeper of a caravansera. He keeps an account of all the merchandise that are sold upon truth, and demands the payments of the sums due to the merchants for what has been sold in the caravansera, on the seller's paying two per cent.

CARAVEL; thus they call a small vessel on the coast of France, which goes to fish for herring on the banks. They are commonly from 25 to 30 tons burden. Those which are designed for the fame fishery in the British channel are called by the French tringarts: these are from 12 to 15 tons burden.

CARAWAY, in botany. See CARUM.

CARBONADE, or CARBONADO, in cookery; flesh, fowl, or the like, seafoned and broiled on the coals.

CARBUNCLE, in natural history, a very elegant gem, whose colour is deep red, with an admixture of scarlet.

This gem was known among the ancients by the name of anthrax. It is usually found pure and faultless, and is of the same degree of hardnes with the sapphire; it is naturally of an angular figure; and is found adhering, by its base, to a heavy stone. It is naturally of a deep sapphire: it is naturally of the emery kind: its usual size is near a quarter of an inch in length, and two thirds of that in diameter in its thickest parts: when held up against the sun, it looses its deep tinge, and becomes exactly of the colour of a burning charcoal, whence the propriety of the name which the ancients gave it. It bears the fire unaltered, not parting with its colour, nor becoming at all the paler by it. It is found only in the East Indies, so far as is yet known; and there but very rarely.

CARBUNCLE, or ANTHRAX, in medicine, an inflammation which arises, in time of the plague, with a vesicle or blister almost like that produced by burning.

CARUNCLE, in heraldry, a charge or bearing, consisting of eight radii, four whereof make a common crofs, and the other four a faltier.

Some call these radii buttie, or staves, because round, and enriched with buttons, or pearled like pilgrim's staves, and frequently tipped or terminated with flower-de-luces; others blazon them royal sceptres, placed in faltier, pale and sable.

CARCASSE, or CARCUS, in the art of war, an iron cale, or hollow capacity, about the bigness of a bomb, of an oval figure, made of ribs of iron, filled with combustible matters, as meal-powder, salpetre, sulphur, broken glass, shavings of horn, turpentine, tallow, &c. It has two or three apertures out of which the fire is to blaze; and the design of it is to be thrown...
CARCASSONNE, an ancient city of France, in Lower Languedoc, with a bishop’s see. It is divided into the upper and lower town. They are both surrounded with walls; and though their situations are different they are both watered by the river Aude. The upper town is seated on a hill, with a castle that commands it, as well the lower town. It is strong, not only by its position on a craggy rock, but also by several large towers which are joined to its walls, and which render it of difficult access. The cathedral church is remarkable for nothing but its antiquity. The lower town is large, and built after the modern taste. The streets are very straight, and lead to a large square in the middle, from whence may be seen the four gates of the town. There is here a manufacture of cloth. The neighbouring country is full of olive-trees; and in the mountains there is a fine marble, commonly called marble of Languedoc. E. Long. 2. 25. N. Lat. 43. 11.

This place bore a considerable share in that celebrated crusade undertaken against the Albigenses in the beginning of the 13th century, and which forms one of the most astonishing instances of superstition and of atrocious barbarity to be found in the annals of the world. When the royal power was nearly annihilated, during the reigns of the last kings of the Carlingian race in France, most of the cities of Languedoc erected themselves into little independent states, governed by their own princes. Carcassonne was then under the dominion of viccounts. At the time when Pope Innocent III. patronized and commanded the prosecution of hostilities against the Albigenses for the crime of heresy, Raymond the reigning viccount was included in that prosecution. Simon de Montfort, general of the army of the church, invested the city of Carcassonne in 1209. The inhabitants terrified at the fate of several other places where the most dreadful massacres had been committed, demanded leave to capitulate; but this act of mercy was only extended to them under a condition equally cruel, incredible, and unparalleled in history, if we were not compelled to believe it by the unanimous testimony of all the contemporary writers. The people found in the place were all obliged, without distinction of rank or sex, to evacuate it in a state of nudity; and Arques the vicomte was not exempted, though young and beautiful, from this ignominious and shocking punishment. “On les fit forter tout mados de la ville de Carca­sonne (tous un an­cient aubard) afin qu'ils recourrent de la honte, en montrant ces parties du corps que la paitie de la langue n'exprime pas, sesquelles ils avoient aboie, et s'en etoient servis dans des crimes execrables.” It seems by this imposition that the Albigenses were accused by their enemies of some enormities, probably unjust, and familiar to those which religious enmity and prejudice have attributed to the followers of Zwicndorf in the present century.

CARCERES, in the ancient Circenian games, were inclosures in the circus, wherein the horses were restrained till the signal was given for Rantering, when, by an irremediable circumstance, they all at once flew open.

CARCHEMISH, (anc grog.) a town lying upon Carchemish the Euphrates, and belonging to the Assyrians. Nebuchadnezzar king of Egypt took it from the king of Assyria, 2 Chr. xxxv. 20. Nebuchadnezzar garrisoned in it, which was taken and cut to pieces, in the fourth year of Jehoiachin king of Judah, by Nebuchadnezzar king of Babylon, 2 Kings xxv. 20. Nebuchadnezzar, &c. (x. 9.) speaks of Carchemish, and seems to say that Tiglath-pileser made a conquest of it, perhaps from the Egyptians. This is thought to be the same city with that called Circeum by the Greeks and Latins.

CARCINOMA, in medicine; the same with Cancer.

CARD, among artificers, an instrument consisting of a block of wood, bented with sharp teeth, serving to arrange the hairs of wool, flax, hemp, and the like: there are different kinds of them, as hand-cards, stock-cards, &c. They are made as follows:

A piece of thick leather, of the size intended for the card, is strained in a frame for that purpose; and then pricked full of holes, into which the teeth or pieces of iron wire are infected. After which the leather is nailed by the edges to a flat piece of wood, in the form of an oblong square, about a foot in length and half a foot in breadth, with a handle placed in the middle of one of the longer sides.

The teeth are made in the following manner. The wire being drawn of the size intended, a thin or number of wires are cut into proper lengths by means of a gauge, and then doubled in a tool contrived for that purpose: after which they are bent into the proper direction by means of another tool; and then placed in the leather as mentioned above.

CARDS, among gamesters, little pieces of thin pasteboard of an oblong figure, of several sizes, but most commonly, in Britain, three inches and an half long and two and an half broad, on which are painted several points and figures.

The moulds and blocks for making cards are exactly like those that were used for the first printed books. They lay a sheet of wet or moist paper on the block, which is first lightly done over with a fort of ink made of lamp-black diluted in water, and mixed with some flarch to give it a body. They afterwards rub it off with a round lift. The court-cards are coloured by means of several patterns, styled flavo-files. They consist of papers cut through with a penknife; and in these apertures they apply severally the various colours, as red, black, &c. These patterns are painted with oil-colours, that the brushes may not wear them out; and when the pattern is laid on the pasteboard, they lightly pass over it a brush full of colour, which, leaving it within the openings, forms the face or figure of the card.

Among sharper, divers sorts of false and fraudulent cards have been contrived: as 1. Marked cards, where the aces, kings, queens, knaves, are marked on the corners of the backs with spots of different number and order, either with clear water, or water tinged with pale Indian ink, that these in the secret may distinguish them. Aces are marked with single spots on two corners opposite diagonally; kings with two spots at the same corners; knaves with the same number transversed. 2. Brief cards, those which are longer or broader than the rest; chiefly used at whist and piquet. The
CARDS

Cards, broad cards are usually for kings, queens, knaves, and aces; the long for the rook. Their design is to direct the cutting to enable him in the secret to cut the cards disadvantageously to his adversary, and draw the perfunctory without the fraud to cut them favourably for the sharper. As the pack is placed either endwise or sidewise to him that is to cut, the long or broad cards naturally lead him to cut to them. Brevet cards are sometimes made thus by the manufacturer; but, in defect of these, sharper's pare all but the breves with a penknife or razor. 3. Corner bend, denotes four cards turned down finely at one corner, to serve as a signal to cut by. 4. Middle bend, or Kington-bridge, is where the tricks are bent two different ways, which causes an opening or arch in the middle, to direct likewise the cutting.

Cards were invented about the year 1390, to divert Charles VI. of France, who had fallen into a melancholy disposition. The inventor proposed, by the figures of the four suits or colours, as the French call them, to represent the four classes of men in the kingdom. By coeurs (hearts) are meant the gens de coeur, choir-men, or ecclesiastics; and therefore the Spaniards, who certainly received the use of cards from the French, have copas, or chalices, instead of hearts. The nobility, or prime military part of the kingdom, are represented by the ends or points of lances or pikes; and our ignorance of the meaning or resemblance of the figure induced us to call them spades: The Spaniards have espadas, swords, in lieu of pikes, which are of similar import. By diamonds are denoted the order of citizens, merchants, or tradesmen, carreaux, (square, stones, tiles, or the like): The Spaniards have a coin, discatos, which answers to it; and the Dutch call the French word carreaux "freemen," stones and diamonds, from the form. Trefoils, the trefoil-leaf, or clover-gras (correctly called clubs), alludes to the husbandmen and peasants. But how this fuit came to be called clubs is not easily explained; unlefs, borrowing the game from the Spaniards, who have baffes (flaves or clubs) instead of the trefoils, we give the Spanish significance to the French figure.

The history of the four kings, which the French, in drollery, sometimes call the cards, are David, Alexander, Charles, and Louis, which names are, and still are, on the French cards. These respective names represent the four celebrated monarchies of the Jews, Greeks, Romans, and Franks under Charlemagne. By the queens are intended Argine, Either, Judith, and Pallas (names retained in the French cards), typical of birth, piety, fortitude, and wisdom, the qualifications residing in each person. Argine is an anagram for regina, queen by descent. By the knaves were designed the servants to knights (for knave originally meant only servant); but French pages and valets, now indiscriminately used by various orders of persons, were formerly only allowed to persons of quality, esquire (esquire), shield or armor bearers. Others fancy that the knights themselves were designated by those cards; because Hugier and Labire, two names on the French cards, were famous knights at the time cards were supposed to have been invented.

Deceptions with Cards. See Legendarian, sect. 1.

CARDAMINE, in botany: A genus of the siliquea order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 25th order, Siliqueae. The siliga parts abun­der with a spring, and the valves roll spirally backward; the stigma is entire, and the calyx a little gaping. Of this there are 15 species; but the most remarkable is the pratensis, with a large purplish flower. This grows naturally in many parts of Britain, and is also called cuckow-flower. There are four varieties, viz. the single, with purple and white flowers, which are frequently intermixed in the meadows; and the double, of both colours. The single forms are not admitted into gardens; but the double deserve a place, as making a pretty appearance during the time they are in flower. They will thrive in a moist shady border: and are propagated by parting their roots, which is best performed in autumn. They delight in a soft loamy soil, not too rich. By some the plant is reckoned antifcorbutic.

CARDAMOM, in the Materia Medica. See Amomum.

CARDAN, (Jerom) one of the most extraordinary geniuses of his age, was born at Pavia on the 24th of September 1501. As his mother was not married, she tried every method to procure an abortion, but without effect. She was three days in labour, and they were at last obliged to cut the child from her. He was born with his head covered with black curled hair. When he was four years old, he was carried to Milan; his father being an advocate in that city. At the age of 20, he went to study in the university of that city; and two years afterwards he explained Euclid. In 1524, he went to Padua; and the same year he was admitted to the degree of master of arts: in the end of the following year, he took the degree of doctor of physic. He married about the year 1531. For ten years before, his impotency had hindered him from having knowledge of a woman; which was a great mortification to him. He attributed it to the evil influences of the planet under which he was born. When he enumerated, as he frequently does, the greatest misfortunes of his life, this ten years impotency is always one. At the age of 32, he became professor of mathematics at Milan. In 1539, he was admitted member of the college of physicians at Milan; in 1543, he read public lectures of medical science in that city, and at Pavia one year following: but discouraged in his undertaking, he could not get payment of his salary, and returned to Milan. In 1552, he went into Scotland, having been sent for by the archbishop of St. Andrew's, who had in vain applied to the French king's physicians, and afterwards to those of the emperor of Germany. This prelate, then 43 years old, had for ten years been afflicted with a shortness of breath, which returned every eight days for the two last years. He began to recover from the moment that Cardan prescribed for him. Cardan took his leave of him at the end of six weeks and three days, leaving him prescriptions which in two years wrought a complete cure.

Cardan's journey to Scotland gave him an opportunity of visiting several countries. He crost France in going thither; and returned through Germany, and the Low Countries, along the banks of the Rhine. It was on this occasion he went to London, and calculated king Edward's nativity. This tour took up about four months; after which, coming back to Milan, he continued there till the beginning of October 1552; and
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Cardano, and then went to Pavia, from whence he was invited to Bologna in 1562. He taught in that city till the year 1570; at which time he was thrown into prison; but some months after he was sent home to his own house. He left Bologna in 1571: and went to Rome, where he lived for some time without any public employment. He was, however, admitted a member of the college of physicians, and received a pension from the pope. He died at Rome on the 21st of September 1575, according to Thuanus. This account might be sufficient to show the reader that Cardan was of a very sickly temper; but he will have a much better idea of his singular and odd turn of mind by examining what he himself has written concerning his own good and bad qualities. He paid himself congratulatory compliments for not having a friend in this world; but that, in requital, he was attended by an aerial spirit, emanated partly from Saturn and partly from mercury, who was the constant guide of his actions, and teacher of every duty to which he was bound. He declared, too, that he was so irregular in his manner of walking the streets, as induced all beholders to point at him as a fool. Sometimes he walked very slowly, like a man absorbed in profound meditation; then all on a sudden quickened his steps, accompanying them with very absurd attitudes. In Bologna, his delight was to be drawn about in a mean vehicle with three wheels. When nature did not visit him with any pain, he would procure to himself that disagreeable sensation by biting his lips so wantonly, or pulling his fingers to such a vehement degree, as sometimes to force the tears from his eyes: and the reason he assigned for so doing, was to moderate certain impetuous sallies of the mind, the violence of which was to him far more insupportable than pain itself; and that the force consequent of such a severe discipline was the enjoying the pleasure of health. He says elsewhere, that, in his greatest tortures of soul, he used to whip his legs with rods, and bite his left arm; that it was a great relief to him to weep, but that very often he could not: that nothing gave him more pleasure than to talk of things which made the whole company easy; that he spoke on all subjects, in feaon and out of season: and he was so fond of games of chance, as to spend whole days in them, to the great prejudice of his health.

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CARDIGANSHIRE, a county of South Wales, Cardigan

bound on the North by Merionethshire and Mont-
gomeryshire, on the east by Radnorshire and Brecks-
nockshire, on the west by the Irish Sea, and on the
south by Caermarthenshire. Its length from North-
west to south-east is about 44 miles, and its breadth
near 20. The air, as in other parts of Wales, varies
with the soil, which in the southern and western parts
is more upon a level than this principality generally is,
which renders the air mild and temperate. But as the
northern and eastern parts are mountains, they are
consequently more barren and bleak. However,
there are cattle bred in all parts; but they have nei-
ter wood nor coals of their own for fuel: they have
rich lead mines, and fish in plenty, with fowls both
tame and wild. The principal rivers are the Teivy,
the Ridol, and the Tiffagh. This county hath five
market-towns, viz. Cardigan, Aberystwith, Llanbad-
arnavun, Llanbedar, and Tregaron, with 77 parishes;
and was formerly computed to have upward of 3000
houses, and 320,000 acres of land. It sends two
members to parliament; one for the county, and one for
Cardigan.

CARDINAL, in a general sense, an appellation
given to things on account of their pre-eminence.
The word is formed of the Latin cardo, a hinge; it being
on these fundamental points that all the rest of the
ame kind are supposed to turn. Thus, justice, pru-
dence, temperance, and fortitude, are called the four
cardinal virtues, as being the basis of all the rest.

CARDINAL Flower, in botany. See Lobelia.

CARDINAL Points, in cosmography, are the four
intersections of the horizon with the meridian, and the
prime vertical circle. Of these, two, viz. the inter-
sections of the horizon and meridian, are called North
and South, with regard to the poles they are directed
to. The other two, viz. the intersections of the ho-
izon, and first vertical, are called East and West.

The cardinal points, therefore, coincide with the
cardinal regions of the heavens; and are 90° dis-
tant from each other. The intermediate points are
called collateral points.

CARDINAL Points, in astrology, are the rising and
setting of the sun, the zenith, and nadir.

CARDINAL Signs, in astronomy, are Aries, Libra,
Cancer, and Capricorn.

CARDINAL Winds, are those that blow from the car-
dinal points.

CARDINAL Numbers, in grammar, are the numbers
one, two, three, &c. which are indeclinable; in oppo-
sition to the ordinal numbers, first, second, third,
fourth, &c.

CARDINAL, an ecclesiastical prince in the Romish
church, being one who has a voice in the concave at
the election of a pope. Some say the cardinals were
called from the Latin incardinatus, which signifies
the adoption in any church made of a priest of a for-

eign church, driven thence by misfortune; and add,
that the use of the word commenced at Rome and
Ravenna: the revenues of the churches of which cities
being very great, they became the common refuge of
the unhappy priests of all other churches.

The cardinals compose the pope’s council or senate;
and in the Vatican is a constitution of pope John, which
regulates the rights and titles of the cardinals; and
which
The title of cardinal is also given to some bishops, e. g., to those of Mentz and Milan: the archbishop of Bourges is also, in ancient writings, called cardinal; and the church of Bourges, a cardinal church. The abbot of Vendome calls himself cardinalius.

The cardinals are divided into three classes or orders; containing six bishops, fifty priests, and fourteen deacons; making in all seventy; which constitute what they call the sacred college. The cardinal bishops, who are, as it were, the pope's vicars, bear the titles of the bishoprics assigned to them; the rest take such titles as are given them: the number of cardinal bishops has been fixed; but that of cardinal priests and deacons, and consequently the sacred college itself, is always fluctuating. Till the year 1125, the college only consisted of fifty-two or fifty-three: the council of Constance reduced them to twenty-four; but Sixtus IV. without any regard to that restriction, raised them again to fifty-three, and Leo to fifty-five. Thus, as the number of cardinal priests was anciently fixed to twenty-eight, new titles were to be established, in proportion as new cardinals were created. As for the cardinal deacons, they were originally no more than seven for the fourteen quarters of Rome; but they were afterwards increased to nineteen, and after that were again diminished.

According to Onuphrius, it was pope Pius IV. who first enacted, in 1562, that the pope should be chosen only by the Senate of cardinals; whereas, till that time, the election was by all the clergy of Rome. Some say, the election of the pope rested in the cardinals, exclusive of the clergy, in the time of Alexander III. in 1160. Others go higher still, and say, that Nicholas II. having been elected at Sienna, in 956, by the cardinals alone, occasioned the right of election to be taken from the clergy and people of Rome; only leaving them that of confirming him by their consent; which was at length, however, taken from them. See his decree for this purpose, given in the Roman council of 1059, in Hardouin's Acta Conciliorum, tom. vi. pt. i. p. 1165. Whence it appears, that the cardinals who had the right of suffrage in the election of his successors, were divided by this pontiff into cardinal bishops and cardinal clerks: meaning by the former the seven bishops who belonged to the city and territory of Rome; and by the latter, the cardinal prelates, or ministers of the twenty-eight Roman parishes, or principal churches. To these were added, in process of time, under Alexander III. and other pontiffs, new members, in order to appease the tumults occasioned by the edict of Nicholas II. At the creation of a new cardinal, the pope performs the ceremony of opening and fluttering his mouth; which is done in a private sacristy. The shutting his mouth implies the depriving him of the liberty of giving his opinion in congregations; and the opening his mouth, which is performed 15 days after, signifies the taking off this restraint. However, if the pope happens to die during the time a cardinal's mouth is shut, he can neither give his voice in the election of a new pope, nor be himself advanced to that dignity.

The dress of the cardinal is a red cassock, a short purple mantle, and a red hat.

The
The cardinals began to wear the red hat at the council of Lyons, in 1243. The decree of pope Urban VIII., whereby it is appointed, near the cardinal's palace, and he is styled ille cardy.

When cardinals are sent to the courts of Princes, it is in quality of legates a latere; and when they are appointed governors of towns, their government is called by the name of legation.

CARDINAL has also been applied to secular officers. Thus, the prime ministers in the court of the emperor Theodosius, are called cardinales. Caflidors, lib. vii. formul. 31. makes mention of the cardinal prince of the city of Rome; and in the list of officers of the duke of Braganza, in 1447, we meet with one Raoul de Thorel, cardinal of Quillart, chancellor, and servant of the vicount de Rohan: which shows it to have been an inferior quality.

CARDO Id, in the higher geometry, an algebraic curve, so called from its resemblance to an heart.

CARICUS, in the seafaring language, the caulks of the vessel.

CARDIVUS, among grammarians, a character marked in the margin, or interlined, which ought to come from its resemblance to a character marking a double career; if left, a semi-career.

CARDICIA, the eastern province of Finland; divided into Swedish Carelia, and Moscovite Carelia. The capital of the latter is Povenza, and of the former Weihburg.

CARELSROON, a sea-port town of Sweden, in Blekingia, or Bleking, on the Baltic Sea, with a very good harbour defended by two forts. It was built in 1679, and is very populous, with arsenals for the marine; the house of the director-general of the admiralty is in this town, and here the Swedes lay up their royal navy. E. Long. 15. 5. N. Lat. 56. 15.

CARENTAN, a town of France in Lower Normandy, and in the Cotentin, with an ancient castle. W. Long. 1. 14. N. Lat. 49. 20.

CARET, among grammarians, a character marked thus, signifying that something is added on the margin, or interlined, which ought to come in where the caret stands.

CAREW, (George) born in Devonshire in 1557, an eminent commander in Ireland, was made president of Munster by queen Elizabeth; when, joining his forces with the earl of Thomond, he reduced the Irish insurgents, and brought the earl of Desmond to his trial. King James made him governor of Guernsey, and created him a baron. As he was a valiant commander, he was no less a polite scholar; and wrote 'Pasca Hibernia,' a history of the late wars in Ireland, printed after his death, in 1653. He made several collections for a history of Henry V. which are digested into Speed's History of Great Britain. Besides these, he collected materials of Irish history in four large MSS. volumes now in the Bodleian library, Oxford.

CAREW, (Thomas) descended from the family of Carew in Gloucestershire, was gentleman of the privy chamber to Charles I. who always esteemed him one of the most celebrated wits of his court. He was much respected by the poets of his time, particularly by Ben Johnson and Sir William Davenant; and left behind him several poems, and a masque called 'Calum Britan-niwm,' performed at Whitehall on Shrove Tuesday night, 1633, by the king, and several of his nobles with their ladies. Carew was allied in the contrivance by Inigo Jones, and the music was set by Mr Henry Lawes of the king's chapel. He died in the prime of life, about the year 1639.

CAREW, (Richard) author of the 'Survey of Cornwall,' was the eldest son of Thomas Carew of Easf Anthony, and was born in 1555. When very young, he became a gentleman-commoner of Christ-church college, Oxford; and at 14 years of age had the honour of disputing, extempore, with the afterwards famous
mon Sir Philip Sydney, in the presence of the earls of Leicester, Warwick, and other nobility. After spending three years at the university, he removed to the Middle Temple, where he resided the same length of time, and then travelled into foreign parts. Not long after his return to England, he married, in 1577, Juliana Arundel, of Trelissick. In 1581, Mr Carew was made justice of the peace, and in 1586 was appointed high-sheriff of the county of Cornwall; about which time he was likewise queen’s deputy for the militia. In 1589, he was elected a member of the college of Antiquaries, a distinction to which he was intituted by his literary abilities and pursuits. What particularly engaged his attention was his native county, his “Survey” of which was published, in 4to, at London, in 1602. It hath been twice reprinted, first in 1723, and next in 1769. Of this work Cambden hath spoken in high terms, and acknowledges his obligations to the author. In the prefent improved state of topographical knowledge, and since Dr Borlase’s excellent publications relative to the county of Cornwall, the value of Carew’s “Survey” must have been greatly diminished. Mr Gough remarks, that the history and monuments of this county were faintly touched by Carew; but it is added, that he was a person extremely capable of describing them, if the infancy of those studies at that time had afforded light and materials. Another work of our author was a translation from the Italian, intituled, “The Examination of Men’s Wits. In which, by discovering the variety of natures, is showed what profession each one is apt, and how far he shall profit therein.” This was published at London in 1594, and afterwards in 1604; and tho’ Richard Carew’s name is prefixed to it, hath been principally ascribed by some perons to his father. According to Wood, Carew wrote also, “The true and ready Way to learn the Latin Tongue,” in anser to a query, whether the ordinary method of teaching the Latin by the rules of grammar be the best mode of instructing youths in that language? This tract is involved in Mr Hartlib’s book upon the same subject, and with the same title. It is certain that Carew was a gentleman of considerable abilities and literature, and that he was held in great estimation by some of the most eminent scholars of his time. He was particularly intimate with Sir Henry Spelman, who extols him for his ingenuity, virtue, and learning.

Carew, (George) brother to the subject of the last article, was educated in the university of Oxford, after which he studied the law in the inns of court, and then travelled to foreign countries for farther improvement. On his return to his native country, he was called to the bar, and after some time was appointed secretary to Sir Christopher Hatton lord chancellor of England. This was by the especial recommendation of queen Elizabeth herself, who gave him a prothonotaryhip in the chancery, and conferred upon him the honour of knighthood. In 1597, Sir George Carew, who was then a matter in chancery, was sent ambassador to the king of Poland. In the next reign, he was one of the commissioners for treating with the Scotch concerning an union between the two kingdoms; after which he was appointed ambassador to the court of France, where he continued from the latter end of the year 1605 till 1609. During his residence in that country, he formed an intimacy with Thaunus, to whom he communicated an account of the transactions in Poland whilst he was employed there, which was of great service to that admirable author in drawing up the 21st book of his history. After Sir George Carew’s return from France, he was advanced to the important post of master of the court of Ward’s, which honourable situation he did not long live to enjoy; for it appears from a letter written by Thaunus to Cambden in the spring of 1613, that he was then lately deceased. Sir George Carew married Thomasine, daughter of Sir Francis Godolphin, great grandfather of the lord treasurer Godolphin, and had by her two sons and three daughters. When Sir George Carew returned, in 1609, from his French embassy, he drew up, and addressed to James I. “A Relation of the State of France, with the characters of Henry IV. and the principal Persons of that Court.” The characters are drawn from personal knowledge and close observation, and might be of service to a general historian of that period. The composition is peripetious and manly, and entirely free from the pedantry which prevailed in the reign of James I. but this is the least surprising, as Sir George Carew’s tale had been formed in a better era, that of queen Elizabeth. The valuable tract we are speaking of lay for a long time in MS, till happily falling into the hands of the earl of Hardwicke, it was communicated by him to Dr Birch, who published it, in 1749, at the end of his “Historical View of the Negotiations between the Courts of England, France, and Brussel, from 1592 to 1617.” That intelligent and industrious writer justly observes, that it is a model upon which ambassadors may form and digest their notions and representations; and the late celebrated poet Mr Gray hath spoken of it as an excellent performance.

CAREY, (Harry) a man distinguished by both poetry and music, but perhaps more so by a certain facetiousness, which made him agreeable to every body. He published in 1720 a little collection of poems; and in 1732, six cantatas, written and composed by himself. He also composed many songs for modern comedies, particularly those in the “Proved Husband;” he wrote a farce called “The Contrivances;” in which were several little songs to very pretty airs of his own composition; he also made two or three little dramas for Goodman’s-fields theatre, which were very favourably received. In 1729, he published by subscription his poems much enlarged: with the addition of one intituled “Namby Pamey,” in which Ambrose Phillips is ridiculed. Carey’s talents, says his historian, lay in humour and in satirical satire: to ridicule the rant and bombast of modern tragedy he wrote one, to which he gave the strange title of “Chronophantastologos,” act 1d in 1724. He also wrote a farce called “The Honest Yorkshireman.” Carew was a thorough Englishman, and had an unforfeituable aversion to the Italian opera and the fingers in it: he wrote a burlesque opera on the subject of the “Dragon of Wantley;” and afterwards a sequel to it, intituled, “The Dragonets;” both which were esteemed a true burlesque upon the Italian opera. His qualities being of the entertaining kind, he was led in-
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Cargados to more expences than his finances could bear, and thus was frequently in distress. His friends however were always ready to affit him by their little subscriptions to his works: and encouraged by these, he republished, in 1740, all the songs he had ever compos'd, in a collection, intituled, "The Musical Century, in 100 English Ballads, &c." and, in 1743, his dramatic works, in a small volume, 4to. With all his mirth and good-humour, he seems to have been at times deeply affected with the malevolence of some of his own profession, who, for reasons that no one can guess at, were his enemies: and this, with the prejudice of his circumstances, is supposed to have occasioned his untimely end; for, about 1744, in a fit of desperation, he laid violent hands on himself, and, at his house in north Warner-street, Cold-bath Fields, put an end to a life, which, says Sir John Hawkins, had been led without reproach. It is to be noted, and it is somewhat singular in such a character, that in all his songs and poems on wine, love, and such kind of subjects, he seems to have manifested an inviolable regard for decency and good manners.

Cargadors, a name which the Dutch give to those brokers whose business it is to find freight for ships outward bound, and to give notice to the merchants, who have commodities to fend by sea, of the ships that are ready to sail, and of the places for which they are bound.

Cargapol, or Kargopol, the capital of a territory of the same name, in the province of Dwina, in Muscovy: E. Long. 106°, N. Lat. 63°.

Cargo denotes all the merchandizes and effects which are laden on board a ship.

Super-cargo, a person employed by merchants to go on a voyage, oversee the cargo, and dispose of it to the best advantage.

Caria, (anc. geog.) a country of the Hither Asia; whose limits are extended by fome, while they are contracted by others. Mela, Pliny, extend the maritime Caria from Japhus and Halicarnassus, to Cadynda, and the borders of Lycia. The inland Caria Ptolemy extends to the Meander and beyond. Car, Cariatis, Caris, Carita, and Caris, are the generic names: Caris and Caris are the epithets. In Care periculum, was a proverbial saying on a thing expos'd to danger, but of no great value. The Cares being the Swifs of those days, were hired and placed in the front of the battle, (Cicer.) Cum Caris Carif, denoted the behaviour of clowns. The Cares came originally from the islands to the continent, being formerly subject to Minoes, and called Leleges; this the Cretans affirm, and the Cares deny, making themselves aborigines. They are of a common original with the Myry and Lydis, having a common temple, of a very ancient standing, at Melos, a town of Caria, called Tousis Caris Deinobreun, (Hector.) Homer calls the Carians, barbarians in language.

Cariati, a town of Italy, in the kingdom of Naples, and province of Hither Calabria, with a bishop's see, and the title of a principality. It is two miles from the golf of Taranto, and 37 north-east of Cocenza. E. Long. 17° 19'. N. Lat. 30° 38'.

Caribbee Islands, a cluster of islands situated in the Atlantic ocean between 59° and 83° degrees of west longitude, and between 11° and 18° degrees of north latitude. They lie in the form of a bow or semicircle, stretching almost from the coast of Florida north, to near the river Oronoque. Those that lie nearest the east have been called the Windward Islands, the others the Leeward, on account of the winds blowing generally from the eastern point in those quarters. Abbe Raynal conjectures them to be the tops of very high mountains formerly belonging to the continent, which have been changed into islands by some revolution that has laid the flat country under water. The direction of the Caribbee islands, beginning from Tobago, is nearly north and N. N. W. This direction is continued forming a line somewhat curved towards the north west, and ending at Antigua. In this place the line becomes at once curved; and extending itself in a straight direction to the west and north west, meets in its course with Porto-Rico, St Domingo, and Cuba, known by the name of the Leeward Islands, which are separated from each other by channels of various breadths. Some of these are fix, others 15 or 20 leagues broad: but in all of them the soundings are from 100 to 120 or 150 fathoms. Between Grenada and St Vincent's there is also a small archipelago of 30 leagues, in which the soundings are above ten fathoms. The mountains in the Caribbee islands run in the same direction as the islands themselves. The direction is so regular, that if we were to consider the tops of these mountains only, independent of their bafes, they might be looked upon as a chain of hills belonging to the continent, of which Martinico would be the most north-westely promontory. The springs of water which flow from the mountains in the Windward Islands, run all in the western parts of these islands. The whole eastern coast is without any running water. No springs come down there from the mountains: and indeed they would have there been useless; for after having run over a very short tract of land, and with great rapidity, they would have fallen into the sea. In Porto Rico, St Domingo, and Cuba, there are a few rivers that discharge themselves on the northern side, and whose sources rise in the mountains running from east to west, that is, thro' the whole length of these islands. From the other side of the mountains facing the south, where the sea, flowing with great impetuousity, leaves behind it marks of its inundations, several rivers flow down, the mouths of which are capable of receiving the largest ships. The soil of the Caribbees consists mostly of a layer of clay or gravel of different thickness; under which is a bed of stone or rock. The nature of some of those soils is better adapted to vegetables than others. In those places where the clay is drier and more friable, and mixes with the leaves and remains of plants, a layer of earth is formed of greater depth than where the clay is moister. The sand or gravel has different properties according to its peculiar nature: wherever it is less hard, less compact, and less porous, small pieces separate themselves from it, which, though dry, preserve a certain degree of coldness useful to vegetation. This soil is called in America parnier-sand soil. Wherever the clay and gravel do not go through such modifications, the soil becomes barren, as soon as the layer formed by the decomposition of the original plants is destroyed.—By a treaty concluded in January 1660.
between the French and English, the Caribs were confined to the islands of St. Vincent's and Dominica, where all the scattered body of this people were united, and at that time did not exceed in number 6000 men. See St. Vincent's and Dominica.

As the Caribee islands are all between the tropics, their inhabitants are exposed, allowing for the varieties resulting from difference of situation and soil, to a perpetual heat, which generally increases from the rising of the sun till an hour after noon, and then declines in proportion as the sun declines. The variations of the temperature of the air seem to depend rather on the wind than on the changes of the season. In those places where the wind does not blow, the air is excessively hot, and none but the easterly winds contribute to temper and refresh it: those that blow from the south and west afford little relief; but they are much less frequent and less regular than that which blows from the east. The branches of the tree exposed to the influence of the latter are forced round towards the west: but their roots are stronger, and more extended under the ground, towards the east than towards the west; and hence they are easily thrown down by strong east winds or hurricanes from that quarter. The easterly wind is fierce felt in the Caribbee islands before 9 or 10 o'clock in the morning, increases in proportion as the sun rises above the horizon, and decreases as it declines. Towards the evening it ceases entirely to blow on the coasts, but not on the open sea. It has also been observed that it blows with more force, and more regularity, in the dog-days than at any other time of the year.

The rain also contributes to the temperature of the Caribee islands, though not equally in them all. In those places where the easterly wind meets with nothing to oppose its progress, it dispels the clouds as they begin to rise, and causes them to break either in the woods or upon the mountains. But whenever the storms are too violent, or the blowing of the easterly wind is interrupted by the changeable and temporary effect of the westerly and westerly ones, it then begins to rain. In the other Caribee islands, where this wind is not generally blowing, the rains are far less frequent and plentiful, especially in the winter season, which lasts from the middle of July to the middle of October, that, according to the most accurate observations, as much rain falls in one week, as in our climates in a year. Instead of these mild refreshing showers which fall in the European climates, the rains of the Caribee islands are torrents, the found of which might be mistaken for hail, were not that almost totally unknown under so burning a sky. These showers indeed refresh the air; but they occasion a dampness, the effects of which are not less disagreeable than fatal. The dead must be interred within a few hours after they have expired. Meat will not keep sweet above 24 hours. The fruits decay, whether they are gathered ripe or before their maturity. The bread must be made up into biscuits, to prevent its growing mouldy. Common wines turn sour, and iron turns rusty, in a day's time. The seeds can only be preserved by constant attention and care, till the proper season returns for sowing them. When the Caribee islands were first discovered, the corn that was conveyed there for the support of the Europeans, was so soon damaged, that it became necessary to send it out in the ears. This necessary precaution so much enhanced the price of it, that few were able to purchase it. Flour was then substituted in lieu of corn; which lowered indeed the expenses of transport, but had this inconvenience, that it was sooner damaged. It was imagined by a merchant, that if the flour were entirely separated from the bran, it would have the double advantage of being cheaper and keeping longer. He caused it therefore to be sifted, and put the finest flour into strong bags, and beat it close together with iron hammers, till it became so close a body that the air could scarcely penetrate it. This method was found to answer the purpose: and if, by it, the flour cannot be preferred as long as in dry and temperate climates, it may be kept for six months, a year, or longer, according to the degree of care taken in the preparation.

However troublesome these effects of the rain may be, it is attended with some others still more formidable; namely, frequent and dreadful earthquakes. These happening generally during the time or towards the end of the rainy season, and when the tides are highest, some ingenious naturalists have supposed that there might be connection between them. The waters of the sky and of the sea undermine, dig up, and ravage the earth in several different ways. Among the various shocks to which the Caribee islands are exposed from the fury of the boisterous ocean, there is one distinguished by the name of raz de maree, or whirlpool. It constantly occurs once, twice, or thrice from July to October, and always on the western coasts, because it takes place after the time of the westerly or southerly winds, or while they blow. The waves, which, at a distance seem to advance gently within 400 or 500 yards, suddenly swell against the shore, as if acted upon in an oblique direction by some superior force, and break with the greatest impetuosity. The ships which are then upon the coast, or in the roads beyond it, unable either to keep their anchors or to put out to sea, are dashed to pieces against the land, and all on board most commonly perish. The hurricane is another phenomenon in these islands, by which incredible damage is occasioned; but happily it occurs not often.

The produce of the Caribee islands is exceedingly valuable to the Europeans, consisting of sugar, rum, molasses, indigo, &c. a particular account of which is given under the names of the respective islands as they occur in the order of the alphabet.

Caribbiana, or Caribiana, the north east coast of Terra Firma, in South America, otherwise called New Andalusia.

Carica, the papaw: A genus of the decandria order, belonging to the dicoty clafs of plants; and in the natural method ranking under the 38th order, Trioses. The calyx of the male almost none; the corolla is quinquefoil and funnel-shaped; the filaments in the tube of the corolla, a longer and shorter one alternately. The calyx of the female quinquevented; the corolla is pentagonal, with five filaments; the fruit an unilocular and polypermous berry.

Species. 1. The papaya rifes with a thick, soft, herbaceous item, to the height of 18 or 20 feet, naked till within two or three feet of the top. The leaves come out on every side, upon very long footstalks.
Thefe which are situated undermost are almost horizontal; but those on the top are erect: these leaves in full grown plants are very large, and divided into many lobes deeply sinuate. The stem of the plant, and also the footstalks of the leaves, are hollow. The flowers of the male plant are produced from between the leaves on the upper part of the plant. They have four foottalks near two feet long: at the end of which the flowers stand in loose clusters, each having a separate footstalk: these are of a pure white, and have an agreeable odour. The flowers of the female papaya also come out from between the leaves towards the upper part of the plant, upon very short footstalks, fitting close to the stem: they are large, and bell-shaped, composed of six petals, and are commonly yellow; when these fall away, the germen swells to a large fleshy fruit, of the size of a small melon. These fruits are of different forms: some angular, and compressed at both ends; others oval, or globular; and some pyramidal. The fruit, and all the other parts of the tree abound with a milky acid juice, which is applied for killing of ring-worms. When the roundish fruit are nearly ripe, the inhabitants of India boil and eat them with their meat as we do turnips.

But they soak them for some time in salt and water, until the fruit is tender. When they are grown to a large size, they should be removed into separate pots, each having a separate short stalk, the lobes of the leaves entire the branches of which are built or framed.

CARICATURA, in painting, denotes the concealment of real beauties, and the exaggeration of blemishes, but still so as to preserve a resemblance of the object. The word is Italian; formed of carica, a load, burden, or the like.

CARICOUS, an epithet given to such tumours as resemble the figure of a fig. They are frequently found in the piles.

CARIRES, the corruption or mortification of a bone. See Medicine and Surgery, Index.

CARIGNAN, a fortified town of Piedmont, situated on the river Po, about seven miles south of Turin. E. Long. 7. 25. N. Lat. 44. 30. It was taken in 1544 by the French; who demolished the fortifications, but spared the castle. It was also taken, and retaken, in 1601.

CARILLONS, a species of chimes frequent in the low countries, particularly at Ghent and Antwerp, and played on a number of bells in a belfry, forming a complete series or scale of tones and feminine, like those on the harpsichord and organ. There are petals communicating with the great bells, upon which the carillonner with his feet plays the base to sprightly airs, performed with the two hands upon the upper species of keys. These keys are projecting sticks, wide enough to be struck with violence and velocity by either of the hands edgeways, without the danger of hitting the neighbouring key. The player is supplied with a thick leather covering for the little finger of each hand, to guard against the violence of the stroke. These carillons are heard through a large town.

CARINA, a Latin term, properly signifying the keel of a ship; or that long piece of timber running along the bottom of the ship from head to stern, upon which the whole structure is built or framed.

CARINA is also frequently used for the whole capacity or bulk of a ship; containing the hull or all the space below the deck. Hence the word is also sometimes used by a figure for the whole ship.

CARINA is also used in the ancient architecture. The Romans gave the name carina to all buildings in form of a ship, as we still give the name nave to the middle or principal vault of Gothic churches; because it has that figure.

CARINA, among anatomists, is used to denote the pisum doffis as likewise for the fibrous rudiments or embryo of a chick appearing in an incubated egg. The carina consists of the entire periosteum, as they appear after ten or twelve days incubation. It is thus called, because crooked in form of the keel of a ship—Botani-
CARKE, denotes the 30th part of a CARRAF of wool.

CARLE. See CHUR.

CARLETON, (Sir Dudley) was born in Oxfordshire, 1573, and bred in Chrift-church college. He went as secretary to Sir Ralph Winwood into the Low Countries, where king James resigned the caufatory towns to the States; and was afterwards employed for 20 years as ambaʃador to Venice, Savoy, and the United Provinces. King Charles created him vicount Dorchell, and appointed him one of his principal secretaries of state; in which office he died in 1621. He was esteemed a good flatesman, though an honest man, and published several political works.

CARLINA, the CARLINE THISTLE: A genus of the polygamy æqualis order, belonging to the syngnæfia class of plants; and in the natural method ranking under the 49th order, Compoſite. The calyx is radiated with long coloured marginal feals. There are seven species, only one of which is a native of Britain, viz. the vulgaris. The others are natives of the south of France or Italy; and are very easily propagated in Britain by seeds, which must be sown on a bed of very undug earth, where they are to remain, as they do not bear transplanting. When the plants appear above ground, they should be carefully weeded, and afterwards thinned, leaving them about ten inches or a foot asunder. The second year most of them will flower; but, unless the season proves dry, they rarely produce good seeds in Britain, and some of the plants decay soon after they have flowered, so that it is pretty difficult to maintain them there. The roots are used in medicine, and for that purpose are imported from those countries where the plants grow naturally. As we receive them, they are about an inch thick, externally of a brown colour, and covered with numerous small holes appearing on the surface as if worm-eaten. They have a strong smell, and a sub-acrid, bitterish, weakly, aromatic taste. They are looked upon to be warm aphrodisiacs and diapho­atics. Frederic Hoffman, the elder relates that he has observed a decoction of them in broth to occasion vomiting. They have been for some time greatly esteemed among foreign physicians; but never were much in use in Britain. The present practice has entirely rejected them, nor are they often to be met with in the shops.

CARLINE, or CARLINE THISTLE. See CARLI­NA. It is said to have been discovered by an angel to Charlemagne, to cure his army of the plague; whence its denomination.

CARLINE, or CAROLINE, a silver coin current in the Nespolian dominions, and worth about 8d. of our money.

CARLINES, or CARLINGS, in a ship, two pieces of timber lying fore and aft, along from one beam to another, directly over the keel; serving as a foundation for the whole body of the ship. On these the ledges rest, whereon the planks of the deck and other matters of carpentry are made fast. The carlines have their ends let into the beams called culver-tail-wife.

CARLINE-KNEES, are timbers going athwart the ship,
from the sides to the hatch-way, serving to sustain the deck on both sides.

CARLINGFORD, a port-town of Ireland, seated on Carlingford bay, in the county of Louth, and province of Leinster, 22 miles north of Drogheda. W. Long. 6° 24'. N. Lat. 54° 5'.

CARLISLE, the capital city of the county of Cumberland, seated on the south of the river Eden, and between the Patterdale, the Caude and the east. It is surrounded by a strong stone-wall, and has a pretty large cattle in the western part of it, as also a citadel in the eastern part, built by Henry VIII. It flourished in the time of the Romans, as appears from the antiquities that are to be met with here, and the Roman coins that have been dug up. At the departure of the Romans this city was ruined by the Scots and Picts; and was not rebuilt till the year 695, by Egfrid, who encompassed it with a wall, and repaired the church. In the 8th and 9th centuries, the whole country was again ruined, and the city laid desolate by the incursions of the Norwegians and Danes. In this condition it remained till the time of William Rufus; who repaired the walls and the cattle, and caused the houses to be rebuilt. It was fortified by Henry I. as a barrier against Scotland; he also placed a garrison in it, and made it an episcopal see. It was twice taken by the Scots, and afterwards burnt accidentally in the reign of Richard II. The cathedral, the suburbs, and 1200 houses, were destroyed at that time. It is at present in a good condition; and has three gates, the English on the south, the Scotch on the north, and the Irish on the west. It has two parishes, and as many churches; St. Cuthbert and St. Mary's, the last of which is the cathedral, and is separated from the town by a wall of its own. The eastern part, which is the new, is a curious piece of workmanship. The choir with the ailes is 71 feet broad; and has a flatly east window 48 feet high and 30 broad, adorned with curious pillars. The roof is elegantly vaulted with wood; and is embellished with the arms of England and France quartered; as also with Piercy's, Lucy's, Warren's, Moubray's, and many others. In the choir are the monuments of three bishops who are buried there. The fee was erected in 1133 by king Henry I. and made suffragan to the archbishop of York. The cathedral church here had been founded a short time before by Walter, deputized in these parts for king William Rufus, and by him dedicated to the Virgin Mary. He likewise built a monastery, and filled it with canons regular of St. Auguffine. This foundation continued till the dissolution of monasteries, when its lands were added to the fee, and the maintenance of a dean, &c. placed here in their room. The church was almost ruined by the usurper Cromwell and his soldiery; and has never since recovered its former beauty, although repaired after the restoration. This diocefe contains the greatest part of the counties of Cumberland and Westmoreland, in which are only 93 parishes; but the (as all the northern are exceeding large; and of these there are 1200 houses. Here is one archdeacon, viz. of Carlisle. The fee is valued in the king's books at L. 500: 4: 11s., but is computed to be worth annually L. 2800. The clergy's tenth amounts only to L. 161: 1: 7s. To this cathedral belong a bishop, a dean, a chancellor, an archdeacon, four prebendaries, eight minor canons, &c. and other inferior officers and servants.

The Picts wall, which was built across the country from Newcastle, terminates near this place. Carlisle was a fortified place, and still has its governor and lieutenant-governor, but no garrison. It was taken by the rebels Nov. 15, 1745; and was retaken by the duke of Cumberland on the 20th of December following, and deprived of its gates. It is governed by a mayor, twelve aldermen, two bailiffs, &c. and has a considerable market on Saturdays. The manufactures of Carlisle are chiefly of printed linens, for which near 3000l. per annum is paid in duties. It is also noted for a great manufacture of whips, in which a great number of children are employed. —Salmons appear in the Eden in numbers; so early as the months of December and January; and the London and even Newcastle markets are supplied with early fish from this river; but it is remarkable, that they do not visit the Elk in any quantity till April; notwithstanding the mouths of the two rivers are at a small distance from each other. —Carlisle sends two members to parliament, and gives title of Earl to a branch of the Howard family.

CARLOCK, in commerce, a sort of singlafs, made with the furgeon's bladder, imported from Archangel. The chief use of it is for clarifying wine, but it is also used by the dyers. The best carlock comes from Afric,
According to the original scheme, it was intended that large magazines for the accommodation of men of war, be provided with provision stores, which have been taken in the year 1806. It is said to be a province of modern origin, and is distinguished into the former lying to the east of the river Maine, in E. Long. 9. 51. N. Lat. 43. and the latter lying to the west of the same sea, Its name is from the Greek, "Carilla," and signifies a province of modern origin, and is distinguished into the former lying to the east of the river Maine, in E. Long. 9. 51. N. Lat. 43. and the latter lying to the west of the same sea, Its name is from the Greek, "Carilla," and signifies a province of modern origin, and is distinguished into the former lying to the east of the river Maine, in E. Long. 9. 51. N. 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The word comes from the Latin *carminare*, to card or tease wool, and figuratively to attenuate and diffuses wind or vapours, and promote their discharge by perpiration. Though Dr. Quincy makes it more mystical: He says it comes from the word *carmen*, taking it in the sense of an invocation or charm; and makes it to have been a general name for all medicines which operated like charms, i.e. in an extraordinary manner. Hence, as the most violent pains were frequently those arising from pent-up wind, which immediately cease upon diffusion; the term *carminatives* became in a peculiar sense applied to medicines which gave relief in windy cases, as if they cured by enchantment: but this interpretation seems a little too far strained.

CARMINE, a powder of a very beautiful red colour, bordering upon purple; and used by painters in miniature, though rarely on account of its great price. The manner of preparing it is kept a secret by the colour-makers; neither do any of those receipts which have for a long time been published concerning the preparation of this and other colours at all answer the purpose. See *Colour-Making*.

CARMONA, a town of Italy in Friuli, and in the county of Goritz, seated on a mountain near the river Indri. It belongs to the house of Austria. E. Long. 5° 27'. N. Lat. 42° 19'.

CARMINE, an ancient town of Spain in Andalusia. The gate towards Seville is one of the most extraordinary pieces of antiquity in all Spain. It is seated in a fertile country, 15 miles east of Seville. W. Long. 5° 37'. N. Lat. 37° 24'.

CARNATION, in botany. See DIANTHUS.

CARNATION-COLOUR, among painters, is understood of all the parts of a picture, in general, which represent flesh, or which are naked and without drapery. Titian and Corregio in Italy, and Rubens and Vandyke in Flanders, excelled in carnations. —In colouring for flesh, there is so great a variety, that it is hard to lay down any general rules for instruction therein; neither are there any regarded by those who have acquired a skill this way: the various colouring for carnations may be easily produced, by taking more or less red, blue, yellow, or fihet, whether for the first colouring, or for the finishing the colouring for women should be bluish, for children a little red, both fresh and gay; and for the men it should incline to yellow, especially if they are old.

Carnation, among dyers. To dye a carnation, or red rote colour, it is directed to take liquor of wheat bran a sufficient quantity, alum three pounds, tartar two ounces; boil them and enter twenty yards of broad cloth; after it has boiled three hours, cool and wash it: take fresh clear bran liquor a sufficient quantity, madder five pounds; boil and sodden according to art. —The Bow dyers know that the solution of juniper, or delved tin, being put in a kettle to the alum and tartar, in another proceeds, make the cloth, &e. attract the colour into it, so that none of the cochineal is left, but the whole is absorbed by the cloth.

CARNEADES, a celebrated Greek Philosopher, was a native of Cyrene in Africa, and founder of the third academy. He was so fond of study, that he not only avoided all entertainments, but forgot even to eat at his own table; his maid-servant Melida was obliged to put the viands into his hands. He was an antagonist of the Stoics; and applied himself with great energy
CAR

CARNEADES gerrnfit to refute the works of Chrysippus, one of the most celebrated philosophers of their sect. The power of his eloquence was dreaded even by a Roman senate. The Athenians being condemned by the Romans to pay a fine of 500 talents for plundering the city of Oropus, sent ambassadors to Rome, who got the fine mitigated to 100 talents. Carneades the academic, Diogenes the Stoic, and Critolaus the Peripatetic, were charged with this embassy. Before they had an audience of the senate, they harangued to great multitudes in different parts of the city. Carneades' eloquence was distinguished from that of the others by its strength and rapidity. Cato the elder made a motion in the senate, that these ambassadors should be immediately sent back, because it was very difficult to discern the truth through the arguments of Carneades. The Athenian ambassadors (aided many of the senators) were sent rather to force us to comply with their demands, than to solicit them by persuasion; meaning, that it was impossible to retort the power of that eloquence with which Carneades addreesed himself to them. According to Plutarch, the youth at Rome were so charmed by the fine orations of this philosopher, that they forsook their exercises and other diversions, and were carried with a kind of madness to philosophy. The humour of philosophising spreading like enthusiasm. This grieved Cato, who was particularly afraid of the facility of wit and strength of argument with which Carneades managed either side of a question. Carneades harangued in favour of justice one day, and the next day against it, to the admiration of all who heard him, among whom were Galba and Cato, the greatest orators of Rome. This was his element; he delighted in demolishing his own work; because it served in the end to confirm his grand principle, that there are only probabilities or resemblances of truth in the mind of man; so that of two things directly opposite, either may be chosen indifferently. Quintilian remarks, that though Carneades argued in favour of injustice, yet he himself acted according to the strict rules of justice. The following was a maxim of Carneades: "If a man privately knew that his enemy, or any other person whose death might be of advantage to him, would come to fit down on graves in which there lurked an asp, he ought to give him notice of it, though it were in the power of no person whatever to blame him for being silent." Carneades, according to Suidas, lived to be 85 years old; others make him to be 90; his death is placed in the 4th year of the 162d Olympiad.

CARNEDDE, in British antiquity, denotes heaps of stones supposed to be druidical remains, and thrown together on occasion of confirming and commemorating a covenant. Gen. xxxi. 46. They are very common in the Isle of Anglesey, and were also used as sepulchral monuments, in the manner of tumuli; for Mr Rowland found a curious urn in one of these carn- edde. Whence it may be inferred, that the Britons had the custom of throwing stones on the deceased. From this custom is derived the Welch proverb, Karu ardiben, "ill betide thee."

CARNEIA, in antiquity, a festival in honour of Apollo, surnamed Carneus, held in most cities of Greece, but especially at Sparta, where it was first instituted. The reason of the name, as well as the occasion of the institution, is controverted. It lasted nine days, beginning on the 13th of the month Carneus. The ceremonies were an imitation of the method of living and discipline used in camps.

CARNEL.—The building of ships first with their timber and beams, and after bringing on their planks, is called carnel-work, to distinguish it from clinch-work.

Vessels also which go with mizen-fails instead of main-fails are by some called carnels.

CARNELIAN, in natural history, a precious stone, of which there are three kinds, distinguished by three colours, a red, a yellow, and a white. The red is very well known among us; is found in roundish or oval masses, much like our common pebbles; and is generally met with between an inch and two or three inches in diameter: it is of a fine, compact, and clothe texture: of a glossy surface; and, in the several specimens, is of all the degrees of red, from the palest flesh-colour to the deepest blood-red. It is generally free from spots, clouds, or variegations; but sometimes it is veined very beautifully with an extremely pale red, or with white: the veins forming concentric circles, or other less regular figures, about a nucleus, in the manner of those of agates. The pieces of carnelian which are all of one colour, and perfectly free from veins, are those which our jewelers generally make use of for seals, though the variegated ones are much more beautiful. The carnelian is tolerably hard, and capable of a very good polish; it is not at all affected by acid menstrums: the fire divests it of a part of its colour, and leaves it of a pale red; and a strong and long continued heat will reduce it to a pale dirty grey.

The finest carnelians are those of the East Indies; but there are very beautiful ones found in the rivers of Silesia and Bohemia; and there are some notpicable ones in England.

Though the ancients have recommended the carnelian as astringent, and attributed a number of fanciful virtues to it, we know of no other use of the stone than the cutting feals on it; to which purpose it is excellently adapted, as being not too hard for cutting, and yet hard enough not to be liable to accidents, to take a good polish, and separate easily from the wax.

CARNERO, in geography, a name given to that part of the gulph of Venice which extends from the western coast of Illyria to the island of Grossa and the coast of Morlachia.

Carnero is likewise the name of the cape to the west of the mouth of the bay of Gibraltar.

CARNIFEX, among the Romans, the common executioner. By reason of the ordeals of his office, the carnifex was expressly prohibited by the laws from having his dwelling-house within the city. In middle age writers carnifex also denotes a butcher.

Under the Anglo-Danish kings, the carnifex was an officer of great dignity; being ranked with the archbishop of York, earl Goodwin, and the lord steward. Flor. Wicorn. ann. 1040. Rex Hardecanutus Affricum Ebor. Archip. Goodwinum comitem, Edricum dipenfatorum, Thordum sauum carniscem, & altos magni dignitatis viros Londinum nifi.

CARNIOLA, a duky of Germany bounded on the south by the Adriatic sea, and that part of Illyria polynomial
Carniola, possessed by the republic of Venice; on the north, by Carnithia and Stiria; on the east, by Scavonia and Carinthia; on the west, by Friuli, the county of Gorz or Goritz, and a part of the gulph of Venice; extending in length about 110 miles, and in breadth about 50. It had its ancient name Carnia, as well as the modern one Carniola, from its ancient inhabitants the Carni, a tribe of Scythians, otherwise called Japides, whence this and the adjacent countries were also called Japida. Carniola is full of mountains, some of which are cultivated and inhabited, some covered with wood, others naked and barren, and others continually buried in snow. The valleys are very fruitful. Here are likewise mines of iron, lead and copper; the latter by the commonalty, and the reason of abstinence then ensuing. Accordingly, in the cattle, open breasts, and lying on a hard bench without mean. The Italians, particularly at Venice, holding from the sovereign's magazines. There are. mines of iron, lead and copper; besides many medicinal springs and inland lakes. The common people are very hearty, going barefooted in winter through the snow, with open breaths, and sleeping on a hard bench without bed or bolster. Their food is also very coarse and mean. In winter, when the snow lies deep on the ground, the mountaineers bind either small bales, or long thin narrow boards, like the Laplanders, to their feet, on which, with the help of a stick or pole, they descend with great velocity from the mountains. The languages chiefly in use are the Scavonian or Wendish, and German; the first by the commonalty, and the latter by people of fashion. The duchy is divided into the Upper, Lower, Middle, and Inner, Carniola. The principal commodities exported hence are, iron, steel, lead, quicksilver, white and red wine, oil of olives, cattle, sheep, chaff, linen, and a kind of woolen stuff called mahlum, Spanish leather, honey, walnuts, and timber; together with all manner of wood-work, as boxes, dishes, &c.—Christianity was first planted here in the eight century. Lutheranism made a considerable progress in it; but, excepting the Walchians or Ufikokes, who are of the Greek church, and flyle themselves Staravoziri, i.e. old believers, all the inhabitants at present are Roman Catholics. Carniola was long a marquisate or marquessate; but in the year 1231 was erected into a duchy. As its proportion towards the maintenance of the army, it pays annually 363,171 florins; but only two regiments of foot are quartered in it. CARNIVAL, or Carnaval, a time of rejoicing, a feast of mirth, observed with great solemnity by the Italians, particularly at Venice, holding from the twelfth day till Lent. The word is formed from the Italian Carnaval; which Mr Du Cange derives from Carna-vel, by reason the 12th then goes to pot, to make amends for the feast of abstinence then ensuing. Accordingly, in the corrupt Latin, he observes, it was called Carnalevamen, and Carnivorium; as the Spaniards still denominate it Carnes tollendas. Feasts, balls, operas, concerts of music, intrigues, marriages, &c. are chiefly held in carnival time. The carnival begins at Venice the second holiday in Christmas: Then it is they begin to wear masks, and open their play-houses and gaming houses; the place of St Mark is filled with mountebanks, jack-puddings, pedlars, whores, and such like mob, who flock thither from all parts. There have been no less than seven sovereign princes and 30,000 foreigners here to partake of these diversions. CARNIVOROUS, an epithet applied to those animals which naturally seek and feed on flesh. It has been a dispute among naturalists, whether man is naturally carnivorous. Those who take the negative side of the question, infult chiefly on the structure of our teeth, which are molly incisors or molars; not such as carnivorus animals are furnished with, and which are proper to tear flesh in pieces; to which it may be added, that, even when we do feed on flesh, it is not without a preparatory alteration by boiling, roasting, &c. and even then that it is the hardest of digestion of all foods. To these arguments Dr Wallis subjoins another, which is that all quadrupeds which feed on herbs or plants have a long colon, with a cæcum at the upper end of it, or somewhat equivalent, which conveys the food by a long and large progres, from the stomach downwards, in order to its slower passage and longer stay in the intestines; but that, in carnivorus animals, such cæcum is wanting, and instead thereof there is a more short and slender gut, and a quicker passage through the intestines. Now, in man, the cæcum is very visible; a strong presumption that nature, who is still confident with herself, did not intend him for a carnivorous animal.—It is true, the cæcum is but small in adults, and seem of little or no use; but in a fetus it is much larger in proportion: And it is probable, our customary change of diet, as we grow up, may occasion this shrinking. But to these arguments, Dr Tyfon replies, that if man had been by nature designed not to be carnivorous, there would doubtless have been found, somewhere on the globe, people who do not feed on flesh; which is not the case. Neither are carnivorous animals always without a colon and cæcum; nor are all animals carnivorous which have these parts: the opossum, for instance, hath both a colon and cæcum, and yet feeds on poultry and other flesh; whereas the hedge-hog, which has neither colon nor cæcum, and so ought to be carnivorous, feeds only on vegetables. Add to this, that hogs, which have both, will feed upon flesh when they can get it; and rats and mice, which have large cæcums, will feed on bacon as well as bread and cheese. Lastly, the human race are furnished with teeth necessary for the preparation of all kinds of foods; from whence it would seem, that nature intended we should live on all. And as the alimentary duct in the human body is fitted for digesting all kinds of food, ought we not rather to conclude, that nature did not intend to deny us any? It is no less disputed whether mankind were carnivorous before the flood. St Jerom, Chrysostom, Theodoros, and other ancients, maintain, that all animal food was then forbidden; which opinion is also strenuously supported among the moderns by Curr.ca, and refuted by Heiddegger, Banzius, Backhart, &c. See Antediluvians. CARNOSITY is used by some authors for a little flesh.
Belides
dy excrecence, tuber
e, or weal, formed in the
urethra, the neck of the bladder, or yard, which flops
the passage of the urine.—Carnalities are very dif
cult of cure: they are not easily known but by introduc
ing a probe into the passage, which there meets with re
sistance. They usually arise from some venereal ma
day ill managed.

CARO, (Annibale) a celebrated Italian poet, was
born at Civita Nuovo in 1507. He became secre
try to the Duke of Parma, and afterwards to Cardinal
Parnefe. He was also made a knight of Malta. He
translated Virgil’s Æneid into his own language with
rich propriety and elegance of expression, that he was
allowed by the best judges to have equalled the origi
nal. He also translated Aristotle’s rhetoric, two ora
tories of Gregory Nazianzen, with a discourse of Cy
rian. He wrote a comedy; and a miscellany of his
poems was printed at Venice in 1584. He died at
Rome in 1566.

CAROLINA, (North and South) two of the United
States of North America, lieing between 32° and 36°,
30 N. Lat. and 76° and 91° W. Long. Bounded on the
east by the Atlantic, on the west by the river Missillopi,
on the north by Virginia, and on the south by Georgia
and Florida.

This country is seated between the extremities of
heat and cold, though the heat is more troublesome in
summer than the cold in winter; their winters being
very short, and the frosts frequently succeed by warm days. The air is generally serene
and clear the greatest part of the year; but in Febru
ary and March the inhabitants have a custom of
burning the woods, which causes such a smoke as to
strangers would seem to proceed from a fog or thick
ness in the air. The smoke of the tar-kilns likewise
deceives strangers, and gives them an ill opinion of the
air of Carolina; to which add conduces a custom of
the Indians of setting fire to the woods in their hunt
ings, for many miles round. The great rains are in
winter, though they are not without heavy showers at midsummer; add to these the constant dews that fall in the night, which refresh the ground and supply the plants with moisture. In Carolina, the north
winds are strong in the winter, and very powerful
ther; but they are not of long continuance. Weater
ly winds bring very pleasant weather; but the fouth
erly are hot and uncomfortable, occasioning fevers and
other disorders. But this must be understood in sum
mer, for in winter they are very comfortable. The
depth of winter is towards the latter end of February,
and then the ice is not strong enough to bear a man’s
weight. In August and September there are some
times great storms and squalls of wind, which are so
violent as to make lanes of 100 feet wide, more or less,
 thro’ the woods, tearing up the trees by the roots. These
storms generally happen once in about seven years;
and are attended with dreadful thunder, lightning, and
heavy rains. They commonly happen about the time
of the hurricanes which rage to fatally among the is
lands between the tropics; and seem to be occasioned
by them, or to proceed from the same cause: but by the
time they reach Carolina, their force is much ab
ated; and the farther north they proceed, so much the
more do they decrease in fury. The soil on the coast
is sandy; but farther up, the country is so fruitful
that they have not yet been at the trouble to manage
their land. The grains most cultivated are Indian corn
and rice, though any fort will thrive well enough; they
have also grife of several forts, little known in England.
All kinds of garden stuff usual in England are culva
ted here, and may be had in great plenty. They
export large quantities yearly of rice, pitch, tar, tur
pentine, deer-fkins, and timber for building; cyprefs,
cedar, safffras, oak, walnut, and pine. Besides these
they also fend out beef, pork, tallow, hides, furs, wheat,
peas, potatoes, honey, bees-wax, myrtle-wax, tobacco,
snake-root, cotton, several forts of gums and medicinal
drugs. Indigo is also cultivated in this country, but of
an inferior quality to that which is raised in the Carib
bee islands. The culture of vines in this country has
made but little progress, from the idea that the frosts,
though not of long continuance, are yet sufficient to
check the growth of the vine, as well as olives, dates,
oranges, &c. but as population increases these articles
will become of much importance. The furs are bought
of the Indians with vermilion, lead, gunpowder, coarse
cloth, iron, and spirituous liquors. The aspect of the coun
try is very fine, being adorned with beautiful rivers and
creeks, and the woods with lofty timber, which afford
delightful and pleasant seats for the planters, and ren
der the fencing their lands very easy. And as they
have plenty of fish, wild fowl, and venison, besides other
necessaries which this country produces naturally, they
live easy and luxuriously.

Carolina was discovered by Scobban Cabot, about the
year 1500, in the reign of Henry VII. but the set
ling of it being neglected by the English, a colony of
French Protestants, by the encouragement of Admiral
Coligni, were transported thither; and named the place
Arx Carolina, in honour of their prince, Charles IX. of France: but in a short time that
colony was destroyed by the Spaniards; and no other
attempt was made by any European power to settle there
until the year 1664, when 800 English landed at Cape
Fear in North Carolina, and took possession of the coun
try. In 1670 Charles II. of Britain granted Carolina
to the Lords Berkley, Clarendon, Albemarle, Craven,
and Ashley, Sir George Carteret, Sir William Berkley,
Sir John Coliton. The plan of government for this
new colony was drawn up by the famous Mr. Locke,
who very wisely proposed an universal toleration in re
ligions matters. The only restriction in this respect
was, that every perfon claiming the protection of that
settlement, should, at the age of 17, register himself in
some particular communion. To civil liberty, however,
our philosopher was not so favourable; the code of Car
olina gave to the eight proprietors who founded the colo
ny, and to their heirs, not only all the rights of a mon
arch, but all the powers of a legislatian. The court,
which was composed of this sovereign body, and called
the Palatine Court, was invested with the right of no
mitating to all employments and dignities, and even of
confering nobility; but with new and unprecedented
titles. They were, for instance, to create in each coun
try two cortiques, each of whom was to be possessed of
24,000 acres of land; and a landgraces, who was to
have 80,000. The persons on whom these honours
should be bestowed were to compose the upper house,
and their pollsions were made unalienable. They had
only the right of farming or letting out a third part of

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Carolina, them at the most for three lives. The lower house was composed of the deputies from the several counties and towns. The number of this representative body was to be increased as the colony grew more populous. No tenant was to pay more than a shilling per acre, and even this rent was redeemable. All the inhabitants, however, both slaves and freemen, were under an obligation to take up arms upon the first order from the Palatine court.

It was not long before the defects of this constitution became apparent. The proprietary lords used every endeavours to establish an arbitrary government; and, on the other hand, the colonists exerted themselves with great zeal to avoid servitude. In consequence of this struggle, the whole province, distracted with tumults and dissensions, became incapable of making any progress, though great things had been expected from its particular advantages of situation. The toleration in religious matters was a part of the original constitution, dissensions arose likewise on that account. In 1705, Carteret, now Lord Granville, who, as the oldest of the proprietors, was sole governor of the colony, formed a design of obliging all the non-conformists to embrace the ceremonies of the Church of England; and this act of violence, though disavowed and rejected by the mother-country, inflamed the minds of the people. In the year 1712, a dangerous conspiracy was formed by the Coree and Tuscorora tribes of Indians, to murder and expel this infant colony. The foundation for this conspiracy is not known. Probably they were offended at the encroachments upon their hunting ground. They managed their conspiracy with great cunning and profound secrecy. They surrounded their principal town with a breast-work to secure their families. Here the warriors convened to the number of 1200. From this place of rendezvous they sent out small parties, by different roads, who entered the settlement under the mask of friendship. At the change of the full moon, all of them had agreed to begin their murderous operations the same night. When the night came, they entered the houses of the planters, demanding provisions, and pretending to be offended, fell to murdering men, women and children without mercy or distinction. One hundred and thirty-seven settlers, among whom were a Swiss baron, and almost all the poor Palatines that had lately come into the country, were slaughtered that night. Such was the ferocity and dispatch of the Indians in this expedition, that none knew what had befallen his neighbour, until the barbarians had reached their own door. Some few, however, escaped and gave the alarm.—The militia assembled in arms, and kept watch day and night, until the news of the sad disaster had reached the province of South Carolina. Governor Craven lost no time in sending a force to their relief.—The assembly voted £4000 for the service of the war. A body of 600 militia, under the command of colonel Barnwell, and 366 Indians of different tribes, with different commanders, marched with great expedition, through a hideous wilderness, to their assistance. In their first encounter with the Indians, they killed 300 and took 100 prisoners. After this defeat the Tuscororas retreated to their fortified town—Carolina— which was shortly after surrendered to colonel Barnwell. In this whole expedition it was computed that near a thousand Tuscororas were killed, wounded and taken.

The remainder of the tribe soon after abandoned their country, and joined the Five Nations, with whom they have ever since remained. The lords proprietors having refused to contribute towards the expenses of an expedition, of which they were to share the immediate benefits, were deprived of their prerogative, except Lord Granville, who still retained his eighth part. The relief received a remuneration of about 24,000l. The colony was taken under the immediate protection of the crown, and from that time began to flourish. The division into North and South Carolina now took place, and from that time peace being restored unto the internal government as well as with the Cherokees and other Indian tribes, these provinces began to breathe, and their trade increased with wonderful rapidity. See NORTH CAROLINA and SOUTH-CAROLINA (A).

CAROLINE. See CARLINE.

Caroline-Books, the name of four books, composed by order of Charlemagne, to refute the second council of Nice. These books are couched in very harsh and severe terms, containing 120 heads of accusation against the council of Nice, and condemning the worship of images.

CARLOSTADIANs, or CARLOSTADISANS, an ancient sect or branch of Lutherans, who denied the real presence of Christ in the eucharist.

They were thus denominatred from their leader Andrew Caroloftadis, who having originally been arch-deacon of Wittenberg, was converted by Luther, and was the first of all the reformed clergy who took a wife: but disagreeing afterwards with Luther, chiefly in the point of the sacrament, founded a sect apart. The Caroloftadisans are the same with what are otherwise denominated Sacramentarians, and agree in most things with the Zuinglians.

CAROLUS, an ancient English broad piece of gold struck under Charles I. Its value has of late been at 23 shillings Sterling, though at the time it was coined it is said to have been rated at 20 shillings.

CAROLUS, a small copper coin, with a little silver mixed with it, struck under Charles VIII. of France. The carolus was worth 12 deniers when it ceased to be current. Those which are still current in trade in Lorrain, or in some neighbouring provinces, go under the name of French fols.

CAROTIDS, in anatomy, two arteries of the neck, which convey the blood from the aorta to the brain: one called the right, and the other the left, carotid.

CARP, in ichthyology, the English name of a species of cyprinids. See CYPRINUS; also CARP-FISHING.

The carp is the most valuable of all kinds of fish for stocking of ponds. It is very quick in its growth, and brings forth the spawn three times a year, so that the increase is very great. The female does not begin to breed till eight or nine years old; so that in breeding-ponds a supply must be kept of carp of that age.

(A) As communications of importance have been promised to the publisher concerning these States, it was judged expedient to refer further particulars to the above articles.
Carp and tench thrive very well of three years old, carpes in marley yards; they love also clay-ponds well of grass under the water. A pound of one acre extent will very well feed the fish, four males growing from five inches to one inch to one inch in a year. A hundred fishes, and six thousand breams, and two thousand tenches. A hundred fishes should be thrown into carp-ponds, to help to fatten the fish. Grains, blood, chicken-guts, and the like, may at times be thrown into carp-ponds, to help to fatten the fish. To make them grow large and fat, the growth of grasses under the water should by all means be encouraged. For this purpose, as the water decreases in the summer, the sides of the pond left naked and dry should be well raked with an iron rake, to destroy all the weeds, and cut up the surface of the earth; hay-feed should then be thrown plentifully in these places; and more ground prepared in the same manner, as the water falls more and more away. By this means there will be a fine and plentiful growth of young grass along the sides of the pond to the water's edge; and when the rains fill up the pond again, this will be cleared under the water, and will make a feeding-place for the fish, where they will come early in the morning, and will fatten greatly upon what they find there.

CARPATES, or APES BASTARNICAE, (anc. geogr.) a range of mountains, running out between Poland, Hungary, and Transylvania. Now called the Carpathian Mountains.

CARPATHIUM, (Marr, Horace, Ovid); the sea that washes the island Carpathus.

CARPATHUS, an island on the coast of Asia, two hundred fathoms in compass, and an hundred in length. Its name is said to be from its situation on the coast of Carpathus between the Rhodus and Cretan seas, which from this island is called the Carpathian Sea, and has to the north the Ionian, to the south the Egyptian, to the west the Cretan and African seas. It is two hundred furlongs in compass, and a hundred in length. It had anciently according to Strabo, four cities; according to Sclavon mentions but one, which he calls Pheidias. This island is now called Scarpanto.

CARPEA, a kind of dance anciently in use among the Athenians and Magnesians, performed by two persons, the one acting a labourer, the other a robber. The labourer, laying by his arms, goes to ploughing and fowing, still looking warily about him as if afraid of being robbed; the robber at length appears, and the labourer quitting his plough, breaks himself to his arms, and fights in defence of his oxen. The whole was performed to the sound of flutes, and in cadence. Sometimes the robber was overcome and sometimes the labourer; the victor's reward being the oxen and plough. The design of the exercise was to teach and accustom the peasants to defend themselves against the attacks of ruffians.

CARPENTER, a person who practices carpentry. Carpenter. Carpenter.

The word is formed from the French charpentier, which signifies the same, formed of charpente, which denotes timber; or rather from the Latin carpenterius, a maker of carpenter, or carriages.

Carpenter of a Ship, an officer appointed to examine and keep in order the frame of a ship, together with her mats, yards, boats, and all other wooden machinery. It is his duty in particular to keep the ship tight; for which purpose he ought frequently to review the decks and sides, and to caulk them when it is necessary. In the time of battle, he is to examine up and down, with all possible attention, in the lower apartments of the ship, to stop any holes that may have been made by shot, with wooden plugs provided of several sizes.

CARPENTERAS, an episcopal town of Provence in France, and capital of Venaissin. It is subject to the pope; and is seated on the river Auvon, at the foot of a mountain. E. Long. 5. 6. N. Lat. 44. 4.

CARPENTRY, the art of cutting, framing, and joining large pieces of wood, for the use of building. It is one of the arts subervient to architecture: it is divided into house-carpentry and ship-carpentry: the first is employed in raising, roofing, flooring of houses, &c. and the second the building of ships, barges, &c. The rules in carpentry are much the same with those of joinery; the only difference is, that carpentry is used in the large and coarser work, and joinery in the smaller and curious.

CARPENTUM, in antiquity, a name common to divers sorts of vehicles, answering to coaches as well as wagons, or even carts among us. The carpentum was originally a kind of car or vehicle in which the Roman ladies were carried; though in after times it was also used in war. Some derive the word from carso; others from Carmenta the mother of Evander, by a conversion of the m into p.

CARPET, a sort of covering of stuff, or other materials, wrought with the needle or on a loom, which is part of the furniture of a house, and commonly spread over tables, or laid upon the floor.

There are also carpets of Persia, which, as far as they are the most esteemed: though at Paris there is a manufactury for the manufacture and sale of Persian carpets, where they make them little inferior, not so fine as the true Persian carpets. They are velvety, and perfectly imitate the carpets which come from the Levant. There are also carpets of Germany, some of which are made of woolen stuffs, as ferges, &c. and called square carpets: others are made of wool also, but wrought with the needle, and pretty often embellished with silk; and, lastly, there are some made of dogs' hair. There are likewise carpets made in Britain, which are used either as floor-carpets, or to cover chairs, &c. It is true, they are not arrived at the like perfection in this manufacture with their neighbours the French; but may not this be owing to the want of a like public encouragement?

CARPI, a principality of Modena in Italy, lying about four leagues from that city. It formerly belonged to the house of Pio; the elder sons of which bore the title of Prince of St Gregory. In the beginning of the 14th century Manfroy was the first prince of Carpi; but in the 16th, the emperor Chas. V. gave the principality to Alfonso duke of Ferrara.
CARPI

This nobleman, in recompence, gave to Albert Pio, whom the principality of Carpi belonged of right, the estate of Saluzzo and some other lands. Albert was, however, at last obliged to retire to Paris, where, being stripped of all his estates, he died in 1538, with the reputation of being one of the best and bravest men of his age. The family of Pio is yet in being, and continues attached to the French court. Some of them have even been raised to the purple, and still make a figure in Europe.

CARPI, a town of Italy in the duchy of Modena, and capital of the said mentioned principality. It has a strong castle, and is situated in E. Long. 11. 12. N. Lat. 44. 45.

CARPI, a town of the Veronese in Italy, memorable for a victory gained by the Imperialists over the French in 1701. It is subject to the Venetians; and is situated on the river Adige, in E. Long. 11. 39. N. Lat. 45. 10.

CARPI, (Ugo da) an Italian painter, of no very considerable talents in that art, but remarkable for being the inventor of that species of engraving on wood, distinguishing the name of chiaro-furo, in imitation of drawing. This is performed by using more blocks than one; and Ugo da Carpi usually had three; the first for the outline and dark shadows, the second for the lighter shadows, and the third for the half tint. In that manner he struck off prints after several designs, and caricatures of Raphael; particularly one of the Sybil, a Daughter of the Cross, and the History of Simon the Sorcerer. He died in 1500. This art was brought to a still higher degree of perfection by Balthasar Fe-ruzzi of Siena, and Parmigianno, who published several excellent designs in that manner.

CARPI, (Giroldano da) history and portrait painter, was born at Ferrara in 1501, and became a disciple of Garofalo. When he quitted that master, he devoted his whole time, thoughts, and attention, to study the works of Correggio, and to copy them with a most critical and observant eye; in which labour he spent several years at Parma, Modena, and other cities of Italy, where the chief works of that exquiste painter were preserved. He acquired such an excellence in the imititation of Correggio's style, and copying his pictures, that many paintings finished by him were taken for originals, and not only admired, but were eagerly purchased by the connoisseurs of that time. Nor is it improbable that several of the paintings of Giroldano da Carpi pass at this day for the genuine work of Correggio himself. He died in 1556.

CARPINUS, the horn-beam, in botany: A genus of the polyandria order, belonging to the monoe- cha clas of plants; and in the natural method ranking under the 50th order, Amentacea. The calyx of the male is monophyllous and ciliated; there is no corolla, but 20 lamina. The calyx of the female is monophyllous and ciliated; no corolla; 2 germens, with 2 styles on each. The fruit is an egg-shaped nut. There are two species, viz.

1. The betulus, or common hornbeam; a deciduous tree, native of Europe and America. Its leaves are of a darkish green, and about the size of those of the beech, but more pointed and deeply ferrated. Its branches are long, flexible, and crooked; yet in their general appearance very much resemble those of the beech; indeed there is so great a likeness between those two trees, especially in the thrifty and underwood state, that it would be difficult to distinguish them at the first glance, were it not for that glossy varnish with which the leaves of the beech are strongly marked. In the days of Evelyn, when topiary work was the gardener's idol, the hornbeam might be considered as deserving of those endearing expressions which that enthusiastic writer has been pleased to lavish upon it; nevertheless, as an ornamental in modern gardening it stands low; and its present uses are few. As an underwood it affords stakes and eddies, fuel and charcoal. Its timber ranks with that of the beech and the yew; and the inner bark is much used in Scandinavia to dye yellow. The only superior excellency of the hornbeam lies in its fits for fence fences for sheltering gardens, nurseries, and young plantations from the severities of the winter season. It may be trained to almost any height, and by keeping it trimmed on the sides it becomes thick of branches, and consequently thick of leaves; which being by their nature retained upon the plant after they wither, a hornbeam hedge occasions a degree of shelter nearly equal to that given by a brick wall. Indeed, being less reflective than that expensive fence, it affords a more uniform temperature of air to the plants which stand near it. In this point of view, too, the hornbeam is useful to be planted promiscuously, or in alternate rows, amongst more tender plants in exposed situations, in the same manner as the birch; the hornbeam has a strong preference: namely, it is warmer in winter—and Hanbury says, the hornbeam is peculiarly grateful to hares and rabbits; consequently it may prevent their injuring its more valuable neighbours; yet, like Evelyn, he seems to be of opinion that it is disaffected by deer. If this be really the case, the hornbeam may upon many occasions be introduced into the deer-parks with inglorious propriety.

Of this species there are three varieties: The Eastern Hornbeam, Flowering Hornbeam, American Hornbeam. The eastern hornbeam arrives to the leaf height of all the forts; about ten feet is the farthest of its growth, and it looks pretty enough with trees of the same growth. The leaves are by no means so large as the common fort; and as the branches are always closer in proportion to the smallness of the leaves, where a low hedge is wanted of the deciduous kind, this would not be an improper tree for the purpose, either to be kept fenced, or suffered to grow in its natural state. The bark of this fort is more spotted than that of the common. The flowering hornbeam is the most free floater of any of the forts; and will arrive to be the highest, the common hornbeam only excepted. It will grow to be thirty or forty feet high. The branches of this tree are less spotted with greyish spots than any of the other forts. The leaves are very rough, of a dark-green colour, and longer than the common fort. The property which the common hornbeam is poffed off, of retaining its leaves all winter, does not belong to this fort, the leaves of which constantly fall off in the autumn with other deciduous trees. American hornbeam is a more elegant tree than any of the former forts. The branches are slender, covered with a brownish speckled bark, and are more sparingly sent forth than from any of the others.
CARPUS, the writing. See Anatomy, p. 38.

CARR, a kind of rolling throne, used in triumphs, and at the splendid entries of princes. See Chariot.

The word is from the ancient Gaulish, or Celtic, Carr; mentioned by Caesar, in his commentaries, under the name Carrus. Plutarch relates, that Camillus, having entered Rome in triumph, mounted on a carr drawn by four white horses, it was looked on as too haughty an innovation.

Carr is also used for a kind of light open chariot. The carr, on medals, drawn either by horses, lions, or elephants, usually signifies either a triumph or an apotheosis; sometimes a procession of the images of the gods at a solemn supplication, and sometimes of those of some illustrious family at a funeral. The carr covered and drawn by mules, only signifies a consecration, and the honour done any one of having his image carried at the games of the circus. See consecration, &c.

CARRAC, or Carraca, a name given by the Portuguese to the vessels they sent to Brissil and the East Indies; being very large, round built, and fitted for fight as well as burden. Their capacity lies in their depth, which is very extraordinary. They are narrower above than underneath, and have sometimes seven or eight floors; they carry about 2000 tons, and are capable of lodging 2000 men; but of late they are little used. Formerly they were also in use among the knights of Rhodes, as well as among the Genoese, and other Italians. It is a custom among the Portuguese, when the carracas returned from India, not to bring any boat or floon for the service of the ship beyond the island of St. Helena; at which place they are applied: but the only use the Europeans make of it is in Venice treacle and mitridate; and in these not a great deal, for cubbs and juniper berries are generally substituted in its place.

CARPOCRATIANS, a branch of the ancient Gnostics, so called from Carpostates, who in the second century revived and improved upon the errors of Simon Magus, Menander, Saturnius, and other Gnostics. He owned, with them, one sole principle and father of all things, whose name as well as nature was unknown. The world, he taught, was created by angels, vailly inferior to the first principle. He opposed the divinity of Jesus Christ; making him a mere man, begotten carnally on the body of Mary by Joseph, though possessed of uncommon gifts which set him above other creatures. He inculcated a community of women; and taught, that the soul could not be purified, till it had committed all kinds of abominations, making that an necessary condition of perfection.

CARPOLITHI, or Fruit-stone Rocks of the Germans, are composed of a kind of jasper, of the nature of the amygdaloids, or almond-stones. Bretzard afferts that the latter are those which appear to be composed of elliptical pieces like petrified almonds, though in truth they are only small oblong pieces of calcareous stone rounded by attrition, and sometimes small mullcshells connected by a flony concretion. The name of carpolithi, however, is given in general by writers on fossils to all sorts of flony concretions that have any resemblance to fruit of whatever kind.

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they sink them on purpose, in order to take from the crew all hopes or possibility of saving themselves, in case of shipwreck.

CARRARA MARBLE, among artificers, the name of a species of white marble, which is called marmo lucens, and calcis firmum by the ancients: it is distinguished from the Parian, now called the statuary marble, by being harder and less bright.

CARRARA, a town of Turkey in Europe, with a Greek archbishop's see. E. Long. 22. 25. N. Lat. 40. 27.

CARRIDGE, a vehicle serving to convey persons, goods, merchandizes, and other things, from one place to another.

For the construction and mechanical principles of wheel-carriages, see MECHANICS.

CARRIDGE of a common, the frame or timber-work on which it is mounted, serving to point it for shooting, or to carry it from one place to another. It is made of two planks of wood, commonly one half the length of the gun, called the cheeks, and joined by three wooden tranfums, strengthened with three bolts of iron. It is mounted on two wheels, but on a march has two fore-wheels with limbers added. The principal parts of a carriage are the cheeks, tranfums, bolts, plates, train, bands, bridge, bed, hooks, trunnion holes, and capriscarpe.

Block-CARRIDGE, a cart made on purpose for carrying mortars and their beds from place to place.

Truck-CARRIDGE, two short planks of wood, supported on axe-trees, having four trucks of fold wood for carrying mortars or guns upon battery, where their own carriages cannot go. They are drawn by men.

CARRICK, the southern division of the shire of Ayr in Scotland. It borders on Galloway; stretches 32 miles in length; and is a hilly country fit for pasturage. The chief rivers are the Stencher and Giren, both abounding with salmon; here are also several lakes and forests; and the people on the coast employ themselves in the herring-fishtery, though they have no harbour of any conquence. The only towns of this district are Bargeny and Maybole, two inconsiderable villages; yet the firft gave the title (now extinct) of baron to a branch of the Hamilton family. The prince of Wales, as prince of Scotland, is earl of Carrick.

CARRICK on the Suir, a town of Ireland, in the county of Tipperary and province of Munster. W. Long. 7. 14. N. Lat. 52. 16.

CARRICK-FERGUS, a town of Ireland, in the county of Antrim and province of Ulifter. It is a town and county in itself, and sends two members to parliament. It is very rich and populous, with a good harbour; and is governed by a mayor, recorder, and sheriffs. It has, however, been of far greater conquence than at present, as appears from the mayor having been admiral of a considerable extent of coast in the counties of Down and Antrim, and the corporation enjoying the customs paid by all vessels within these bounds, the creeks of Belfast and Bangor excepted. This grant was repurchased, and the custom-house transferred to Belfast—Here is the skeleton of a fine house built by Lord Chichester in the reign of James I. an old Go-thic church with many family monuments, and a very large old castle. The town was formerly walled round, but some part of the walls is still remaining entire. Carrick-fergus is seated by a bay of the same name in the Irish channel; and is noted for being the landing place of king William in 1690. Here alo Thurot made a defect in 1759, took possession of the castle, and carried away hostages for the ransom of the town; but being soon after pursued by commodore Elliot, his three ships were taken, and he himself was killed.

CARRIER, is a person that carries goods for others for hire. A common carrier, having the charge and carriage of goods, is to answer for the fame, or the value, to the owner. And where goods are delivered to a carrier, and he is robbed of them, he shall be charged and answer for them, because of the hire. If a common carrier who is offered his hire, and who has convenience, refuses to carry goods, he is liable to an action, in the same manner as an inn-keeper who refuses to entertain a guest. See ASSUMPT.

One brought a box to a carrier, with a large sum of money, and the carrier demanded of the owner what was in it; he anfwered, that it was filled with silks, and such like goods: upon which the carrier took it, and was robbed, and adjudged to make it good; but a special acceptance, as provided there is no charge of money, would have excused the carrier. A person delivered to a carrier's book-keeper two bags of money sealed up, to be carried from London to Exeter, and told him that it was L 200, and took his receipt for the fame, with promise of delivery for L 200. per cent. carriage and risk: though it be proved that there was L 400 in the bags, if the carrier be robbed, he shall answer only for L 200, because there was a particular undertaking for that sum and no more; and his reward, which makes him answerable, extends no farther. If a common carrier lofes goods which he is incurned to carry, a special action on the cafe lies against him, on the custom of the realm, and notrover; and for a common carrier by boat. An action will lie againſt a porter, carrier, or barge-man, upon his bare receipt of the goods, if they are lost through negligence. Also a lighter man spoiling goods he is to carry, by letting water come to them, action of the cafe lies against him, on the common custom.

CARRIER-PIGEON, or courrier-pigeon, a fort of pigeon used, when properly trained, to be sent with letters from one place to another. See Columna.

Though you carry these birds hood-winked, 20, 30, 40 or 100 miles, they will find their way in a very little time to the place where they were bred. They are trained to this service in Turkey and Persia; and are carried ftrill, while young, short flights of half a mile, afterwards more, till at length they will return from the farthest part of the kingdom. Every Balbaw has a basket of these pigeons bred in the feraglio, which, upon any emergent occasion, as an interposition, or the like, he dispatches, with letters braised under their wings, to the seraglio; which proves a more speedy method, as well as a more safe one, than any other; he sends out more than one pigeon, however, for fear of accidents. Lithgow affurres us, that one of these birds will carry a letter from Babylon to Aleppo, which
which is 30 days journey, in 48 hours. This is also a very ancient practice ; Hiries and Brutus, at the siege of Modena, held a correspondence with one another by means of pigeons. And Ovid tells us, that Tauroph(thenes), by a pigeon tained with purple, gave notice to his father of his victory at the Olympic Games, sending it to him at Aegina.

In modern times, the most noted were the pigeons of Aleppo, which served as couriers at Alexandria and Bagdad. But this use of them has been laid aside for the last 30 or 40 years, because the Cud robbers killed the pigeons. The manner of sending advice by them was this: they took pairs which had young ones, and carried them on horseback to the place from whence they wished them to return, taking care to let them have a full view. When the news arrived, the correspondent tied a billet to the pigeon's foot, and let her loose. The bird impatient to see its young, flew off like lightning, and arrived at Aleppo in ten hours from Alexandria, and in two days from Bagdad. It was not difficult for them to find their way back, since Aleppo may be discovered at an immense distance. This pigeon has nothing peculiar in its form, accept its noftrils, which, instead of being smooth and even, are swelled and rough.

CARRON, a small but remarkable river in Scotland, rising about the middle of the isle of Arran, between the friths of Forth and Clyde. Both its source, which is from within the fhire of Stirling, which it falls into, and ran parallel to it for several miles. Near the middle of its course, in a pleasant valley, stand two beautiful mounts, called the Hills of Dunipace, which are taken notice of by most of the Scottish historians as monuments of great antiquity. The whole structure of these mounts is of earth; but they are not both of the same form and dimensions. The more easterly one is perfectly round, resembling an oven, and about fifty feet in height: And this is an artificial work does not admit of the least doubt; but we cannot affirm the same, with equal certainty, of the other, though it has been generally supposed to be so too. It bears no resemblance to the easterly one either in shape or size. At the foundation it is nearly a triangular form; but the superstructure is quite irregular; nor does the height thereof bear any proportion to the extent of its base. These mounts are now planted with firs, which, with the parih-church of Dunipace standing in the middle between them, and the river running hard by, give this valley a very romantic appearance. The common account

of these mounts is, that they were erected as monuments of a peace concluded in that place between the Romans and the Caledonians, and that their name partakes of the language of both people; Dunipace signifies a hill in the old language of that island, and Pax "peace" in the language of Rome. The compound word, Dunipace, signifies "the hills of peace." And we find in history, that no less than three treaties of peace were, at different periods, entered into between the Romans and Caledonians; the first, by Severus, about the year 210; the second, soon after, by his son Caracalla; and the third, by the usurper Carausus, about the year 280; but of which of these treaties Dunipace is a monument, we do not pretend to determine. If the concurring testimony of historians and antiquaries did not agree in giving this original to these mounts, we would be tempted to conjecture that they are sepulchral monuments. Human bones and urns have been discovered in earthen fabrics of this kind in many parts of Britain, and the little mounts or barrows, which are scattered in great numbers about Stonhenge in Salisbury plain are generally supposed to have been the sepulchres of the ancient Britons. See Barrows.

From the valley of Dunipace, the river runs for some time in a deep and hollow channel, with steep banks on both sides; here it passes by the foundations of the ancient Roman bridge; not far from which, as is generally thought, was the scene of the memorable conference between the Scotch patriot William Wallace and Robert Bruce, father to the king of that name, which first opened the eyes of the latter to a just view, both of his own true interest and that of his country. After the river has left the village and bridge of Larbert, it soon comes up to another small valley, through the midst of which it has now worn out to itself a straight channel: whereas, in former ages, it had taken a considerable compass, as appears by the track of the old bed, which is still visible. The high and circling banks upon the fourth-side, give this valley the appearance of a spacious bay: and, according to the tradition of the country, there was once an harbour here: nor does the tradition seem altogether groundless: pieces of broken anchors having been found here, and some of them within the memory of people yet alive. The stream-sides would still flow near the place, if they were not kept back by the dam-head built across the river at Stenhouse; and there is reason to believe, that the frith flowed considerably higher in former ages than it does at present. In the near neighbourhood of this valley, upon the south, stand the ruins of ancient Camelon; which, after it was abandoned by the Romans, was probably inhabited, for some ages, by the natives of the country.

Another ancient monument, called Arthur's Oven, once stood upon the banks of Carron; but was, with a spirit truly Gothic, entirely demolished about 40 years ago. The corner of a small inclosure between Stenhouse and the Carron-iron-works, is pointed out as the place of its situation. This is generally supposed to have been a Roman work; though it is not easy to conceive what could be their motive for erecting such a fabric, at so great a distance from any other;
of their works, and in a spot which, at that time, must have been very remote and unfrequented. The form of it is said to have been perfectly round, and rising perpendicular for some yards at first, but afterwards gradually contracted, till it terminated in a narrow orifice at the top.

As Carron extends over the half of the 14th century, and runs to near the ancient boundaries of the Roman empire, the adjacent country fell naturally to be the scene of many battles and reencounters. Historians mention a bloody battle fought near this river between the Romans and the confederate army of the Scots and Picts in the beginning of the 5th century. The scenes of fame of Offian's poems were, in the opinion of the translator, upon the banks of this river. Here Fingal fought with Caracal, the son of the king of the world, supposing to have been the same with Caracalla the son of the Roman emperor Severus. Here also young Oscar, the son of Offian, performed some of his heroic exploits. Hereabout was the stream of Crona, celebrated in the ancient compositions of the Gaelic bard; possibly that now called the water of Bonny, which runs in the neighbourhood of the Roman wall, and discharges itself into Carron at Dunipace. In those poems, mention is made of a green vale upon the banks of this river, from the valiant John Graham, who fell there, and whose grave-stone is to be seen in the church-yard of Falkirk. The scenes of fame of Crom, celebrated in the ancient compositions of the Gaelic bard, and the manner of its entrance into the church-yard of Falkirk.

The river Carron, though it hath long since ceased to be navigable amid the din of arms, still preserves its fame, by lending its aid to trade and manufactures; (see the next article) — The river is navigable for some miles near its mouth, and a considerable trade is carried on upon it by small craft; for the convenience of which, its channel has of late years been straightened and much shortened, and the great Canal has its entrance from it.

CARRON-WORKS, a large iron-foudastery, two miles north from Falkirk in Scotland. They are conveniently situated on the banks of the Carron, three miles above its entry into the frith of Forth. Above 100 acres of land have been converted into reservoirs and pools, for water diverted from the river, by magnificent dams built about two miles above the works, which, after turning 18 large wheels for the several purposes of the manufacture, falls into a tide-navigation that conveys their cargais to the sea.

These works are the greatest of the kind in Europe, and were established in 1760. At present, the buildings are of vast extent; and the machinery, constructed by Mr Smeaton, is the first in Britain, both in elegance and correctness: there are 1600 men employed, to whom is paid weekly above 350l. Sterling; which has greatly enriched the adjoining country.
nother charter of the same reign at 100 acres: in the
time of Edward I. at 150 acres: and in the 23d of
Edward III. a carrucate of land in Barchester contain-
ed 112 acres, and in Middleton 150 acres.

By a statute under William III. for charging per-
fons to the repair of the highways, a plough-land 
was rated at a fifty pound per annum, and may contain
houses, mills, wood, pasture, &c.

CARRYING, in falconry, signifies a hawk's fly-
ging away with the quarry. Carrying is one of the ill
qualities of a hawk, which the acquires either by a
dislike of the falconer, or not being sufficiently broke
to the lure.

CARRYING, among huntsmen. When a hare runs
on rotten ground (or even sometimes in a frost), and
it flicks to her feet, they say the carries.

CARRYING, among riding-masters. A horse is said
to carry low, when having naturally an ill-shaped neck,
he lowers his head too much. All horses that arm
themselves carry low, but a horse may carry low with-
out arming. A French branch, or gigot, is prescribed as
useful against carrying low.

A horse is said to carry well, when his neck is rai-
ed, or arched, and he holds his head high and firm,
without constraint.

CARRYING wind, a term used by dealers in hor-
ses to express such a one as frequently toffes his nose
as high as his ears, and does not carry handomely.
This is called carrying wind; and the difference be-
tween carrying in the wind, and beating upon the
hand, is this: that the horse who beats upon the
hand, shakes the brace and refits it, while he shakes
his head; but the horfe that carries in the wind puts
up his head without shaking, and sometimes beats up
on the hand. The opposite to carrying in the wind,
is arming and carrying low; and even between these
two there is a difference in wind.

CARS, or KARS, a considerable and strong town of
Asia, in Armenia, feated on a river of the same name,
with a castle almost impregnable. E. Long. 43. 50.
N. Lat. 41. 30.

CARSE, or Carps of Cowry, a diocese of Perchfibre
in Scotland. It lies on the north side of the Tay, and
extends 14 miles in length from Dundee to Perth, and
is from two to four in breadth. It is a rich plain
country, cultivated like a garden, and producing as
good harvefts of wheat as any in Great Britain. It
abounds with all the necessaries of life; but from its
low damp situation, the inhabitants are subject to a
sicknes and the commonalty are in great want of firing.
In this diocese, not far from the Tay, stands the houfe
of Errol, which formerly belonged to the Earls of that
name, the chiefls of the ancient family of Hay, here-
ditary contables of Scotland.

CARSTAIRS, (William) an eminent Scots Divine,
whose merit and good fortune called him to act in
great scenes, and to associate with men to whose so-
ciety and intercourse bis birth gave him few preten-
tions to aspire. A small village, in the neighbourhood
of Glasgow, was the place of his nativity. His father,
of whom little is known, exercised the functions of a
clergyman.

Young Carstairs turned his thoughts to the profes-
sion of theology; and the perfections and oppre-
sions of government, both in regard to civil and reli-
gious liberty, having excited his strongest indignation,
it became a matter of prudence that he should proce-
due his studies in a foreign university. He went ac-
cordingly to Utrecht; and his industry and attention
being directed with skill, opened up and unfolded those
faculties which he was about to employ with equal
honour to his country and himself.

During his residence abroad, he became acquainted
with Penitential Fagel, and entered with warmth in-
to the interest of the Prince of Orange. On his re-
turn to Scotland to procure a licence to teach doc-
tines which he had studied with the greatest care, he
became disjointed with the proud and insolent conduct
of Archbishop Sharp, and prepared to revitit Holland;
where he knew that religious liberty was respected,
and where he hoped he might better his condition by
the connexions he had formed.

His expectations were not vain. His prudence, his
reverence, and his political address, were strong recom-
mendations of him to the Prince of Orange; and he was
employed in personal negotiations in Holland, England,
and Scotland. Upon the elevation of his talent to the
English throne, he was appointed the King's chap-
lain for Scotland, and employed in settling the affairs
of that kingdom. William, who carried politics into
religion, was solicitous that episcopacy should prevail
there as universally as in England. Carstairs, more
vervant in the affairs of his native country, saw all the
impropriety of this, and the danger that would arife
from the enforcing of it. His reafonings, his re-
monstrances, his intrigues, overcame the firmness
of king William. He yielded to confiderations founded
alike in policy and in prudence; and to Carstairs, Scot-
land is indebted for the full establishment of its church
in the Presbyterian form of government.

The death of King William was a severe afflection
to him; and it happened before that Prince had pro-
vided for him with the liberality he deserved. He
was continued, however, in the office of chaplain for
Scotland by Queen Anne; and he was invited to ac-
cpt the Principality of the University of Edinburgh.
He was one of the minifters of the city, and four times
moderator of the general assembly. Placed at the
head of the church, he profecuted its interest with
zeal and with integrity. Nor were his influence and
activity confined to matters of religion. They were
exercised with success in promoting the culture of the
arts and sciences. The universities of Scotland owe
him obligations of the highest kind. He procured, in
particular, an augmentation of the salaries of their
professors; a circumstance to which may be ascribed
their reputation, as it enabled them to cultivate with
spirit the different branches of knowledge.

A zeal for truth, a love of moderation and order,
prudence and humanity, distinguished Principal Car-
stairs in an uncommon degree. His religion had no
mixture of austerity; his secular transactions were
attended with no imitation of artifice; and the verfa-
tility of his talents made him pass with ease from a
court to a college. He was among the last who suf-
feref torture before the privy-council, in order to
make him divulge the secrets intrusted to him, which
he firmly resisted; and after the revolution, that in-
human instrument the thumb-screw was given to him
in a prefect by the council.—This excellent perfon
died
C A R  [ 186 ]  C A R

Carfughi died in 1751; and in 1774 his State-papers and Letters, with an account of his life, were published in one vol. 4to, by the Rev. Dr M'Cormick.

Carfughi (Raüer) a Jesuit, born at Citerna in Tuscany, in 1647, was the author of a Latin poem, entitled, Ars bene fortundal, which is esteemed both for the elegance of the style and for the excellent precepts it contains. He also wrote some epigrams. He died in 1709.

C A R T A M A, a town of Spain in the kingdom of Grenada, formerly very considerable. It is seated at the foot of a mountain, near the river Guadala-Medina, in W. Long. 4. 28. N. Lat. 36. 40.

C A R T, a land-carriage with two wheels, drawn commonly by horSES, to carry heavy goods, &c. from one place to another. The word seems formed from the French charrette, which signifies the fame, or rather the Latin carretta, a diminutive of carus. See C A R R.

In London and Westminster carts shall not carry more than twelve sacks of meal, seven hundred and fifty bricks, one child of coals, &c. on pain of forfeiture of the horses, (5 Geo. I. c. 6.) By the laws of the city, cart-men are forbidden to ride either on their carts or horses. They are to lead or drive them on foot through the streets on the forfeiture of ten shillings, (Stat. 1 Geo. I. cap. 57.) Criminals used to be drawn to execution in a cart. Bawds and other malefactors are whipped at the cart's tail.

Scripture makes mention of a fort of carts or drags used by the Jews to do the threshing. They were supported on low thick wheels, bound with iron, which were rolled up and down on the heaves, to break them, and force out the corn. Something of the like kind also obtained among the Romans, under the denomination of planiftra, of which Virgill makes mention, (Georg. I.)

Tardaque Eleusine matris volventia planiftra, Tribulagae, trahereque.

On which Servius observes, that trahere denotes a cart without wheels, and tribula a fort of cart armed on all sides with teeth, used chiefly in Africa for threshing corn. The Sepuqant and St Jerome represent these carts as furnished with saws, infomuch that their surface was befit with teeth. David having taken Rabbah, the capital of the Ammonites, ordered all the inhabitants to be cruelled to pieces under such carts, moving on wheels fet with iron teeth; and the king of Damascus is said to have treated the Israelites of the land of Gilead in the same manner.

C A R T-Bote, in law, signifies wood to be employed in making and repairing instruments of husbandry.

C A R T-S of War, a peculiar kind of artillery anciently in use among the Scots. They are thus described in an act of parliament, A. D. 1456: "It is thocht speidfull, that the King mak requiteit to certain of the great barons of the land that are of any myght, to mak carts of weir, and ilk cart twa Gunnis, and ilk ane to have twa chalmers, with the remanent of the graith that effairs thereto, and an cunning man to hrut thame." By another act, A. D. 1471, the prelates and barons are commanded to provide such carts of war against their old enemies the English.

C A R T-E, the historian, was the son of Mr Samuel C a r t e prebendary of Litchfield, and born in 1686. When he was reader in the abbey-church at Bath, he took occasion, in a 30th of January sermon, 1714, to vindi cate Charles I. with respect to the irish massacre, which drew him into a controversy with Mr Chandler the dissenting minister; and on the accession of the present royal family he refused to take the oaths to government, and put on a lay habit. He is said to have acted as a kind of secretary to Bishop Atterbury before his troubles; and in the year 1722, being accused of high treason, a reward of 1000l. was offered for apprehending him: but Queen Caroline, the great patroness of learned men, obtained leave for him to return home in security. He published, 1. An edition of Tho mas, in seven volumes folio. 2. The Life of the first Luke of Ormond, three volumes, folio. 3. The history of England, four volumes, folio. 4. A Collection of Original Letters and Papers concerning the affairs of England, two volumes 8vo.; and some other works. He died in April 1754.—His history of England ends in 1654. His design was to have brought it down to the Revolution; for which purpose he had taken great pains in copying every thing valuable that could be met with in England, Scotland, France, Ireland, &c.—He had (as he himself says, p. 43. of his Vindication of a full answer to a letter from a bystander), "read abundance of collections relating to the time of King Charles II. and had in his power a series of memoirs from the beginning to the end of that reign; in all those intrigues and turns at court, at the latter end of that king's life, which bishop Burnet, with all his gout for tales of secret history, and all his genius for conjectures, does not pretend to account for, are laid open in the clearest and most convincing manner; by the person who was most affected by them, and had the best reason to know them."—At his death, all his papers came into the hands of his widow, who afterwards married Mr Jernegan, a member of the church of Rome. They are now deposited in the Bodleian library, having been delivered by Mr Jernegan to the university, 1778, for a valuable consideration. While they were in this gentleman's possession, the earl of Hardwicke paid 200l. for the perusal of them. For a consideration of 300l. Mr Macpherson had the use of them; and from these and other materials compiled his history and state-papers. Mr Carte was a man of a strong constitution and indefatigable application. When the studies of the day were over, he would eat heartily; and in conversation was cheerful and entertaining.

C a r t e-Blanche, a sort of white paper, signed at the bottom with a person's name, and sometimes also sealed with his seal, giving another person power to supersign what conditions he pleaseth. Much like this is the French blanc signé, a paper without writing, except a signature at the bottom, given by contending parties to arbitrators or friends, to fill up with the conditions they judge reasonable, in order to end the difference.

C a r t e, an agreement between two states for the exchange of their prisoners of war.

C a r t e signifies also a letter of defiance or a challenge to decide a controversy either in a tournament or in a single combat. See D u e l.

C a r t e-S hips, a ship commissioned in time of war to
CAR

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C A R

exchange the prisoners of any two hostile powers; also to carry any particular request or proposal from one to another: for this reason, the officer who commands her is particularly ordered to carry no cargo, ammunition, or implements of war, except a single gun for the purpose of firing signals.

CARTES, (Rene des) descended of an ancient family in Touraine in France, was one of the most eminent philosophers and mathematicians in the 17th century. At the Jesuits College at la Fleche, he made a very great progress in the learned languages and polite literature, and became acquainted with Father Marfenne. His father designed him for the army; but his tender constitution then not permitting him to expose himself to such fatigues, he was sent to Paris, where he launched into gaming, in which he had prodigious success. Here Marfenne persuaded him to return to study; which he purued till he went to Holland, in May 1616, where he engaged as a volunteer among the prince of Orange's troops. While he lay in garrison at Breda, he wrote a treatise on music, and laid the foundation of several of his works. He was at the siege of Rochelle in 1628; returned to Paris; and, a few days after his return, at an assembly of men of learning in the house of Monfignor Bagni, the Pope's Nuncio, was prevailed upon to explain his sentiments with regard to philosophy, when the nuncio urged him to publish his system. Upon this he went to Amsterdam, and from hence to Franeker, where he began his metaphysical meditations, and drew up his "Treatise on Meteorology." He made a short tour to England; and, not far from London, made some observations concerning the declination of the magnet. He returned to Holland, where he finished his "Treatise on the World."

His books made a great noise in France; and Holland thought of nothing but discarding the old philosophy, and following him. Voetius being chosen rector of the university of Utrecht, procured his philosophy to be prohibited, and wrote against him; but he immediately published a vindication of himself. In 1647, he took a journey into France, where the king, on the recommendation of 300 learned persons, fixed his residence. He attended the court; but his health failed, and he was sent to the island of Cyprus, for the young women to go on certain stated days, before marriage, to the sea-side, there to look for strangers, that might possibly arrive on their coasts, in order to prostitute themselves for gain, that they might thereby acquire a dowry. Out of these, the Tyrians selected 80, whom they carried along with them. From Cyprus they sailed directly for the coast of Africa; and at last safely landed in the province called Africa Propria, not far from Utica, a Phoenician city of great antiquity. The inhabitants received their countrymen with great demonstrations of joy, and invited them to settle among them. The common fable is, that the Phoenicians imposed upon the Africans in the following manner: They desired, for their intended settlement, only as much ground as an ox's hide would encompass. This request the Africans laughed at; but were surprised, when, upon their granting it, they saw Elifa cut the hide into the smallest shreds, by which means it surrounded a large territory; in which the built the citadel called Byrsa. The learned, however, are now uncertain as to the name of the citadel.
Car

The Carthaginians entered into a treaty with the Romans. It related chiefly to matters of navigation and commerce. From it we learn, that the whole island of Sardinia, and part of Sicily, were then subject to Carthage; that they were very well acquainted with Carthage the coasts of Italy, and had made some attempts upon and Rome, on them before this time; and that, even at this early period, a spirit of jealousy had taken place between the two republics. Some time near this period, the Carthaginians had a mind to discontinue the tribute they had hitherto paid the Africans for the ground on which their city stood. But, notwithstanding all their power, they were at present unsuccessful; and at last were obliged to conclude a peace, one of the articles of which was, that the tribute should be continued.

By degrees the Carthaginians extended their power Sicily invaded over all the islands in the Mediterranean, Sicily ex- by the celebrated; and for the entire conquest of this, they made Carthaginian vessels preparations, about 480 years before Christ. Their navy consisted of 300,000 men; their fleet was composed of upwards of 2000 men of war, and 3000 transports; and with such an immense armament, they made no doubt of conquering the whole island in a single campaign. In this, however, they found themselves miserably deceived. Hamilcar their general having landed his numerous forces, invested Himera, a city of considerable importance. He carried on his attacks with the greatest assiduity; but was at last attacked in his trenches by Gelon and Theron, the tyrants of Syracuse and Agrigentum, who gave the Carthaginians one of the greatest overthrows mentioned in history. An hundred and fifty thousand were they killed in the battle and pursuit, and all the rest taken utterly de- prived; so that of so mighty an army, not a single person escaped. Of the 2000 ships of war and 3000 transports, of which the Carthaginian fleet consisted, eight ships only, which then happened to be at sea, made their escape; the rest immediately fell for Carthage; but were all lost and every soul perished, except a few who were saved in a small boat, and at last reached Carthage with the dismal news of the total loss of the fleet and army. No words can express the consternation of the Carthaginians upon receiving the news of so terrible a disaster. Ambassadors were immediately dispatched to Sicily, with orders to conclude a peace upon any terms. They put to sea without delay; and landing at Syracuse, threw themselves at the conqueror’s feet. They begged Peace con- ged, with many tears, to receive their city into cliuded, favour, and grant them a peace on whatever terms they should choose to prescribe. He granted their request on condition that Carthage should pay him 2000 talents of silver to defray the expense of the war; that they should build two temples, where the articles of the treaty should be lodged and kept as sacred; and that for the future they should abstain from human sacri- fices. This was not thought a dear purchase of a peace for which there was such occasion; and to show their gratitude for Gelon’s moderation, the Carthaginians complimented his wife Demarata with a crown of gold worth 100 talents.

From this time we find little mention of the Carthaginians for 70 years. Some time during this period, however, they had greatly extended their dominions
Carthage and its influence in Africa, and likewise shaken off the tribute which gave them so much uneasiness. They had warm disputes with the inhabitants of Cyrene the capital of Cyrenaica, about a regulation of the limits of their respective territories. The consequence of these disputes was a war, which reduced both nations to so low, that they agreed first to a secession of arms, and then to a peace. At last it was agreed, that each state should appoint two commissioners, who should settle out from their respective cities on the same day, and that the spot on which they met should be the boundary of both states. In consequence of this, two brothers called 'Philæni' were sent out from Carthage, who advanced with great celerity, while those from Cyrene were much more slow in their motions. Whether this proceeded from accident or design, or perjury, we are not certainly informed; but, be this as it will, the Cyreneans finding themselves greatly outstripped by the Philæni, accused them of breach of faith, alleging that they had set out before the time appointed, and consequently that the convention between their principals was broken. The Philæni desired them to propose some expedient whereby their differences might be accommodated; promising to submit to it, whatever it might be. The Cyreneans then proposed, either that the Philæni should retire from the place where they were, or that they should be buried alive upon the spot. With this last condition the brothers immediately complied, and by their death gained a large extent of territory to their country. The Carthaginians ever after celebrated this as a most brave and heroic action; paid them divine honours; and endeavoured to immortalize their names by erecting two altars there, with suitable inscriptions upon them.

Sicily invaded anew. About the year before Christ 412, some disputes happening between the Egypotines and Selinuntines, inhabitants of two cities in Sicily, the former called the Carthaginians to their assistance; and this occasioned a new invasion of Sicily by a nation. Great preparations were made for this war; Hannibal, whom they had appointed general, was empowered to raise an army equal to the undertaking, and equip a suitable fleet. They also appointed certain funds for defraying all the expenses of the war, intending to exact their whole force to reduce the island under their sujection.

The Carthaginian general having landed his forces, immediately marched for Selinus. In his way he took Emporium, a town situated on the river Mazara; and having arrived at Selinus, he immediately invested it. The besieged made a very vigorous defence; but at last the city was taken by storm, and the inhabitants were treated with the utmost cruelty. All were massacred by the savage conquerors, except the women who fled to the temples; and these escaped, not through the merciful dispossession of the Carthaginians, but because they were afraid, that if driven to despair they would set fire to the temples, and by that means consume the treasure they expected to find in those places. Sixteen thousand were massacred; 2250 escaped to Agrigentum; and the women and children, about 5000 in number, were carried away captives. At the same time the temples were plundered, and the city razed to the ground.

After the reduction of Selinus, Hannibal laid siege to Himera; that city he despaired of all things to become master of, that he might revenge the death of his grandfather Hamilcar, who had been slain before it by Gelon. His troops, flushed with their late successes, behaved with undaunted courage; but finding his battering engines not to answer his purpose sufficiently, he undermined the wall, supporting it with large beams of timber, to which he afterwards set fire, and thus laid part of it flat on the ground. Notwithstanding this advance, however, the Carthaginians were several times repulsed with great slaughter; but at last they became masters of the place, and treated it in the same manner as they had done Selinus. After this, Hannibal, dispersing his Sicilian and Italian allies, returned to Africa.

The Carthaginians were now so much elated, that they meditated the reduction of the whole island. But as the age and infirmities of Hannibal rendered him incapable of commanding the forces alone, they joined in commissioin with him Imlinar the son of Hanno, one of the same family. On the landing of the Carthaginian army, all Sicily was alarmed, and the principal cities put themselves into the best state of defence they were able. The Carthaginians immediately marched to Agrigentum, and after a very vigorous resistance from the walls with great fury. The besieged, however, defended themselves with incredible resolution, in a sally burnt all the machines raised against their city, and repulsed the enemy with great slaughter. The Syracusians in the mean time, being alarmed at the danger of Agrigentum, sent an army to its relief. On their approach they were immediately attacked by the Carthaginians; but after a sharp dispute the latter were defeated and forced to fly to the very walls of Agrigentum, with the loss of 6000 men. Had the Agrigentine commanders now sallied out, and fallen upon the fugitives, in all probability the Carthaginian army must have been destroyed; but either through fear or corruption they refused to fit out of the place, and this occasioned the loss of it. Immense And taken. Booby was found in the city; and the Carthaginians behaved with their usual cruelty, putting all the inhabitants to the sword, not excepting even those who had fled to the temples.

The next attempt of the Carthaginians was design- ated against the city of Gela; but the Gelates, being greatly alarmed, implored the protection of Syracuse; and, at their request, Dionysius was sent to allit them with 2000 foot and 400 horse. The Gelates were so well satisfied with his conduct, that they treated him with the highest marks of distinction; they even sent ambassadors to Syracuse to return thanks for the important services done them by sending him farther; and soon after he was appointed generalissimo of the Syracusan forces and those of their allies against the Carthaginians. In the mean time Imlinar, having raised the city of Agrigentum, made an incursion into the territories of Gela and Comarina; which having ravaged in a dreadful manner, he carried off such immense quantity of plunder, as filled his whole camp. He then marched against the city: but though Gela before it was but indifferently fortified, he met with a very vigorous resistance; and the place held out for a long time without receiving any assistance from its allies.
Abandoned making their
abitants.

Peace eluded.

To amuse the enemy, he left
his march with great celerity. The Carthaginians
battted the Carthaginian camp, but was repulsed
by the Carthaginian army greatly weakened, partly by the
plague which had broken out in their city, did not depoid, but fell
officers to Europe, with considerable sums, to raise troops
with the utmost diligence. Ten galleys were also sent
from Carthage to destroy all the ships that were found
in the harbour of Syracuse. The admiral, according to
his orders, entered the harbour in the night, without
being discovered by the enemy; and having sunk all
of the ships he found there, returned without the loss of a man.

This all while the Motyans defended themselves with
incredible vigour; while their enemies, defirous of
revenging the cruelties exercised upon their countrymen by the Carthaginians; fought like lions. At last
the place was taken by storm, and the Greek soldiers
began a general massacre. For some time Dionysius
was not able to restrain their fury: but at last he
proclaimed that the Motyans should fly to the Greek
temples; which they accordingly did, and a flood was
put to the slaughter; but the soldiers took care thoroughly to plunder the town, in which they found a great treasure.

The following spring, Dionysius invaded the Carthaginian territories, and made an attempt upon Egela; but here he was again disappointed. The Carthaginians were greatly alarmed at his progress; but, next
year, notwithstanding a considerable loss sustained in a sea-fight with Leptines, Himilco their general landed
a powerful army at Panormus, seized upon Eryx, and then advancing towards Motya, made himself master of it, before Dionysius could send any forces to its relief. He next advanced to Messana, which he like-
wise besieged and took; after which most of the Siculi
revolted from Dionysius.

Notwithstanding this defection, Dionysius, finding his forces still amount to 50,000 foot and 3000 horse, advanced against the enemy. At the same time, Leptines was sent with the Syracusan fleet against that of the Carthaginians, but with positive orders not to break the line of battle upon any account whatever. But, notwithstanding these orders, he thought proper to divide his fleet, and the consequence of this was a total defeat; above 100 of the Syracusan galleys being sunk or taken, and 20,000 of their men killed in the battle or in the pursuit. Dionysius disheartened by this misfortune, returned with his army to Syracuse, being afraid that the Carthaginian fleet might become masters of that city, if he should advance to fight the land army. Himilco did not fail immediately to invest the capital;
In this place; the Carthaginians being apprized that the Corinthian succours were detained by tempestuous weather at Thurium, posted a strong squadron, under Hanno their admiral, to intercept them in their passage to Sicily. But that commander, not imagining the Corinthians would attempt a passage to Sicily in such a stormy season, left his station at Thurium, and ordering his seamen to crown themselves with garlands, and adorn their vessels with bucklers both of the Greek and Carthaginian form, failed to Syracuse in a triumphant manner. Upon his arrival there, he gave the troops in the citadel to understand, that he had taken the succours Timoleon expected, thinking by this means to intimidate them to surrender. But, while he thus trifled away his time, the Corinthians marched with great expedition to Rhegium, and, taking the advantage of a gentle breeze, were easily wafted over into Sicily. Mago, the Carthaginian general, was no sooner informed of the arrival of this reinforcement, than he was struck with terror, though the whole Corinthian army did not exceed 4000 men; and, soon after, fearing a revolt of his mercenaries, he weighed anchor, in spite of all the remonstrances of Icetas, and set sail for Africa. Here he no sooner arrived, than, overcome with grief and shame for his unparalleled cowardice, he laid violent hands on himself. His body was hung upon a gallows or cross, in order to deter succeeding generals from forfeiting their honour in so flagrant a manner.

After the flight of Mago, Timoleon carried all before him. He obliged Icetas to renounce his alliance with the state of Carthage, and even deposed him, and continued his military preparations with the greatest vigour. On the other hand, the Carthaginians prepared for the ensuing campaign with the greatest alacrity. An army of 70,000 men was sent over, with a fleet of 200 ships of war, and 1000 transports laden with warlike engines, armed chariots, horses, and all other sorts of provisions. This immense multitude, however, was overthrown on the banks of the Crimis by Timoleon: 10,000 were left dead on the field of battle; and of these, above 5000 were native Carthaginians of the chief families in the city. Above 15,000 were taken prisoners; all their baggage and provisions, with 200 chariots, 1000 coats of mail, and 10,000 shields, fell into Timoleon's hands. The spoil, which consisted chiefly of gold and silver, was so immense, that the whole Sicilian army was three days in collecting it and stripping the slain. After this signal victory, he left his mercenary forces upon the frontiers of the enemy, to plunder and ravage the country; while he himself returned to Syracuse with the rest of his army, where he was received with the greatest demonstrations of joy. Soon after, Icetas, grown weary of his private station, concluded a new peace with the Carthaginians; and, having assembled an army, ventured an engagement with Timoleon: but in this he was utterly defeated; and himself, with Eupolemus his son, and Euthymus general of his horse, were brought bound to Timoleon by their own soldiers. The two first were immediately executed as tyrants and traitors, and the last murdered in cold blood; Icetas's wives and daughters were likewise cruelly put to death after a public trial. In a short time after, Marcus, another of the Carthaginian confederates, was over
Peace concluded.

War renewed.

Agathocles raises himself to the throne of Syracuse.

Agathocles seeing himself stripped of almost all his dominions, and his capital itself in danger of falling into the hands of the enemy, formed a design which, were it not attested by writers of undoubted authority, would seem absolutely incredible. This was no less than to transfer the war into Africa, and lay siege to Carthage, the enemy's capital, at a time when he himself was besieged, and only one city left to him in all Sicily. Before he departed, however, he made all the necessary preparations for the defence of the place, and appointed his brother Andranus governor of it. He also gave permission to all who were not willing to stand the fatigues of a siege to retire out of the city. Many of the principal citizens, Justin says 1600, accepted of this offer; but they were no sooner got out of the place, than they were cut off by parties posted on the road for that purpose. Having seized upon their citadels, Agathocles raised a considerable sum, which was intended in some measure to defray the expense of the expedition; however, he carried with him only 50 talents to supply his present wants, being well assured that he should find in the enemy's country whatever was necessary for his subsistence. As the Carthaginians had a much superior fleet, they for some time kept the mouth of the harbour blocked up: but at last a fair opportunity offered; and Agathocles hoisting sail, by the activity of his rowers soon got clear both of the port and city of Syracuse. The Carthaginians purified him with all possible expedition; but, notwithstanding their utmost efforts, Agathocles got his troops landed with very little opposition.

Soon after his forces were landed, Agathocles burnt He burns his ships, probably that his soldiers might behave with his fleet. the greater resolution, they saw no possibility of flying from their danger. He first advanced to a place called the Great City. This, after a feeble resistance, he took and plundered. From hence he marched to Tunis, which furnished him with the first munitions; and Agathocles levelled both places with the ground.

The Carthaginians were at first thrown into the greatest consternation; but soon recovering themselves, the citizens took up arms with so much alacrity, that in a few days they had on foot an army of 40,000 foot and 1000 horse, with 2000 armed chariots. The Carthaginian command of this army they entrusted to Hanno and Bomilcar, two generals between whom there subsisted great animosity. This occasioned the defeat of their whole army with the loss of their camp, though all the forces of Agathocles did not exceed 14,000 in number. Among other rich spoils the conqueror found many chariots of curious workmanship, which carried 20,000 pair of fetters and manacles that the enemy had provided for the Sicilian prisoners. After this defeat, the Carthaginians, supposing themselves to have fallen under the displeasure of their deities on account of their neglecting to sacrifice children of noble families...
In the meantime the Agrigentines, finding that Haruclcar was defeated night-time.

These to them, resolved to expiate this guilt. Accordingly 200 children of the first rank were sacrificed to their bloody gods, besides 300 other persons who voluntarily offered themselves to pacify the wrath of these deities.

After these expiations, Hamilcar was recalled from Sicily. When the messengers arrived, Hamilcar commanded them not once to mention the victory of Agathocles; but, on the contrary, to give out among the troops that he had been entirely defeated, his forces all cut off, and his fleet destroyed by the Carthaginians. This threw the Syracusians into the utmost despair; however, one Eurymon, an Etolian, prevailed upon Antandrus, not to content to a capitulation, but to stand a general assault. Hamilcar being informed of this, prepared his battering engines, and made all the necessary preparations to storm the town without delay.

But while matters remained in this situation, a galley, which Agathocles had caused to be built immediately after the battle, got into the harbour of Syracuse, and acquainted the inhabitants with the certainty of Agathocles's victory. Hamilcar observing that the garrison flocked down to the port on this occasion, and expecting to find the walls unguarded, ordered his soldiers to erect scaling-ladders, and begin the intended assault. The enemy having left the ramparts quite exposed, the Carthaginians mounted them without being discerned, and had almost possessed themselves of an entire part lying between two towers, when the patrol discovered them. Upon this a warm dispute ensued; but at last the Carthaginians were repulsed with loss. Hamilcar, therefore, finding it in vain to continue the siege after such glad tidings had restored life and soul to the Syracusians, drew off his forces, and sent a detachment of 5000 men to reinforce the troops in Africa. He still entertained hopes, however, that he might oblige Agathocles to quit Africa, and return to the defence of his own dominions. He spent some time in making himself master of such cities as were taken by the Syracusians; and after having brought all their allies under subjection, returned again to Syracuse, hoping to surmise it by an attack in the night-time. But being attacked while advancing thro' narrow passages, where his numerous army had not room to move, he was defeated with great slaughter, and himself taken prisoner, carried into Syracuse, and put to death.

In the mean time the Agrigentines, finding that the Carthaginians and Syracusians had greatly weakened each other by this war, thought it a proper opportunity to attempt the sovereignty of the whole island. They therefore commenced a war against both parties; and prosecuted it with such success, that in a short time they wrested many places of note both out of the hands of the Syracusians and Carthaginians.

In Africa the tyrant carried every thing before him. He reduced most of the places of any note in the territories of Carthage; and being about to cross the king of Libya had declared against him, he immediately entered Libya Superior, and in a great battle overthrew that prince, putting to the sword a good part of his troops, and the general who commanded them; after which he advanced against the Carthaginians with such expedition, that he surprized and defeated them, with the loss of 2000 killed, and a great number taken prisoners. He next prepared for the siege of Carthage itself; and in order thereto advanced to a post within five miles of that city. On the other hand, notwithstanding the great losses they had already sustained, the Carthaginians, with a powerful army, encamped between him and their capital. In this situation Agathocles received advice of the defeat of the Carthaginian forces before Syracuse, and the head of Hamilcar their general. Upon this he immediately rode up to the enemy's camp, and showing them the head, gave them an account of the total destruction of their army before Syracuse. This threw them into such consternation, that in all human probability Agathocles would have made himself master of Carthage, had not an unexpected mutiny arisen in his camp, which gave the Carthaginians an opportunity of recovering from their terror.

The year following an engagement happened, in which neither party gained any great advantage; but an alliance was soon after the tyrant, notwithstanding all his victories, found himself unable to carry on the war alone; and therefore endeavoured to gain over to his interest Ophellas, one of the captains of Alexander the Great. In this he perfectly succeeded; and, to succour his new ally the more effectually, Ophellas went to Athens for a body of troops. Having finished his military preparations, Ophellas found his army to consist of 10,000 foot and 600 horse, all regular troops, besides 100 chariots, and a body of 10,000 men, attended by their wives and children, as though he had been going to plant a new colony. At the head of these forces he continued his march towards Agathocles for 18 days; and then encamped at Automale, a city about 3000 stadia distant from the capital of his dominions. From thence he advanced through the Regio Syrta; but found himself reduced to such extremities, that his army was in danger of perishing for want of bread, water, and other provisions. They were also greatly annoyed by serpents and wild beasts, with which that desert region abounded. The serpents made the greatest havoc among the troops; for, being of the same colour with the earth, and extremely venomous, many soldiers, who trod upon them without being observed, were instantly killed. At last, after a very fatiguing march of two months, he approached Agathocles, and encamped at a small distance from him, to the no small terror of the Carthaginians, who apprehended the most fatal consequences from this junction. Agathocles at first carriethim, and ad- vised him to take all possible care of his troops that the former had undergone so many fatigues; but soon after cut off his head, through treachery, and then by fair words and promises persuaded his troops to serve under himself.

Agathocles now finding himself at the head of a numerous army, assumed the title of King of Africa, intending soon to complete his conquests by the reduction of Carthage. He began with the siege of Utica, which was taken by assault. After this he marched against Hippo Diarrhytus, the Bifera of the moderns, which was also taken by storm; and after this most of the people bordering upon the sea-coasts, and even those who inhabited the inland parts of the country, submitted to him. But in the midst of this career of success, the Sicilians formed an association in Carthage, to return favourable home.
Archagathus, after his father's departure, greatly extended the African conquests. He sent Eumachus at the head of a large detachment to invade some of the neighbouring provinces, while he himself, with the greatest part of his army, observed the motions of the Carthaginians. Eumachus falling into Numidia, first took the great city of Tocas, and conquered several of the Numidian cantons. Afterwards he besieged and took Phellina; which was attended with the submission of the Alphadelphiaeans, a nation, according to Diodorus, as black as the Ethiopians. He then reduced several cities; and being at last elated with such a run of good fortune, resolved to penetrate into the more remote parts of Africa. Here he at first met with successes; but hearing that the barbarous nations were advancing in a formidable body to give him battle, he abandoned his conquests, and retreated with the utmost precipitation towards the sea-coasts, after having lost abundance of men.

This unfortunate expedition made a great alteration for the worse in the affairs of Archagathus. The Carthaginians being informed of Eumachus's bad success, resolved to exert themselves in an extraordinary manner to repair their former losses. They divided their forces into three bodies: one of these they sent to the sea-coasts, to keep the towns there in awe; another they dispatched into the Mediterranean parts, to preferve the allegiance of the inhabitants there; and the last body they ordered to the Upper Africa, to support their confederates in that country. Archagathus being apprized of the motions of the Carthaginians, divided his forces likewise into three bodies. One of these he sent to observe the Carthaginian troops on the sea-coasts, with orders to advance afterwards into the Upper Africa; another under the command of Æchirion, one of his generals, he posted at a proper distance in the heart of the country, to have an eye both on the enemy and the barbarous nations; and with the last, which he led in person, he kept nearer Carthage, preferring a communication with the other two, in order to send them succours, or recall them, as the exigency of affairs should require.—The Carthaginian troops sent into the heart of the country, were commanded by Hannibal, a general of great experience, who being informed of the approach of Æchirion, laid an ambuscade for him, into which he was drawn and cut off with 4000 foot and 200 horse. Himilco, who commanded the Carthaginian forces in Upper Africa, having advice of Eumachus's march, immediately advanced against him. An engagement ensued, in which the Greeks were almost totally cut off, or perished with thirst after the battle, out of 8000 foot only 30, and of 800 horse only 40, having the good fortune to make their escape.

Archagathus receiving the melancholy news of these two defeats, immediately called in the detachments he had sent out to harass the enemy, which would otherwise have been inhumanly cut off. He was, however, in a short time hemmed in on all sides in such a manner as to be reduced to the last extremity for want of provisions, and ready every moment to be swallowed up by the numerous forces which surrounded him. In this deplorable situation Archagathus received an express from Archagathus, acquainting him of the losses he had sustained, and the scarcity of provisions he laboured under. Upon this the tyrant, leaving the care of the Sicilian war to one Leptines, by a stratagem got 18 Etruscan ships that came to his assistance out of the harbour; and then engaging the Carthaginian squadron which lay in its neighbourhood, took five of their ships, and made all their men prisoners. By this means he became master of the port, and secured a passage into it for the merchants of all nations, which soon restored plenty to that city, where the famine before had begun to make great havoc. Supplying himself, therefore, with a sufficient quantity of necessaries for the voyage he was going to undertake, he immediately set sail for Africa.

Upon his arrival in this country, Archagathus received the forces, and found them to consist of 6000 Greeks, as many Samnites, Celts, and Etruscans; besides 10,000 Africans, and 1500 horse. As he found his troops almost in a state of despair, he thought this a proper time for offering the enemy battle. The Carthaginians, however, did not think proper to accept the challenge; especially as by keeping close in their camp, where they had plenty of every thing, they could harve the Greeks to a surrender without striking a stroke. Upon this Archagathus attacked the Carthaginian camp with great bravery, made a considerable impression upon it, and might perhaps have carried it, had not his mercenaries deserted him almost at the first onset. By this piece of cowardice he was forced to retire with precipitation to his camp, whither the Carthaginians purfued him very closely, doing great execution in the pursuit.

The next night, the Carthaginians sacrificed all the sufferers of distinction as a greatful acknowledgment to the gods for the victory they had gained. While they were employed in the inhuman work, the wind, still freshly rising, wafted the flames to the sacred tabernacle near the altar, which was entirely consumed, as well as the general's tent, and thole of the principal officers adorning it. A dreadful alarm took place through the whole camp, which was heightened by the great progres of the fire. For the soldiers tents consisting of very combustible materials, and the wind blowing in a most violent manner, the whole camp was almost entirely laid in ashes; and many of the soldiers endeavouring to carry off their arms, and the rich baggage of their officers, perished in the flames. Some of those who made their escape met with a fate equally unhappy: For, after Archagathus had received the last blow, the Africans deserted him, and were in that instant coming over in great numbers to the Carthaginians. These, the persons who were flying from the flames took to be the whole Syracusan army advancing in order of battle to attack their camp. Upon this a dreadful confusion ensued. Some took to their heels; others fell down in heaps one upon another; and others engaged their comrades, mistaking them for the enemy. Five thousand men lost their lives in this tumult, and the rest thought proper to take refuge within the walls of Carthage; nor could the appearance of day-light, for some time, diffuse
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Another in that of Agathocles.

59 The Syracusians seeing a body of troops advancing towards them in good order, concluded that the enemy were marching to attack them, and therefore immediately cried out "To arms." The flames ascending out of the Carthaginian camp into the air, and the lamentable outcries proceeding from thence, confirmed them in this opinion, and greatly heightened their confusion. The consequence was much the same as in the Carthaginian camp; for coming to blows with one another instead of the enemy, they scarce recovered their senses upon the return of light, and the intestine fray was so bloody, that it cost Agathocles 4000 men.

This last disaster so disheartened the tyrant, that he immediately set about contriving means for making his escape privately; and this he did at length, though with great difficulty, effected. After his departure, his two sons were immediately put to death by the soldiers, who, choosing a leader from among themselves, made peace with the Carthaginians upon the following conditions: 1st. That the Greeks should deliver up all the places they held in Africa, receiving from them 300 talents; 2nd. That such of them as were willing to serve in the Carthaginian army should be kindly treated, and receive the usual pay; and, 3d. That the rest should be transported to Sicily, and have the city of Selinus for their habitation.

From this time, to that of the first war with the Romans, we find nothing remarkable in the history of the Carthaginians. The first Punic war, as it is commonly called, happened about 256 years before Christ. At that time, the Carthaginians were possessed of extensive dominions in Spain; they had made considerable progress in Spain; were masters of Sardinia, Corsica, and all the islands on the coast of Italy; and had extended their conquests to a great part of Sicily. The occasion of the first rupture between the two republics was as follows. The Mamertines being insulted in their town, and reduced to great straits by Hiero king of Syracuse, had resolved to deliver up Messina, the only city they now possessed, to that prince, with whose mild government and strict probity they were well acquainted. Accordingly, Hiero was advancing at the head of his troops to take possession of the city, when Hannibal, who, at that time commanded the Carthaginian army in Sicily, prevented him by a stratagem. He came to meet Hiero, as if it were to congratulate him on his victory; and amnestied him while some of the Carthaginian troops filed off towards Messina. Hereupon the Mamertines, seeing their city supported by a new reinforcement, were divided into several opinions. Some were for accepting the protection of Carthage; others were for surrendering to the king of Syracuse; but the greater part were for calling in the Romans to their assistance. Deputies were accordingly dispatched to Rome, offering the possession of the city to the Romans, and in the most moving terms imploiring protection. This, after some debate, was agreed to; and the consul Appius Claudius received orders to attempt a passage to Sicily, at the head of a powerful army. Being obliged to stay some time at Rome, however, one Caius Claudius, a person of great intrepidity and resolution, was dispatched with a few vessels to Rhegium. On his arrival there, he observed the Carthaginian squadron to be so much superior to his own, that he thought it would be little better than madness to attempt at that time to transport forces to Sicily. He crossed the straits, however, and had a conference with the Mamertines, in which he prevailed upon them to accept of the protection of Rome; and on this he made the necessary preparations for transporting his forces. The Carthaginians being informed of the resolutions of the Romans, sent a strong squadron of galleys under the command of Hanno, to intercept the Roman fleet; and accordingly the Carthaginian admiral, coming up with them near the Roman coast of Sicily, attacked them with great fury. During the engagement a violent storm arose, which detained many of the Roman vessels against the rocks, and did a vast deal of damage to their squadron; by which means Claudius was forced to retire to Rhegium, and this he accomplished with great difficulty. Hanno restored all the vessels he had taken; but ordered the deputies sent with them, to expostulate with the Roman general upon the infringement of the treaties subsisting between the two republics. This expostulation, however just, produced an open rupture; Claudius soon after poising himself at Messina.

Such was the beginning of the first Punic war, Carthago which is said to have lasted 24 years. The first year, the Carthaginians and Syracusians laid siege to Messina; and this defeat so much disheartened Hiero with the Carthaginians, that he soon after concluded an alliance with the Romans. After this treaty, having no enemy to contend with but the Carthaginians, the Romans made themselves masters of all the cities on the western coast of Sicily, and at the end of the campaign carried back most of their troops with them to take up their winter-quarters in Italy.

The second year, Hanno, the Carthaginian general, Agrippen fixed his principal magazine at Agrigentum. This turn taken place was very strong by nature, and had been rendered the Romans by the Roman army of 50,000 foot, 6000 horse, and 60 elephants, landed at Lilybaeum, and from thence marched to Heraclae, within 20 miles of Agrigentum. There the general received a deputation from some of the inhabitants of Erbeis, where the Romans had their magazines, offering to put the town into his hands; which was accordingly delivered up; and by this means the Romans now came so much disheartened, that they had certainly been obliged to abandon their enterprise, had not Hiero supplied them with provisions. But all the assistance he was able to give could not long have supported them.
them, as their army was so much weakened by disorders occasioned by famine, that, out of 100,000 men of whom it originally consisted, scarce a fourth part remained fit for service, and could no longer subsist on such parsiimonious supplies. But in the mean time Hannibal acquainted Hanno that the city was reduced to the utmost distress; upon which he resolved to venture an engagement, which he had before declined. In this the Romans were victorious, and the city surrendered at discretion, though Hannibal, with the greatest part of the garrison made their escape. This ended the campaign; and the Carthaginians being greatly chagrined at their bad success, fined Hanno of an immense sum of money, and deprived him of his command, appointing Hamilcar to succeed him in the command of the land army, and Hannibal in that of the fleet.

The third year, Hannibal received orders to ravage the coasts of Italy; but the Romans had taken care to post detachments in such places as were most proper to prevent his landing, so that the Carthaginians found it impossible to execute his orders. At the same time the Romans perceiving the advantages of being masters of the sea, set about building 120 galleys.—While this was doing they made themselves masters of most of the inland cities, but the Carthaginians reduced or kept feady in their interest most of the maritime ones; so that both parties were equally successful during this campaign.

The fourth year, Hannibal by a stratagem made himself master of 17 Roman galleys; after which he committed great ravages on the coast of Italy, whither he had advanced to take a view of the Roman fleet. But he was afterwards attacked in his turn, lost the greatest part of his ships, and with great difficulty made his own escape. Soon after he was totally defeated by the confiduous Dullius, with the loss of 80 ships taken, thirteen sunk, 7000 men killed, and as many taken prisoners. After this victory Dullius landed in Sicily, put himself at the head of the land forces, relieved Segesta besieged by Hamilcar, and made himself master of Macella, though defended by a numerous garrison.

The fifth year, a difference arose between the Romans and their Sicilian allies, which came to such a height, that they encamped separately. Of this Hamilcar availed himself, and attacking the Sicilians in their entrenchments, put 4000 of them to the sword. He then drove the Romans from their posts, took several cities from them, and overran the greatest part of the country. In the mean time, Hannibal, after his defeat, failed with the shattered remains of his fleet to Carthage; but in order to secure himself from punishment, he sent one of his friends with all speed, before the event of the battle was known there, to acquaint the senate, that the Romans had put to sea with a good number of heavy ill-built vessels, each of them carrying some machine, the use of which the Carthaginians did not understand; and asked, whether it was the opinion of the senate that Hannibal should attack them. These machines were the corvi, which were then newly invented, and by means of which, chiefly, Dullius had gained the victory. The senate were unanimous in their opinion, that the Romans should be attacked; upon which the messenger acquainted them with the unfortunate event of the battle. As the senators had already declared themselves for the engagement, they spared their general's life, and, according to Polybius even continued him in the command of the fleet. In a short time, being reinforced by a good number of galleys, and attended by some officers of great merit, he failed for the coast of Sardinia. He had not been long here, before he was surprized by the Romans, who carried off many of his ships, and took great numbers of his men prisoners. This so incensed the rest, that they feized their unfortunate admiral, and crucified him; but who was his immediate successor does not appear.

The sixth year, the Romans made themselves masters of the islands of Corsica and Sardinia. Hanno, who commanded the Carthaginian forces in the latter, delivered himself at a city called Olbia with incredible bravery; but being at last killed in one of the attacks, the place was surrendered, and the Romans soon became masters of the whole island.

The seventh year, the Romans took the town of Mytelae in Sicily, from whence they marched towards Camarina, but in their way were surrounded in a deep valley, and in the most imminent danger of being cut off by the Carthaginian army. In this extremity, a legatary tribune, by name M. Calpurnius, defired the general to give him 300 chosen of a legion of men, promising, with this small company, to find any tribute the enemy such employment as should oblige them to leave a passage open for the Roman army. He performed his promise with a bravery truly heroic; for, having seized, in spite of all opposition, an eminence, and entrenched himself on it, the Carthaginians, jealous of his design, flocked from all quarters to drive him from his post. But the brave tribune kept their whole army in play, till the confid taking advantage of the diversion, drew his army out of the bad situation in which he had imprudently brought it.—The legionaries were no sooner out of danger, than they hastened to the relief of their brave companions; but all they could do was to save their bodies from the in-1fults of their enemies: for they found that all dead on the spot, except Calpurnius, who lay under an heap of dead bodies, all covered with wounds, but still breathing. His wounds were immediately dressed, and it fortunately happened that none of them proved mortal; and for this glorious enterprise he received a crown of gramen. After this the Romans reduced several cities, and drove the enemy quite out of the territory of the Agrigentines; but were repulsed with great loss before Lipara.

The eighth year, Regulus, who commanded the Carthaginian fleet, observing that of the Carthaginians lying along the coast in disorder, failed with a squad of 10 galleys to observe their number and strength, or dering the rest of the fleet to follow him with all expedition. But as he drew too near the enemy, he was surrounded by a great number of Carthaginian galleys. The Romans fought with their usual bravery; but being overpowered with numbers, were obliged to yield. The confid, however, found means to make his escape, and join the rest of the fleet; and then had his full revenge of the enemy, 18 of their ships being taken, and 8 sunk.

The ninth year, the Romans made preparations for invading
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Regulus vades Africa. Their fleet for this purpose consisted of 330 galleys, each of them having on board 120 soldiers and 350 rowers. The Carthaginian fleet consisted of 330 sail, and was much better manned than that of the Romans. The two fleets met near Ecnomus, a promontory in Sicily; where, after a bloody engagement which lasted the greater part of the day, the Carthaginians were entirely defeated, with the loss of 30 galleys sunk, and 63 taken with all their men. The Romans lost only 24 galleys, which were all sunk.—After this victory, the Romans having retaken their fleet, set sail for the coast of Africa with all expedition. The first land they got sight of was Cape Hermes, where the fleet lay at anchor for some time waiting till the galleys and transports came up. From thence they coasted along till they arrived before Ciprea, a city to the east of Carthage, where they made their first descent.

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Carthaginians in great conformation. No words can express the consternation of the Carthaginians, on the arrival of the Romans in Africa. The inhabitants of Ciprea were so terrified, that, according to Zonaras, they abandoned the place, which the Romans immediately took possession of. Having left there a strong garrison to secure their shipping, and keep the adjacent territory in awe, they moved nearer Carthage, taking a great number of towns: they likewise plundered a prodigious number of villages, laid vast numbers of noblemen's feasts in ashes, and took above 20,000 prisoners. In short, having plundered and ravaged the whole country, almost to the gates of Carthage, they returned to Ciprea laden with the immense booty they had acquired in the expedition.

67

Success of Regulus. The tenth year, Regulus pushed on his conquests with great rapidity. To oppose his progress, Hamilcar was recalled from Sicily, and with him Bothar and Aedrural were joined in command. Hamilcar commanded an army just equal to that of Regulus. The other two commanded separate bodies, which were to join him, or act apart as occasion required. But, before they were in a condition to take the field, Regulus, purging his conquests, arrived on the banks of the Braga, a river which empties itself into the sea at a small distance from Carthage. Here he had a monstrous serpent to contend with, which, according to the accounts of those days, infected the waters of the river, poisoned the air, and killed all other animals with its breath alone. When the Romans went to draw water, this huge dragon attacked them; and, twisting itself round their bodies, either squeezed them to death or swallowed them alive. As its hard and thick scales were proof against their darts and arrows, they were forced to have recourse to the halisæ, which they made use of in the sieges to throw great stones, and to beat down the walls of besieged cities. With these they discharged showers of huge stones against this new enemy, and had the good luck, with one of them, to break his back-bone; which disabled him from twisting and winding his immense body, and by that means the Romans made use of the opportunity of approaching and dispatching him with their darts. But his dead body corrupted the air and the water of the river; and spread so great an infection over the whole country, that the Romans were obliged to decamp. We are told that Regulus sent to Rome the skin of this monster, which was 120 feet long; and that it was hung up in a temple, where it was preserved to the time of the Numantine war.

68

He kills a monstrous serpent. Having passed the river, he besieged Adir, or Adda. Defeats the not far from Carthage, which the enemy attempted to relieve; but as they lay encamped among hills and rocks, where their elephants, in which the main strength of their army consisted, could be of no use, Regulus attacked them in their camp, killed 17,000 of them, and took 5000 prisoners, and 18 elephants. Upon the fame of this victory, deputations came from all quarters, insomuch that the conqueror in a few days became master of 80 towns; among which were the city and port of Utica. This increased the alarm at Carthage; which was reduced to despair, when Regulus laid siege to Tunis, a great city about nine miles from the inhabitants; and the public magazines were soon exhausted; and, as the city was full of selfish merchants, who took advantage of the public distress, to sell provisions at an exorbitant price, a famine ensued, with all the evils which attended it.

69

And reducet Carthage. In this extremity Regulus advanced to the very gates of Carthage; and having encamped under the walls, sent deputies to treat of a peace with the senate. The deputies were received with inexpressible joy; but the conditions they proposed were such that the senate could not bear them without the greatest indignation. They were, 1. That the Carthaginians should relinquish all claims to Sardinia, Corsica, and Sicily. 2. That they should restore to the Romans all the prisoners they had taken from them since the beginning of the war. 3. That if they cared to redeem any of their own prisoners, they should pay so much a head for them as Rome should judge reasonable. 4. That they should for ever pay the Romans an annual tribute. 5. That for the future they should fit out but one man of war for their own use, and 50 triremes to serve in the Roman fleet, at the expense of Carthage, when required by any of the future conquests. These extravagant demands provoked the senators, who loudly and unanimously rejected them; the Roman deputies, however, told them that Regulus would not alter a single letter of the proposals, and that they must either conquer the Romans or obey them.

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In this extreme distress, some mercenaries arrived from Greece, among whom was a Macedonian, by appointment named Xanthippus, a man of great valour and experience in war. This man, having informed himself of the circumstances of the late battle, declared publicly, that their overthrow was more owing to their own misconduct than to the superiority of the enemy. This discourse being spread abroad, came at last to the knowledge of the senate; and by them, and even by the desire of the Carthaginian generals themselves, Xanthippus was appointed commander in chief of their forces. His first care was to discipline his troops in a
The Romans were surprised at the sudden alteration they observed in the enemy's conduct; but Regulus, elated with his last successes, came and encamped at a small distance from the Carthaginian army in a vall plain, where their elephants and horse had room to act. The two armies were parted by a river, which Regulus boldly passed, by which means he left no room for a retreat in case of any misfortune. The engagement began with great fury; but ended in the total defeat of the Romans, who except 2000 that escaped to Clupea, were all killed or taken prisoners, and among the latter was Regulus himself. The loss of the Carthaginians scarce exceeded 800 men.

The Carthaginians remained on the field of battle till they had stripped the slain; and then entered their metropolis, which was almost the only place left them, in great triumph. They treated all their prisoners with great humanity, except Regulus; but as for him, he had so inflamed them in his prosperity, that they could not forbear showing the highest marks of their resentment. According to Zonaras and others, he and Numidia, to which the Sicans surrendered, were both taken, and paraded through the whole city, which was almost the only place left them, in triumph.

The eleventh year of this war, the Romans purposed to equip a new fleet. But their treasures being now much reduced, they were no sooner landed, than they found themselves in want of provisions, to evacuate both Clupea and Utica, and abandon Africa altogether. Being deprived of means of subsisting the end of their confulate, they were resolved to stand neutral, refused to comply with their request; telling them, that he could not without breach of fidelity assist one friend against another. However, the republic of Carthage making an effort, equipped a fleet of 100 vessels, and raised an army of 30,000 men, horse and foot, and 240 elephants, appointing Adrabil commander in chief both of the fleet and army. The Romans then finding the great advantages of a fleet, resolved to equip one not without standing all former disasters; and while the vessels were building, two consuls were chosen, men of valour and experience, to superintend the setting ones in Sicily. Metellus, however, one of the former consuls being continued with the title of procenful, found
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Carthage.

82. Carthaginians utterly defeated.

Twenty thousand of the enemy were killed, and many elephants. An hundred and four elephants were taken with their leaders, and sent to Rome, where they were hunted and put to death in the circus.

83. Lilybaeum besieged by the Romans.

The 15th year, the Romans besieged Lilybaeum; and the siege continued during the rest of the first Punic war, and was the only thing remarkable that happened during that time*. The Carthaginians, on the first news of its being besieged, sent Regulus with some deputies to Rome to treat of a peace; but instead of forwarding the negotiation, he hindered it; and notwithstanding he knew the terms prepared for him at Carthage, could not be prevailed upon to stay at Rome, but returning to his enemies country, was put to a most cruel death. During this siege, the Roman fleet under Claudius Pulcher was utterly defeated by Adherbal the Carthaginian admiral. Ninety of the Roman galleys were lost in the action, 8000 of their men either killed or drowned, and 20,000 taken and sent prisoners to Carthage; and the Carthaginians gained this signal victory without the loss of a single ship, or even a single man. Another Roman fleet met a still severer fate. It consisted of 120 galleys, 800 transports, and was laden with all sorts of military stores and provisions. Every one of these vessels was lost by a storm, with all they contained, not a single plank being saved that could be used again; so that the Romans found themselves once more deprived of their whole naval force.

84. They were defeated at sea by the Carthaginians.

In the mean time, the Carthaginian forces having shown a disposition to mutiny, the senate sent over Hamilcar Barca, father of the famous Hannibal, to Sicily. He received a charter of pittance from the senate to act as he thought proper; and by his excellent conduct some revolution took place, and gave him the greatest general of his age. He defended Eryx, which he had taken by force, with such vigour, that the Romans would never have been able to make themselves masters of it, had they not fitted out a new fleet at the expense of private citizens, which, having utterly defeated that of the Carthaginians, Hamilcar, notwithstanding all his valour, was obliged to yield up the place which he had so long and so bravely defended. The following articles of peace were immediately drawn up between the two commanders. 1. The Carthaginians shall evacuate all the places which they have in Sicily, and entirely quit that island. 2. They shall, in 20 years, pay the Romans, at equal payments every year, 2000 talents of silver, that is, L. 437,250 Sterling. 3. They shall restore the Roman captives and defectors without ransom, and redeem their own prisoners with money. 4. They shall not make war upon Hiero king of Syracuse, or his allies. These articles being agreed to, Hamilcar surrendered Eryx upon condition that all his soldiers should march out with him upon his paying for each of them 18 Roman denarii. Hostages were given on both sides, and deputies were sent to Rome to procure a ratification of the treaty by the Senate. After the senators had thoroughly informed themselves of the state of affairs, two more articles were added, viz. 1. That 1000 talents should be paid immediately, and the 2200 in the space of 10 years at equal payments. 2. That the Carthaginians should quit all the little islands about Italy and Sicily, and never more come near them with ships of war, or raise mercenaries in those places. Necessity obliged Hamilcar to consent to these terms; but he returned to Carthage with an hatred to the Romans, which he did not even suffer to die with him, but transmitted to his son the great Hannibal.

The Carthaginians were no sooner got out of this bloody and expensive war, than they found themselves engaged in another which was like to have proved fatal to them. It is called by ancient historians the Libyan war, or the war with the mercenaries. The principal occasion of it was, that when Hamilcar returned to Carthage, he found the republic so much impoverished, that, far from being able to give their troops the largesses and rewards promised them, it could not pay them their arrears. He had committed the care of transporting them to one Cifeo, who, being an officer of great penetration, as though he had foreseen what would happen, did not ship them off all at once, but in small and separate parties, that those who came first might be paid off and sent home before the arrival of the rest. The Carthaginians at home, however, did not act with the same prudence. As the flate was almost entirely exhausted by the last war, and the immense sum of money, in consequence of the peace, paid to the Romans, they judged it would be a laudable action to save something to the public. They did not therefore pay off the mercenaries in proportion as they arrived, thinking it more proper to wait till they all came together, with a view of obtaining some remission of their arrears. But being too soon sensible of their wrong conduct on this occasion, by the frequent disorders these barbarians committed in the city, they with some difficulty prevailed upon the officers to take up their quarters at Sicca, and the heavy taxes imposed on them for their soldiers, subsidies, and promises to comply with their pretenions when the remainder of their troops arrived from Sicily. Here, being wholly immersed in idleness, to which they had long been strangers, a neglect of discipline ensued, and of course a peevish and licentious spirit immediately took place. They were now determined not to acquiesce in receiving their bare pay, but to insist upon the rewards Hamilcar had promised them, and even to compel the state of Carthage to comply with their demands by force of arms. The senate being informed of the mutinous disposition of the foilldiers, dispatched Hanno, one of the suffetes, to pacify them. Upon his arrival at Sicca, he expatriated largely upon the poverty of the state, and the heavy taxes with which the citizens of Carthage were loaded; and therefore, instead of anfwering their high expectations, he defired them to be satisfied with receiving part of their pay, and remit the remainder to serve the pressing exigencies of the republic. The mercenaries being highly provoked, that neither Hamilcar, nor any other of the principal officers who commanded them in Sicily, and were the best judges of their merit, made their appearance on this occasion, but Hanno, a person utterly unknown, and above all others.
Carthage, others utterly disagreeable to them, immediately had recourse to arms. Assembling therefore in a body to the number of 20,000, they advanced to Tunis, and immediately encamped before that city.

The Carthaginians being greatly alarmed at the approach of so formidable a body to Tunis, made large concessions to the mercenaries, in order to bring them back to their duty; but, far from being softened, they grew more incontinent upon these concessions, taking them for the effects of fear; and therefore were altogether averse to thoughts of accommodation. The Carthaginians, making a virtue of a necessity, showed a disposition to satisfy them in all points, and agreed to refer themselves to the opinion of some general in Sicily, which they had all along desired. Leave the choice of such commander entirely to them. Gisco was accordingly pitched upon to mediate this affair, the mercenaries believing Hamilcar to have been a principal cause of the ill treatment they met with, since he never appeared among them, and, according to the general opinion, had voluntarily resigned his commission. Gisco soon arrived at Tunis with money to pay the troops; and after conferring with the officers of the several nations apart, he harmonized them in such a manner, that a treaty was upon the point of being concluded, when Spendius and Mathos, two of the principal mutineers, occasioned a tumult in every part of the camp. Spendius was by nation a Campanian, who had been a slave at Rome, and had fled to the Carthaginians. The apprehensions he was under of being delivered to his old master, by whom he was sure to be hanged or crucified, prompted him to break off the accommodation. Mathos was an African, and free born; but as he had been active in raising the rebellion, and was well acquainted with the implacable disposition of the Carthaginians, he knew that a peace must infallibly prove his ruin. He therefore joined with Spendius, and insinuated to the Africans the danger of concluding a treaty at that juncture, which could not but leave them exposed to the rage of the Carthaginians. This forsook the Africans, who were much more numerous than the troops of any other nation, that they immediately assembled in a tumultuous manner. The foreigners soon joined them, being inspired by Spendius with an equal degree of fury. Nothing was now to be heard but the most horrid oaths and imprecations against Gisco and the Carthaginians. Whoever offered to make any remonstrance, or lend an ear to temperate counsels, was stoned to death by the enraged multitude. Nay, many persons loft their lives barely for attempting to speak, before it could be known whether they were in the interest of Spendius or the Carthaginians.

In the midst of these commotions, Gisco behaved with great firmness and intrepidity. He left no method untried to soften the officers and calm the minds of the soldiers; but the torrent of sedition was now so strong, that there was no possibility of keeping it within bounds. They therefore seized upon the military chief, dividing the money among themselves in part of their arrears, put the person of Gisco under an arrest, and treated him, as well as his attendants, with the utmost indignity. Mathos and Spendius, to destroy the remoteest hopes of an accommodation with Carthage, applauded the courage and resolution of their men, loaded the unhappy Gisco and his followers with iron, and formally declared war against the Carthaginians. All the cities of Africa united to whom they had sent deputies to exhort them to declare war, recover their liberty, soon came over to them, except Utica and Hippo Diarrhythus. By this means their army being greatly increased, they divided it into two parts, with one of which they moved towards Utica, whilst the other marched to Hippo, in order to besiege both places. The Carthaginians, in the mean time, found themselves ready to kindle under the prelude of their misfortunes. After they had been harassed 24 years by a most cruel and destructive foreign war, they entertained some hopes of enjoying repose. The citizens of Carthage drew their particular subsistence from the rents or revenues of their lands, and the public expenses from the tribute paid from Africa; all which they were not only deprived of at once, but, what was worse, had it directly turned against them. They were destitute of arms and forces either by sea or land; had made no preparations for the sustaining of a siege, or the equipping of a fleet. They suffered all the calamities incident to the most ruinous civil war; and, to complete their misery, had not the least prospect of receiving assistance from any foreign friend or ally. Notwithstanding their deplorable situation, however, they did not despond, but pursued all the measures necessary to put themselves into a posture of defence. Hanno was appointed commander in chief of all their forces; and the most arduous efforts were made, not only to repel all the attempts of the mutineers, but even to reduce them by force of arms.

In the mean time Mathos and Spendius laid siege to Utica and Hippacra at once; but as they were carried on by detachments drawn from the army for that purpose, they remained with the main body of their forces at Tunis, and thereby cut off all communication betwixt Carthage and the continent of Africa. By this means the capital was kept in a kind of blockade. The Africans likewise were harassed by perpetual alarms, advancing to the very walls of Carthage by day as well as by night, and treating with the utmost cruelty every Carthaginian that fell into their hands.

Hanno was dispatched to the relief of Utica with a They are good body of forces, 100 elephants, and a large defeated by train of battering engines. Having taken a view of the enemy, he immediately attacked their intrenchments, and, after an obstinate dispute, forced them. The mercenaries lost a vast number of men; and consequently the advantages gained by Hanno were so great, that they might have proved decisive, had he made a proper use of them. But becoming secure after his victory, and his troops being every day the more defeated in their duty, the mercenaries, having rallied their fore-ces, fell upon him, cut off many of his men, forced the ret to fly into the town, retook and plundered the camp, and seized all the provisions, military stores, &c. brought to the relief of the besieged. Nor was this the only instance of Hanno's military incapacity. Notwithstanding he lay encamped in the most advantageous manner near a town called Corza, at which place he twice overthrew the enemy, and had it in his
Hamilcar Barcas appointed to command against them.

He defeats them.

Power to have totally ruined them, he yet neglected to improve those advantages, and even suffered the mercenaries to possess themselves of the Ithmus, which joined the peninsula on which Carthage flood, to the continent of Africa.

These repeated mistakes induced the Carthaginians once more to place Hamilcar Barcas at the head of their forces. He marched against the enemy with 10,000 men, horse and foot; being all the troops the Carthaginians could then assemble for their defence; a full proof of the low fate to which they were at that time reduced. As Mathos, after he had possessed himself of the Ithmus, had posted proper detachments in two places on two hills facing the continent, and guarded the bridge over the Bagrada, which through Hannibal’s neglect he had taken, Hamilcar saw little probability of engaging him upon equal terms, or indeed of coming at him. Observing, however, that on the blowing of certain winds the mouth of the river was choaked up with sand, so as to become slip, the winds continued; he halted for some time at the river’s mouth, without communicating his design to any person. As soon as the wind favoured his intended project, he paddled the river privately by night, and immediately after his passage he drew up the troops in order of battle, and advancing into the plain where his elephants were capable of acting, moved towards Mathos, who had posted the detachment near the bridge. This daring action greatly surprised and intimidated the Africans. However, Spendius receiving intelligence of the enemy’s motions, drew a body of 10,000 men out of Mathos’s camp, with which he attended Hamilcar on one side, and ordered 15,000 from Utica to observe him on the other, thinking by this means to surround the Carthaginians, and cut them all off at one stroke. By feigning a retreat, Hamilcar found means to engage them at a disadvantage; and gave them a total overthrow, with the loss of 6000 killed and 2000 taken prisoners. The rest fled, some to the town at the bridge, and others to the rank of Utica. He did not, however, give them time to recover from their defeat, but pursued them to the town near the bridge before mentioned; which he entered without opposition, the mercenaries flying in great confusion to Tunis; and upon this many towns submitted of their own accord to the Carthaginians, whilst others were reduced by force.

Notwithstanding these disasters, Mathos pushed on the siege of Hippo with great vigour, and appointed Spendius and Autarius, commanders of the Gauls, with a strong body, to observe the motions of Hamilcar.

These two commanders, therefore, at the head of a choice detachment of 6000 men drawn out of the camp at Tunis, and 2000 Gallic horse, attended the Carthaginian general, approaching him as near as they could with safety, and keeping close to the skirts of the mountains. At last Spendius, having received a strong reinforcement of Africans and Numidians, and possesseing himself of all the heights surrounding the plain in which Hamilcar lay encamped, resolved not to let slip so favourable an opportunity of attacking him. Had a battle now ensued, Hamilcar and his army must in all probability have been cut off; but by the defection of one Naravafus, a young Numidian nobleman, with 2000 men, he found himself enabled to offer his enemies battle. The fight was obstinate and bloody; but at last the mercenaries were entirely overthrown, with the loss of 10,000 men killed and 4000 taken prisoners. All the prisoners that were willing to enrol in the Carthaginian service, Hamilcar received among his troops, supplying them with the arms of the soldiers who had fallen in the engagement. To the rest he gave full liberty to go where they pleased; upon condition that they should never for the future bear arms against the Carthaginians; informing them at the same time, however, that as many violators of this agreement as fell into his hands must expect to find no mercy.

Mathos and his associates, fearing that this affected Hamilcar might occasion a defection among the troops, thought that the best expedient would be to put them upon some action so execrable in its nature that no hopes of reconciliation might remain. By their advice, therefore, Gisco and all the Carthaginian prisoners were put to death; and when Hamilcar sent to demand the remains of his countrymen, he received for answer, that whoever presumed hereafter to come upon that errand, should meet with Gisco’s fate; after which they came to a resolution to treat with the fame barbarity all such Carthaginians as should fall into their hands. In return for this enormity, Hamilcar threw all the prisoners that fell into his hands to be devoured by wild beasts; being convinced that compasion served only to make his enemies more fierce and untractable.

The war was now carried on generally to the advantage of the Carthaginians; nevertheless, the malecontents still found themselves in a capacity to take the field with an army of 50,000 men. They watched Hamilcar’s motions; but kept on the hills, carefully avoiding to come down into the plains, on account of the Numidian horse and Carthaginian elephants. Hamilcar, being much superior in skill to any of their generals, at last fluth them up in a plot so contrived that it was impossible to get out of it. Here he kept them strictly besieged, and the mercenaries, not daring to venture a battle, began to fortify their camp and surround it with ditches and intrenchments. They were soon pressed by famine so sorely, that they were obliged to eat one another; but they were driven by desperation of their guilt, and there, Hamilcar, fore no definite terms of accommodation. At last being reduced to the utmost extremity of misery, they insinuated that Spendius, Autarius, and Zarkas, their leaders, should in person have a conference with Hamilcar, and make proposals to him. Peace was accordingly concluded upon the following terms, viz. That ten of the ringleaders of the malecontents should be left entirely to the mercy of the Carthaginians; and that the troops should all be disarmed, every man retiring only in a single coat. The treaty was no sooner concluded, than Hamilcar, by virtue of the first article, seized upon the negotiators themselves, and the army being informed that their chiefs were under arrest, had immediately recourse to arms, as suspecting they were betrayed; but Hamilcar, drawing out his army in order of battle, surrounded them, and either cut them to pieces, or freyed.
After the destruction of this army, Hamilcar invested Tunis, whither Mathos had retired with all his remaining forces. Hamilcar had another general, named Hannibal, joined in the command with him. Hannibal’s quarter was on the road leading to Carthage, and Hamilcar’s on the opposite side. The army was no sooner encamped, than Hamilcar caufed Spendius, and the rest of the prisoners, to be led out in the view of the besieged, and crucified near the walls. Mathos, however, observing that Hannibal did not keep so good a guard as he ought to have done, made a sally, attacked his quarters, killed many of his men, took several prisoners, among whom was Hannibal himself, and plundered his camp. Taking the body of Spendius from the cros, Mathos immediately substituted Hannibal, in its room; and 30 Carthaginian prisoners of distinction were crucified around him. Upon this disaffair, Hamilcar immediately decamped, and posted himself along the sea-coast, near the mouth of the river Bagrada.

The senate, though greatly terrified by this unexpected blow, omitted no means necessary for their preservation. They sent 30 envoys, with Hanno at their head, to solicit with Hamilcar about the proper measures for putting an end to this unnatural war, conjuring, in the most prefling manner, Hanno to be reconciled to Hamilcar, and to sacrifice his private resentment to the public benefit. This, with some difficulty, was effected: and the two generals came to full resolution to act in concert for the good of the public. The senate at the same time, ordered all the youth capable of bearing arms to be preffed into the service; by which means a strong reinforcement being sent to Hamilcar, he soon found himself in a condition to act offensively. He now defeated the enemy in all encounters, drew Mathos into frequent disputes, and gave him one notable over­ throw near Leptis. This reduced the rebels to the necessity of hazarding a decisive battle, which proved fatal to them. The mercenaries fled almost at the first oner; and most of their army fell in the field of battle, and in the pursuit. Mathos, with a few, escaped to a neighbouring town, where he was taken alive, carried to Carthage and executed; and then, by the reduction of the revolted cities, an end was put to this war, which from the excises of cruelty committed in it, according to Polybius, went among the Greeks by the name of the insipible war.

During the Lybian war, the Romans upon some absurd pretences, wrefted the island of Sardinia from the Carthaginians; which the latter not being able to resist, were obliged to submit to. Hamilcar finding his country not in a condition to enter into an immediate war with Rome, formed a scheme to put it on a level with that haughty republic. This was by making an entire conquest of Spain, by which means the Carthaginians might have troops capable of coping with the Romans. In order to facilitate the execution of this scheme, he inspired both his son-in-law Afdrubal, and his son Hannibal, with an implacable averterion to the Romans, as the great oppressors of his country’s grandeur. Having completed all the necessary preparations, Hamilcar, after having greatly enlarged the Carthaginian dominions in Africa, entered Spain, where he commanded nine years, during which time he subdued many warlike nations, and amassed an immense quantity of treasure, which he distributed partly amongst his troops, and partly amongst the great men at Carthage; by which means he supported his interests with these two powerful bodies. At last, he was killed in a battle, and was succeeded by his son-in-law Afdrubal. This general fully answered the expectations of his countrymen; greatly enlarged their dominions in Spain; and built the city of New Carthage, now Carthagena. He made such progress in his conquests, that the Romans began to grow jealous. They did not, however, choose at present to come to an open rupture, on account of the apprehensions they were under of an invasion from the Gauls. They judged it most proper, therefore, to have recourse to milder methods; and prevailed upon Afdrubal to conclude a new treaty with them. The articles of it were:

1. That the Carthaginians should not pass the Iberus.
2. That the Saguntines, a colony of Zacynthians, and a city situated between the Iberus and that part of Spain subject to the Carthaginians, as well as the other Greek colonies there, should enjoy their ancient rights and privileges.

Hannibal, after having governed the Carthaginian dominions in Spain for eight years, was treacherously murdered by a Gaul whom matter he had put to death. Three years before this happened, he had written to Carthage, to desire that young Hannibal, then twenty-two years of age, might be sent to him. This request was complied with, notwithstanding the opposition of Hanno; and from the first arrival of the young man in the camp, he became the darling of the whole army. The great resemblance he bore to Hamilcar, rendered him extremely agreeable to the troops. Every talent and qualification he seemed to possess that can contribute towards forming a great man. After the death of Afdrubal, he was saluted general by the army with the highest demonstrations of joy.

He immediately put himself in motion; and, in the first campaign conquered the Oscaes, a nation seated near the Iberus. The next year he subdued the Vaccaei, another nation in that neighbourhood. Soon after, the Carpoctani, one of the most powerful nations in Spain, declared against the Carthaginians. Their army consisted of 100,000 men, with which they proposed to attack Hannibal on his return from the Vaccaei; but by a stratagem they were utterly defeated, and the whole nation obliged to submit.

Nothing now remained to oppose the progress of the Carthaginian arms but the city of Saguntum. Hannibal, however, for some time, did not think proper to come to a rupture with the Romans by attacking that place. At last he found means to embroil some of the neighbouring cantons, especially the Turdetani, or, as Appian calls them, the Torbolidus, with the Saguntines, and thus furnished himself with a pretence to attack their city. Upon the commencement of the siege, the Roman senate dispatched two ambassadors to Hannibal, with orders to proceed to Carthage in case the general refused to give them satisfaction. They were scarce landed when Hannibal, who was carrying on the siege of Saguntum with great vigour,
Carthage.

 Vigour, sent them word that he had something else to do than to give audience to ambassadors. At last, however, he admitted them; and, in answer to their remonstrances, told them, that the Saguntines had drawn their misfortunes upon themselves, by committing hostilities against the allies of Carthage; and at the same time desired the deputies, if they had any complaints to make of him, to carry them to the Senate of Carthage. On their arrival in that city, they demanded that Hannibal might be delivered up to the Romans to be punished according to his deserts; and this not being complied with, war was immediately declared between the two nations.

The Saguntines are said to have defended themselves for eight months with incredible bravery. At last, however, the city was taken, and the inhabitants were treated with the utmost cruelty. After this conquest, Hannibal put his African troops into winter-quarters at New Carthage; but in order to gain their affection, he permitted the Spaniards to retire to their respective homes.

The next campaign, having taken the necessary measures for securing Africa and Spain, he passed the Pyrenees, subdued all the nations between that river and to the Pyrenees, appointed Hanno commander of all the new conquered district, and immediately began his march for Italy. Upon muttering his forces, after they had been weakened by sieges, defection, mortality, and a detachment of 10,000 foot and 1000 horse left with Hanno to support him in his new post, he found them to amount to 50,000 foot and 9000 horse, all veteran troops, and the best in the world. As they had left their heavy baggage with Hanno, and were all light armed, Hannibal easily crossed the Pyrenees; passed by Rufeino, a frontier town of the Gauls; and arrived on the banks of the Rhone without opposition. This river he passed, notwithstanding some opposition from the Gauls; and was for some time in doubt whether he should advance to engage the Romans, who, under Scipio, were bending their march that way, or continue his march for Italy. But to the latter he was soon determined by the arrival of Magillus prince of the Boii, who brought rich presents with him, and offered to conduct the Carthaginian army over the Alps. Nothing could have happened more favourable to Hannibal's affairs than the arrival of this prince, since there was no room to doubt the sincerity of his intentions. For the Boii bore an implacable enmity to the Romans, and had even come to an open rupture with them upon the first news that Italy was threatened with an invasion from the Carthaginians.

It is not known with certainty where Hannibal began to ascend the Alps. As soon as he began his march, the petty kings of the country assembled their forces in great numbers; and taking possession of the eminences over which the Carthaginians must necessarily pass, they continued harassing them, and were no sooner driven from one eminence than they feized on another, disputing every foot of land with the enemy, and destroying great numbers of them by the advantage they had of the ground. Hannibal, however, having found means to posted himself of an advantageous post, defeated and dispersed the enemy; and soon after took their capital city, where he found the prisoners, horses, &c. that had before fallen into the hands of the enemy, and likewise corn sufficient to serve the army for three days. At last, after a most fatiguing march of nine days, he arrived at the top of the mountains. Here he encamped, and halted two days, to give his wearied troops some repose, and to wait for the stragglers. As the snow was lastly fallen in great plenty, and covered the grounds as high as their toes; the Africans and Spaniards, who were much affected with the cold. In order therefore to encourage them, the Carthaginian general led them to the top of the highest rock on the side of Italy, and thence gave them a view of the large and fruitful plains of Infubria, acquainting them that the Gauls, whose country they saw, were ready to join them. He also pointed out to them the place whereabout Rome stood, telling them, that by climbing the Alps, they had scaled the walls of that rich metropolis; and having thus animated his troops, he decamped, and began to descend the mountains. The difficulties they met with in their descent were much greater than those that had occurred while they ascended. They had indeed no enemy to contend with, except some scattered parties that dared to fight; but the deep snows, the mountains of ice, craggy rocks, and frightful precipices, proved more terrible than any enemy. After they had for some days marched through narrow, steep, and slippery ways, they came at last to a place which neither elephants, horses, nor men, could pass. The way which lay between two precipices was exceeding narrow; and the declivity, which was very steep, had become more dangerous by the falling away of the earth. Here the guides stopped; and the whole army being terrified, Hannibal proposed at first to march round about, and attempt some other way; but all places round him being covered with snow, he found himself reduced to the necessity of cutting away into the rock itself, through which his men, horses, and elephants, might descend. This work was accomplished with incredible labour; and then Hannibal, having spent nine days in ascending, and six in descending, the Alps, gained at length Infubria; and, notwithstanding all the disasters he had met with by the way, entered the country with all the boldness of a conqueror.

Hannibal, on his entry into Infubria, reviewed his army, when he found that of the 50,000 foot with whom he set out from New Carthage five months and 15 days before, he had now but 20,000, and that his 9000 horse were reduced to 6000. His first care, after he entered Italy, was to refresh his troops; who after so long a march, and such inexpressible hardships, looked like as many skeletons raised from the dead, or savages born in a desert. He did not, however, suffer them to languish long in idleness; but joining the Infubrians, who were at war with the Taurinum Taurinians, laid siege to Taurinum, the only city in Taurinum. After this, he entered the country, and in three days time became master of it, putting all who resisted to the sword. This struck the neighbouring barbarians with such terror, that of their own accord they submitted to the conqueror, and supplied his army with all the supplies of provisions.

Scipio, the Roman general, in the mean time, who had gone in quest of Hannibal on the banks of the Rhone, was surprised to find his antagonist had crossed the Alps, and was already on the confines of his empire.
Carthage had the Alps and entered Italy. He therefore returned with the utmost expedition. An engagement ensued near the river Ticinus, in which the Romans were defeated. The immediate consequence was, that Carthage crossed it, and Hannibal continued his march to the banks of the Po. Here he laid two days, before he could cross that river over a bridge of boats. He then sent Mago in pursuit of the enemy, who having rallied their scattered forces, and repassed the Po, were encamped at Placentia. Afterwards having concluded a treaty with several of the Gallic cantons, he joined his brother with the rest of the army, and again offered battle to the Romans: but this they thought proper to decline; and at last the consul, being intimidated by the defection of a body of Gauls, abandoned his camp, passed the Trebia, and posted himself on an eminence near that river. Here he drew lines round his camp, and waited the arrival of his colleague with the forces from Sicily.

Hannibal, being apprised of the consul's departure, sent out the Numidian horse to harass him on his march; himself moving with the main body to support them in case of need. The Numidians arriving before the rear of the Roman army had quite passed the Trebia, put to the sword or made prisoners all the stragglers they found there. Soon after, Hannibal coming up, encamped in sight of the Roman army, on the opposite bank. Here having learned the character of the consul Sempronius lately arrived, he soon brought him to an engagement, and entirely defeated him. Ten thousand of the enemy retired to Placentia; but the rest were either killed or taken prisoners. The Carthaginians pursued the flying Romans as far as the Trebia, but did not think proper to repass that river on account of the great danger. The consul Flaminius, sent an express to Carthage with the news of the battle, named a dictator, as was their custom in times of great danger. The person they chose to this office was Fabius Maximus, surnamed Vercuvius; a man as cool and cautious as Sempronius and Flaminius were warm and impetuous. He set out with a design not to engage Hannibal, but only to watch his motions, and cut off his provisions, which he knew was the most proper way to destroy him in a country so far from his own. Accordingly he followed him through Umbria and Picenum, into the territory of Adria, and then through the territories of the Marrucini and Fanianis to Apulia. When the enemy marched, he followed them; when they encamped, he did the same; but for the most part on eminences, and at some distance from their camp, watching all their motions, cutting off their stragglers, and keeping them in a continual alarm. This cautious method of proceeding greatly disconcerted the Carthaginians, but at the same time raised discontent in his own army. But neither
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these discontented, nor the ravages committed by Hannibal, could prevail on Fabius to alter his measures. The former, therefore, entered Campania, one of the finest countries of Italy. The ravages he committed there, raised such complaints in the Roman army, that the dictator, for fear of irritating his soldiers, was obliged to pretend a desire of coming to an engagement. Accordingly he followed Hannibal with more expedition than usual; but at the same time avoided, under various pretences, an engagement with more care than the enemy fought it. Hannibal finding he could not by any means bring the dictator to a battle, resolved to quit Campania, which he found abundance of more fruit and wine than corn, and to return to Samnium through the passes called Eribanus. Fabius concluding from this march that this was his design, got there before him, and encamped on Mount Callicula, which commanded the passes, after having placed several bodies in all the avenues leading to it.

Hannibal was for some time at a loss what to do; but at last contrived the following stratagem, which put to hazard nor guard against. Being encamped at the foot of Mount Callicula, he ordered Aframith to pick out of the cattle taken in the country, 2000 of the strongest and mildest oxen, to tie faggots to their horns, and to have them and the herdsmen ready without the camp. After supper, when all was quiet, the cattle were brought in good order to the hill, where Fabius had placed some Roman parties in ambush to flop up the passes. Upon a signal given, the faggots on the horns of the oxen were set on fire; and the herdsmen, supported by some battalions armed with small javelins, drove them on quietly. The Romans seeing the light of the fires, imagined that the Carthaginians were marching by torch-light. However, Fabius kept close in his camp, depending on the troops he had placed in ambush to flop up the passes. Upon a signal given, the faggots on the horns of the oxen were set on fire; and the herdsmen, supported by some battalions armed with small javelins, drove them on quietly. The Romans seeing the light of the fires, imagined that the Carthaginians were marching by torch-light. However, Fabius kept close in his camp, depending on the troops he had placed in ambush to flop up the passes. Upon a signal given, the faggots on the horns of the oxen were set on fire; and the herdsmen, supported by some battalions armed with small javelins, drove them on quietly.

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Soon after this, the dictator was recalled to Rome; and as Hannibal, notwithstanding the terrible ravages he had committed, had all along spared the lands of Fabius, the latter was suspected of holding a secret correspondence with the enemy. In his absence, Minucius, the general of the horse, gained some advantages, which greatly tended to increase the discontent with the dictator, infomuch that before his return Minucius was put upon an equal footing with himself. The general of the horse proposed that each should command his day; but the dictator chose rather to divide the army, hoping by that means to save at least a part of it. Hannibal soon found means to draw Minucius from an engagement, and, by his masterly skill in laying ambuscades, covered himself with every side, and would have been cut off with all his troops, had not Fabius hastened to his assistance, and relieved him. Then the two armies waiting, advanced in good order to renew the fight; but Hannibal, not caring to venture a second action, found a retreat, and retired to his camp; and Minucius, being ashamed of his rashness, resigned the command of the army to Fabius.

The year following, the Romans augmented their army to 87,000 men, horse and foot; and Hannibal being reduced to the greatest straits for want of provisions, resolved to leave Samnium, and penetrate into the heart of Apulia. Accordingly he decamped in the night; and by leaving fires burning, and tents standing in his camp, made the Romans believe for some time that his retreat was only feigned. When the truth was discovered, Aemilius was against pursuing him; but Terentius, contrary to the opinion of all the officers in the army, except the proconfular Servilius, was obstinately bent on following the enemy; and overtook them at Canne, till this time an obscure village in Apulia. A battle ensued in this place, as any memorable of any mention in history; in which the Romans, though almost twice as numerous to the Carthaginian army, were defeated at Cannae, being overthrown by Hannibal's cavalry in feats of rejoicing, and next day in stripping the dead bodies of the unhappy Romans: after which the victorious general invested their two camps, where he found 4000 men.

The immediate consequences of this victory, as Hannibal had foreseen, was a disposition of that part of Italy called the Old Province, Magna Graecia, Tarquinia, and part of the territory of Capua, to submit to him. The neighbouring provinces likewise discovered an inclination to shake off the Roman yoke, but wanted first to see whether Hannibal was able to protect them. His first march was into Samnium, being informed that the Hirpini and other neighboring nations were disposed to enter into an alliance with the Carthaginians. He advanced to Compsa, which opened its gates to him. In this place he left his heavy baggage, as well as the immense plunder he had acquired. After which he ordered his brother Mago, with a body of troops destined for that purpose, to profess himself all of the fortresses in Campania, the most delicious province of Italy. The humanity Hannibal had all along shown the Italian prisoners, as well as the fame of the complete victory he had lately obtained, brought to powerfully upon the Lucani, Brutii, and Apulians, that they expressed an eager desire of being taken under his protection. Nay, even the Campanians themselves, a nation more obliged to the Romans than any in Italy, except the Latins, discovered an inclination to abandon their natural friends. Of this the Carthaginian general receiving intelligence, he bent his march towards Capua, not doubting but that, by means of the popular faction there, he should easily make himself master of it; which accordingly happened. Soon after this place had made its submission, many cities of the Brutii opened their gates to Hannibal, who ordered his brother Mago to take possession of them. Mago was then dispatched to Carthage, with the important news of the victory at Cannae, and the consequences attending it. Upon his
his arrival there, he acquainted the senate, that Hannibal had defeated six Roman generals, four of whom were consuls, one dictator, and the other general of horse to the dictator; that he had engaged six consul- lars armies, killed two consuls, wounded one, and driven another out of the field with scarce 50 men to attend him; that he had routed the general of the horse, who was of equal power with the consuls; and that the dictator was esteemed the only general fit to command an army, merely because he had not the courage to engage him; and as a demonstrative proof of what he advanced, he produced, according to some authors, three halffles and a half of gold rings, taken from knights and senators who had been killed in the various engagements.

Hitherto we have seen Hannibal surprisingly victorious; and, indeed, if we consider what he had already done, we shall find his exploits superior to those of any other general, either ancient or modern. Other commanders have been celebrated for victories gained over barbarous and uncivilized nations. Alexander the Great invaded and overran the empire of Perse; but that kingdom was then funk in sloth and effeminacy, so as to be an easy conquest: but had the great commander turned his arms against the western nations, who were of a more martial disposition, it is more than probable he had not conquered so easily. Hannibal, on the other hand, lived at a time when such combinations were formed as a demonstration of what he could do. Hannibal, in the whole world. That nation he attacked with an army of only 26,000 men, without resources either for recruits, money, or provisions, except what he could procure in the enemies country. With these he had for three years resisted the Roman armies, which had been hitherto invincible by all other nations. Their armies had been commanded by generals of different temperaments, dispositions, and abilities: the losses they sustained are by the Roman writers imputed to the faults of the generals themselves; but experience had abundantly shown, that these commanders, with all their faults, were able to conquer the most warlike nations, when commanded by another than Hannibal. In the battles fought with the Romans he had destroyed 200,000 of their men, and taken 50,000 prisoners; yet from the time of the battle of Cannae, the affairs of this great man totally declined. The reason of this is, by the Roman historians, said to be, that when he put his army into winter-quarters in Capua, he so encraved himself and his army by debaucheries in that place, that he became no longer capable of coping with the Roman forces. But this seems by no means to have been the case; for the Roman historians themselves own, that, after the battle of Cannae, he gave their armies many and terrible defeats, and took a great number of towns in their sight.

The true reason of that reverse of fortune which Hannibal now experienced, was his not having sufficient resources for recruiting his army. On the first news, indeed, of his success at Carthage, a body of 4000 Numidian cavalry, 40 elephants, and 10,000 talents of silver, were granted by the senate. A large detachment of Spanish forces was also appointed to follow them; and that these last might be ready in due time, Mago set out immediately for Spain to raise 20,000 foot and 4000 horse there. Had this ample supply been sent with proper expedition, it is by no means probable that the Romans would have had any occasion to reflect upon Hannibal's conduct at Capua. That general would undoubtedly have obliged the haughty republic to submit to the superior force of his arms the next campaign. But, notwithstanding the influence of the Barcinian faction at Carthage, Hannibal and his adherents found means not only to retard the march of the supplies intended, but even to diminish their number. Mago, through the artifices of that infatuated party, could obtain an order for only 12,000 foot and 2500 horse, and even with this inconsiderable body of troops he was sent into Spain. Hannibal being thus deferred by his country, found himself obliged to act on the defensive; his army amounting to no more than 26,000 foot and 4000 horse. But though obliged to act in this manner, he was only hindered from conquering the utmost efforts of the whole Roman power not being able to drive this small army out of Italy for more than 14 years.

The Romans, though greatly reduced, were not yet exhausted. They were able to send two consuls with their regular armies into the field, fully recruited and in good order; and as neither the Gauls nor Italians were natural allies of the Carthaginians, they did not fail to abandon them on the first reverse of fortune. After the Romans had recovered from the confusion into which they were thrown by the defeat at Cannae, they chose a dictator, and recalled Marcellus, the conqueror of Syracuse, from Sicily. All the young Romans, above 17 years of age, of what rank ever, were obliged to infli in themselves; as were also those who had already served their legal time. By this means four legions and 10,000 horse were soon raised in the city. The allies of Rome, the colonies, and the municipia, furnished the contingent as usual. To these were added 8000 of the youngest and strongest slaves in the city. The republic purchased them of their masters, but did not oblige them to serve without their own consent, which they gave, by anfwering Vale, "I am willing;" whence they were called volones, to distinguish them from the other troops. As the Romans, after the loss of so many battles, had no swords, darts, or bucklers, left in their magazines, the volones were supplied with the arms which had been formerly taken from the enemy, and hung up in the public temples and porticoes. The finances of Rome were no less exhausted; but this defect was supplied by the liberality of her citizens. The senators flowing the example, were followed first by the knights, and afterwards by all the tribes, who stripping themselves of all the gold they had, brought it to the public treasury. The senators only returned their rings, and the bulk about their children's necks. As for the silver coin, it was now, for the first time, alloyed with copper, and increased in its value. Thus the finances were put into a good condition, and a competent army raised.

This was plainly the last effort the Romans could make; and could Hannibal have procured a sufficient supply of men and money to enable him to cope with this army, and to break it as he had done the others before, there could have been no more resistance made on their part. He began, however, to be in want of money;
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They refuse to treat of peace.

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Hannibal, who now came to the head of the Roman army, to the number of about 35,000 men, marched out of the city, under the command of the dictator, while Marcellus kept the remains of Varro's army, amounting to about 15,000 men, at Castrum, in readiness to march whenever there should be occasion.

Thus the Roman forces were still superior to those of Hannibal; and as they now saw the necessity of following the example of Fabius Maximus, no engagement of any consequence happened the first year after the battle of Cannae. Hannibal made a fruitless attempt upon Nola, expecting it would be delivered up to him; but this was prevented by Marcellus, who had entered that city, and fallying unexpectedly from three gates upon the Carthaginians, obliged them to retire in great confusion with the loss of 3000 men. This was the first advantage that had been gained by the Romans where Hannibal had commanded in person, and raised the spirits of the former not a little. They were, however, greatly dejected, on hearing that the confuls Pothinius Albinus, with his whole army, had been cut off by the Boi, as he was crossing a forest. Upon this it was resolved to draw all the Roman forces out of Gaul and other countries, and turn them against Hannibal; so that the Carthaginian flight daily more and more in need of those supplies, which yet never arrived from Carthage. He reduced, however, the cities of Nuceria, Calatium, Petelia, Centinum, Croton, Locri, and several others in Great Greece, before the Romans gained any advantage over him, except that before Nola already mentioned. The Carthaginians who had espoused the Carthaginian interest, raised an army of 14,000 of their own nation in favour of Hannibal, and put one Marius Alitus at the head of it; but he was surprized by the confuls Sempronius, who defeated and killed him with 2000 of Carthaginian men. It was now found, that Hannibal had concluded a treaty of alliance, offensive and defensive with Philip king of Macedon; but to prevent any disturbance from that quarter, a Roman army was sent to Macedon. Soon after this Marcellus defeated Hannibal in a pitched battle, having armed his men with fceptred pikes used generally at sea, and chiefly in boarding of ships; by which means the Carthaginians were pierced through, while they were totally unable to hurt their adversaries with the short javelins they carried. Marcellus pursued them close; and, before they got to their camp, killed 5000, and took 600 prisoners; losing himself about 1000 men, who were trod down by the Numidian horse, commanded by Hannibal in person. After this defeat the Carthaginian general found himself defeated by 1200 of his best horse, partly Spaniards, and partly Numidians, who had crossed the Alps with him. This touched him so sensibly, that he left Campania, and retired into Apulia.

The Romans still continued to increase their forces; and Hannibal, not having the same resources, found it impossible to act against so many armies at once. Fabius Maximus advanced into Campania, who, with Hannibal, was obliged to return in order to save Capua. He ordered Hanno, however, at the head of 17,000 foot and 1700 horse, to seize Beneventum; but he was utterly defeated, scarce 2000 of his men being left alive. Hannibal himself, in the mean time advanced to Nola, where he was again defeated by Marcellus. He now began to lose ground; the Romans retook and began Castrum, Accia in Apulia, Arpi, and Aternum; to lose ground, but the city of Tarentum was delivered up to him by its inhabitants. The Romans then entered Campania, and ravaged the whole country, threatening Capua with a siege. The inhabitants immediately acquainted Hannibal with their danger; but he was so intent upon retaining the citadel of Tarentum, that he could not be prevailed upon to come to their assistance. In the mean time Hanno was again utterly defeated by Fulvius, his camp taken, and he himself forced to fly into Bruttium with a small body of horse. The confuls then advanced with a design to besiege Capua in form. But in their way, Sempronius Gracchus, a man of great bravery, and an excellent general, was betrayed by a Lucanian and killed, which proved a very great detriment to the republic. Capua, however, was soon invested on all sides; and the besieged once more sent to Hannibal, who now came to their assistance with his horse, his light-armed infantry, and 32 elephants. He found means to inform the besieged of the time he designed to attack the Romans, in vain, ordering them to make a vigorous sally at the same time. The Roman generals, Appius and Fulvius, upon the first news of the enemy's approach, divided their troops, Appius taking upon him to make head against the garrison, and Fulvius to defend the intrenchments against Hannibal. The former found no difficulty in repulsing the garrison, and would have entered the city with them, had he not been wounded at the very gate, which prevented him from pursuing his design. Fulvius found it more difficult to withstand Hannibal, whose troops behaved themselves with extraordinary resolution. A body of Spaniards and Numidians. 
The Carthaginians had the boldness to pass the ditch, and, in spite of all opposition, climbing the ramparts, penetrated into the Roman camp; but not being properly seconded by the rest, they were all to a man cut in pieces. The Carthaginian general was so disheartened at this, especially after the garrison was repulsed, that he founded a retreat, which was made in good order. His next attempt for the relief of Capua was to march to Rome, where he hoped his approach would strike so much terror, that the armies would be called from before Capua; and that the Capuans might not be disheartened by his sudden departure, he found means to acquaint them with his design. The news of his approach caused great consternation in the metropolis. Some of the senators were for calling all the armies in Italy into the neighborhood of Rome, as thinking nothing less was able to resist the terrible Carthaginian. But Fabius told them that Hannibal's design was not to take Rome, but relieve Capua; upon which Fulvia was recalled to Rome with 15,000 foot, and 1000 horse; and thus obliged Hannibal again to retire. He then returned before Capua so suddenly that he surprised Appius in his camp, drove him out with the loss of a great number of men, and obliged him to entrench himself; on some eminences, where he expected to be soon joined by his colleague Fulvius. As Hannibal, however, now expected to have all the Roman forces upon him, he could do nothing more for the relief of Capua, which was, of consequence, obliged to submit to the Romans.

A little before the surrender of Capua, Hannibal came up with a Roman army commanded by one M. Centenius Penula, who had signalized himself on many occasions as a centurion. This rash man being introduced to the senate, had the assurance to tell them, that if they would trust him with a body of only 7000 men, he would give a good account of Hannibal. They gave him 8000, and his army was soon increased to double that number. He engaged the Carthaginians on Hannibal's first offering him battle; but after an engagement of two hours, was defeated, himself and all his men being slain, except about 1000. Soon after, having found means to draw the praetor Cneius Fulvius into an ambuscade, Hannibal cut in pieces almost his whole army, consisting of 18,000 men. In the mean time Marcellus was making great progress in Samnium. The city of Salapia was beheaded, he soon after gave the praetor Fulvius Centumales, whom he surprised and cut off, with 13,000 of his men. After this defeat, the great Marcellus advanced with his army to oppose Hannibal. Various engagements happened without any thing decisive. In one of them the Romans are said to have been defeated, and in another Hannibal; but, notwithstanding these, it was neither in the power of Marcellus, nor any other Roman general, totally to defeat or disperse the army of Hannibal in person. Nay, in the eleventh year of the war, Hannibal found means to decoy into an ambuscade, and cut off, the great Marcellus himself; the consequence of which was, that the Romans were obliged to raise the siege of Locri, with the loss of all their military engines.

Hitherto the Carthaginian, though no longer the Carthaginian affairs entirely roused to action. This was the defeat of Alcuvibul, Hannibal's brother, who had left Spain, and was marching to his assistance. He crossed the Pyrenees without any difficulty; and, as the silver mines had supplied him with a very considerable quantity of treasure, he not only prevailed upon the Gauls to grant him a passage through their territories, but likewise to furnish him with a considerable number of recruits. Meeting with many favorable circumstances to expedite his march, he arrived at Placentia sooner than the Romans, or even his brother Hannibal expected. Had he continued to use the same expedition with which he set out, and hastened to join his brother, it would have been utterly impossible to have saved Rome; but, fitting down before Placentia, he gave the Romans an opportunity of assembling all their forces to attack him. At last he was obliged to raise the siege, and began his march for Umbria. He sent a letter to acquaint his brother of his intended motion; but the messenger was intercepted; and the two confuls, joining their armies, with united forces fell upon the Carthaginians. As the latter were inferior both in numbers and resolution, they were utterly defeated, and Alcuvibul was killed. About the same time, Hannibal himself is said to have suffered several defeats, and was retired to Carthage; but, on the fatal news of his brother's defeat and death, he was filled with despair, and retired to the extremity of Brutium; where, assembling all his forces, he remained for a considerable time in a state of inaction, the Romans not daring to disturb him, so formidable did they esteem him alone, though every thing about him went to wreck, and the Carthaginian affairs seemed not far from the verge of destruction. Livy tells us, that it was difficult to determine whether his conduct was more wonderful in prosperity or in adversity. Notwithstanding which, Brutium being but a small province, and many of its inhabitants being either forced into the service, or forming themselves into parties of banditti, so that a great part of it remained uncultivated, he found it a difficult matter to subdue there, especially as no manner of supplies were sent him from Carthage. The people there were so obstinate about preferring their polemions in Spain, and as little concerned about the situation of affairs in Italy, as if Hannibal had met with an uninterrupted course of successes, and no disaster befell his since he first entered that country.

All their felicitous, however, about the affairs of Spain, was to no purpose; their generals, one after another, were defeated by the Romans. They had indeed cut off the two Scipios; but found a much more formidable enemy in the young Scipio Africanus. He overthrew them in conjunction with Mactia, king of Numidia; and the latter, thereafter, abandoned their interest. Soon after, Syphax, king of the Maedjellii, was likewise persuaded to abandon their party. Scipio also gave the Spanish Reguli a great overthrow; and reduced the cities
The obliged to deliver all the Roman fingers after for the army, and buy horses to remount the cavalry. His arrival He entered into a league with the Regulus of the army of Magnolands to Italy. He landed in Italy. The cities of New Carthage, Gades, and many other important places. At last the Carthaginians began to open their eyes when it was too late. Mago was ordered to abandon Spain, and fail with all expedition.

Mago lands to Italy. He landed on the coast of Liguria with an army of 12,000 foot and 200 horse; where he surprised Genoa, and also seized upon the town and port of Savo. A reinforcement was sent him to this place, and new levies went on very briskly in Liguria; but the opportunity was passed, and could not be recalled. Scipio having carried all before him in Spain, passed over into Africa, where he met with no enemy capable of opposing his progress. The Carthaginians then, seeing themselves on the brink of destruction, were obliged to recall their armies from Italy, in order to save their city. Mago, who had entered Infibra, was defeated by the Roman forces there; and having retreated into the maritime parts of Liguria, met a courier who brought him orders to return directly to Carthage. At the same time, Hannibal was likewise recalled. When the messengers acquainted him with the senate's pleasure, he expressed the utmost indignation and concern, groaning, gnashing his teeth, and scarce refraining from tears. Never banished man, according to Livy, showed so much regret in quitting his native country, as Hannibal did at going out of that of the enemy.

The Carthaginian general was no sooner landed in Africa, then he sent out parties to get provisions for the army, and buy horses to remount the cavalry. He entered into a league with the Regulus of the Arcadiæ, one of the Numidian tribes. Four thousand of Syphax's horse came over in a body to him; but as he did not think proper to repose any confidence in them, he put them all to the sword, and distributed their horses among his troops. Vermina, one of Syphax's sons, and Mafetulus, another Numidian prince, likewise joined him with a considerable body of horse. Most of the fortified places in Massinissa's kingdom either surrendered to him upon the first summons, or were taken by force. Narce, a city of considerable note there, he made himself master of by stratagem. Tychæus, a Numidian Regulus, and faithful ally of Syphax, whose territories were famous for an excellent breed of horses, reinforcing him also with 2000 of his best cavalry, Hannibal advanced to Zama, a town about five day's journey distant from Carthage, where he encamped. He thence sent out spies to observe the posture of the Romans. These being brought to Scipio, he was so far from inflicting any punishment upon them, which he might have done by the laws of war, that he commanded them to be led about the camp, in order to take an exact survey of it, and then dismissed them. Hannibal, admiring the noble alluriance of his rival, sent a messenger to Scipio to inquire into his interview with him; which, by means of Massinissa, he obtained. The two generals, therefore, encoraged by equal detachments of horse, met at Nadaagara, where, by the assistance of two interpreters, they held a private conference. Hannibal flattered Scipio in the most refined and arithful manner, and expatiated upon all those topics which he thought could influence that general to grant his nation a peace upon tolerable terms; amongst other things, that the Carthaginians would willingly confine themselves to Africa, since such was the will of the gods, in order to procure a lasting peace, whilst the Romans would be at liberty to extend their conquest to the remotest nations. Scipio answered, that the Romans were not prompted by ambition, or any finer views, to undertake either the former or present war against the Carthaginians; but by justice, and a proper regard for their allies. He also observed that the Carthaginians had, before his arrival in Africa, not only made him the same proposals, but likewise agreed to pay the Romans 5000 talents of silver, restore all the Roman prisoners without ransom, and deliver up all the galleys. He insisted on the perfidious conduct of the Carthaginians, who had broke a truce concluded with them; and told him, that, so far from granting them more favourable terms, they ought to expect more rigorouis ones; which if Hannibal would submit to, a peace would ensue; if not, the decision of the dispute must be left to the sword.

This conference, between two of the greatest generals of the world ever produced, ending without; Scipio, Mago and Hannibal. recalled. Hannibal's proceedings after his arrival in Africa. He has an interview with Scipio.
The peace between Carthage and Rome was scarce signed, when Masinissa unjustly made himself master of part of the Carthaginian dominions in Africa, under pretence that these formerly belonged to his family. The Carthaginians, through the villanous mediation of the Romans, found themselves under a necessity of ceding these countries to that ambitious prince, and of entering into an alliance with him. The good understanding between the two powers continued for many years afterwards; but at last Masinissa violated the treaties subsisting between him and the Carthaginian republic, and not a little contributed to its subversion.

After the conclusion of the peace, Hannibal still kept up his credit among his countrymen. He was intrusted with the command of an army against some neighbouring nations in Africa; but this being disagreeable to the Romans, he was removed from it, and rivalled to the dignity of praetor in Carthage. Here he remained for some time, reforming abuses, and putting the affairs of the republic into a better condition; but this likewise being disagreeable to the Romans, he was obliged to fly to Antiochus king of Syria. After his flight, the Romans began to look upon the Carthaginians with a suspicious eye; though, to prevent every thing of this kind, the latter had ordered two ships to pursue Hannibal, had confiscated his effects, ruled his house, and by a public decree declared him an exile. Soon after, disputes arising between the Carthaginians and Masinissa, the latter, notwithstanding the manifold iniquity of his proceedings, was supported by the Romans. That prince, grasping at further conquests, endeavoured to embroil the Carthaginians with the Romans, by ascertaining that the former had received ambassadors from Perseus king of Macedon: that the senate assemblèd in the temple of Aesculapius in the night-time in order to confer with them; and that ambassadors had been dispatched from Carthage to Perseus, in order to conclude an alliance with him. Not long after this, Masinissa made an irruption into the province of Tylica, where he soon poiffessed himself of 70, or, as Apian will have it, 50 towns and castles. This obliged the Carthaginians to apply with great importance to the Roman senate for redress, their hands being so tied up by an article in the last treaty, that they could not repel force by force, in cafe of an invasion, without their consent. Their ambassadors begged, that the Roman senate would settle once for all what dominions they were to have, that they might from thenceforth know what they had to depend upon; or if their fate had any way offended the Romans, they begged that they would punish them themselves, rather than leave them exposed to the insults and vexations of so merciless a tyrant. Then profiting themselves on the earth, they burst out into tears. But, notwithstanding the impudence their speech made, the matter was left undecided; so that Masinissa had liberty to pursue his rapines as much as he pleased. But whatever villainous disguises the Romans might have with regard to the republic of Carthage, they affected to show a great regard to the principles of justice and honour. They therefore sent Cato, a man famous for committing enormities under the specious pretence of public spirit, into Africa, to accommodate all differences between Masinissa and the Carthaginians. The latter very well knew their fate, had they submitted to such a mediation; and therefore appealed to the treaty concluded with Scipio, as the only rule by which their conduct and that of their adversary ought to be examined. This unreasonable appeal so incensed the righteous Cato, that he pronounced them a devoted people, and from that time resolved upon their destruction. For some time he was oppressed by Scipio Nasica; but the people of Carthage, knowing the Romans to be their inveterate enemies, and reflecting upon the iniquitous treatment they had met with from them ever since the commencement of their disputes with Masinissa, were under great apprehensions of a visit from them. To prevent a rupture as much as possible, by a decree of the senate, they impeached Afdrubal general of the army, and Carthalo commander of the auxiliary forces, together with their accomplices, as guilty of high treason, for being the authors of the war against the king of Numidia. They sent a deputation to Rome, to discover what sentiments were entertained there of their late conduct, and to know what satisfaction the Romans required. These messengers meeting with a cold reception, others were dispatched, who returned with the same success. This made the unhappy citizens of Carthage believe that their destruction was resolved upon; which threw them into the utmost despair. And indeed they had but too just grounds for such a melancholy apprehension, the Roman senate now discovering an inclination to fall in with Cato's measures. About the same time, the city of Utica, being the second in Africa, and famous for its immense riches, as well as its equally commodious and capacious port, submitted to the Romans. Upon the possession of so important a fortress, which, by reason of its vicinity to Carthage, might serve as a place of arms in the attack of that city, the Romans declared war against the red by the Carthaginians without the least hesitation. In consequence of this declaration, the consuls M. Manlius Nepos, and L. Marcus Censorinus, were dispatched with an army and fleet to begin hostilities with the utmost expedition. The land forces consisted of 80,000 foot and 4000 chosen horse; and the fleet of 50 quinqueremes, besides a vast number of transports. The consuls had secret orders from the senate not to conclude the operations but by the destruction of Carthage, without which, it was pretended, the republic could not but look upon all her possessions as insecure. Pursuant to the plan they had formed, the troops were first landed at Lilybaeum in Sicily, from whence, after receiving a proper refreshment, it was proposed to transport them to Utica.

The answer brought by the last ambassadors to Carthage had not a little alarmed the inhabitants of that city. But they were not yet acquainted with the resolutions taken at Rome. They therefore sent fresh ambassadors thither, whom they invested with full powers to act as they thought proper for the good of the republic, and even to submit themselves without reserve to the pleasure of the Romans. But the most sensible persons among them did not expect any great succours from this condensation, since the early
The Romans demand 300 hostages.

And all the Carthaginian arms, military machines, &c.

They command them to destroy their city.

The Carthaginians resolve to sustain a siege.

The Romans in the mean time the consuls delayed drawing near to Carthage, not doubting but the inhabitants, whom they imagined impotent to sustain a siege, would, upon cool reflection, submit; but at length, finding themselves deceived in their expectation, they came before the place and invested it. As they were still persuaded that the Carthaginians had no arms, they flattered themselves that they should easily carry the city by assault. Accordingly they approached the walls in order to plant their scaling-ladders; but the Romans, who were to their great surprize discovered a prodigious multitude of men on the ramparts, flinging in the arms they had newly made. The legionaries were terrified at this unlooked-for sight, that they drew back, and would have retired, if the consuls had not led them on to the attack: which, however, proved unsuccessful; the Romans, in spite of their utmost efforts, being obliged to give over the enterprise, and lay aside all thoughts of taking Carthage by assault. In the mean time Afdrubal, having collected from all places subject to Carthage a prodigious number of troops, came and encamped within reach of the Romans, and soon reduced them to great straits for want of provisions. As Marcus, one of the Roman consuls, was poled near a marsh, the exhalations of the stagnating waters, and the heat of the season, infected the air, and caused a general sickness among his men. Marcus, therefore, ordered his fleet to draw as near the shore as possible, in order to transport his troops to an healthier place. Asdrubal being informed of this motion, ordered all the old barks in the harbour to be filled with faggots, tow, sulphur, bitumen, and other combustible materials; and then taking advantage of the wind, which blew towards the enemy, let loose home to precipice the electors; and the Carthaginians looking upon the absence of one of the consuls to be a good omen, made a brisk fire in the night; and would have surprised the consul's camp, but Eumilanus, with some squadrons, marched out of the
gave opposite to the place where the attack was made, and, coming round, fell unexpectedly on their rear, and obliged them to return in disorder to the city.

Afrubal had posted himself under the walls of a city named Nepheris, 24 miles distant from Carthage, and situated on a high mountain, which seemed inaccessible on all sides. From thence he made incursions into the neighbouring country, intercepted the Roman convoys, fell upon their detachments sent out to forage, and even ordered parties to infilt the confular army in their camp. Hereupon the consul resolved to drive the Carthaginian from this advantageous post, and set out for Nepheris. As he drew near the hills, Afrubal suddenly appeared at the head of his army in order of battle, and fell upon the Romans with incredible fury. The confular army overthrew the attack with great resolution; and Afrubal retired in good order to his post, hoping the Romans would attack him there. But the consul being now convinced of his danger, resolved to retire. This Afrubal no sooner perceived, than he rushed down the hill, and falling upon the enemy’s rear, cut a great number of them in pieces. The whole Roman army was now saved by the bravery of Scipio Emilianus, who, with head of 300 horse, he subdued the attack of all the forces commanded by Afrubal, and covered the legions, while they passed a river in their retreat before the enemy. Then he and his companions threw themselves into the stream and swam across it. When the army had crossed the river, it was perceived that four manipuli were wanting; and soon after they were informed that they had retired to an eminence, where they resolved to fell their lives as dear as possible. Upon this news Emilianus, taking with him a chosen body of horse, and provisions for two days, crossed the river, and flew to the assistance of his countrymen. He seized an hill over against that on which the four manipuli were posted; and, after some hours repose, marched against the Carthaginians who kept them invested, fell upon them at the head of his squadron with the boldness of a man determined to conquer or die, and in spite of all opposition opened a way for his fellow-soldiers to escape. On his return to the army, his companions, who had given him over for lost, carried him to his quarters in a kind of triumph; and the manipuli he had saved gave him a crown of sprays. By these and some other exploits, Emilianus gained such reputation, that Cato, who is said never to have commended any body before, could not refuse him the praises he deferred; and is said to have foretold that Carthage would never be reduced till Scipio Emilianus was employed in that expedition.

The next year, the war in Africa fell by lot to the consuls L. Calpurnius Piso; and he continued to employ Emilianus in several important enterprises, in which he was attended with uncommon success. He took several cities; and in one of his excursions, found means to have a private conference with Phanesas, general, under Afrubal, of the Carthaginian cavalry, and brought him over, together with 2200 of his horse to the Roman interest. Under the consul Calpurnius Piso himself, however, the Roman arms were unsuccessful. He invested Clupea; but was obliged to abandon the enterprise, with the loss of a great number of men killed by the enemy in their fallacies.

From this place he went to vent his rage on a city newly built, and thence called Neapolis, which professed a strict neutrality, and had even a safeguard from the Romans. The consul, however, plundered the place, and spilt the inhabitants of all their effects. After this he laid siege to Hippogretas, which employed the Roman fleet and army the whole summer; and, on the approach of winter, the consul retired to Utica, without performing a single action worth notice during the whole campaign.

The next year Scipio Emilianus was chosen consul, and ordered to pass into Africa; and upon his arrival, the face of affairs was greatly changed. At the time of his entering the port of Utica, 3500 Romans were in great danger of being cut in pieces before Carthage. These had besieged Megalai, one of the suburbs of the city; but as they had not furnished themselves with provisions to subsist there, and could not retire, being closely invested on all sides by the enemy’s troops, the praetor Mancinus, who commanded this detachment, seeing the danger into which he had brought himself, dispatched a light boat to Utica, to acquaint the Romans there with his situation. Emilianus received this letter a few hours after his landing; and immediately flew to the relief of the besieged Romans, obliged the Carthaginians to retire within their walls, and safely conveyed his countrymen to Utica. Having then drawn together all the troops, Emilianus applied himself wholly to the siege of the capital.

His first attack was upon Megalai; which he carried by assault, the Carthaginian garrison retreating into the citadel of Byrsa. Afrubal who had commanded the Carthaginian forces in the field, and was now governor of the city, was so enraged at the losss of Megalai, that he caused all the Roman captives taken in the two years the war lasted, to be brought upon the ramparts and thrown headlong, in the sight of the Roman army, from the top of the wall; after having, with an excess of cruelty, commanded their hands and feet to be cut off, and their eyes and tongues to be torn out. He was of a temper remarkably inhuman, and it is said that he even took pleasure in seeing some of these unhappy men flayed alive. Emilianus, in the mean time was busy in drawing lines of circumvallation and contravallation across the neck of land which joined the isthmus on which Carthage stood, and by that means, all the avenues on the land-side of Carthage being shut up, the city could receive no provisions that way. His next care was to raise a mole in the sea, in order to block up the old port, and the new one being already shut up by the Roman fleet; and this great work he effected with immense labour. The mole reached from the western neck of land, of which the Romans were masters, to the entrance of the port; and was 90 feet broad at the bottom and 80 at the top. The besieged, when the Romans first began this surprising work, laughed at the attempt; but were no less alarmed than surprised, when they beheld a vast mole appearing above water, and by that means the port rendered inaccessible to ships, and quite useless. Prompted by despair, however, the Carthaginians, with incredible and most miraculous industry, dug a new basin, and cut a passage into the sea, by which they could receive the provisions that were sent them by their troops in the field. With the same diligence...
The inhabitants of the country, who could not retire on either side. The day after, the conful endeavoured to make himself master of a terrace which covered the city on the side next the sea; and on this occasion the besieged signalized themselves in a most remarkable manner. Great numbers of them, naked and unarmed, went into the water in the dead of the night, with unlighted torches in their hands; and having, partly by swimming, partly by wading, got within reach of the Roman engines, they struck fire, lighted their torches, and threw them with fury against the machines. The sudden appearance of these naked men, who looked like so many monsters started up out of the sea, so terrified the Romans who guarded the machines, that they began to retire in the utmost confusion. The conful, who commanded the detachment in person, and had continued all night at the foot of the terrace, endeavoured to stop his men, and even ordered those who fled to be killed. But the Carthaginians, perceiving the confusion the Romans were in, threw themselves upon them like so many wild beasts; and having put them to flight only with their torches, they set fire to the machines, and entirely consumed them.

This, however, did not discourage the conful: he renewed the attack a few days after, carried the terrace by assault, and lodged 4000 men upon it. As this was an important post, because it pent in Carthage on the sea-side, Emilianus took care to fortify and secure it against the sallies of the enemy; and then, winter approaching, he suspended all further attacks upon the place till the return of good weather. During the winter season, however, the conful was not inactive. The Carthaginians had a very numerous army under the command of one Diogenes, strongly encamped near Nepheus, whence convoys of provisions were sent by sea to the besieged, and brought into the new bafon. To take Nepheus, therefore, was to deprive Carthage of her chief magazine. This Emilianus undertook, and succeeded in the attempt. He first forced the enemy's entrenchments, put 70,000 of them to the sword, and made 10,000 prisoners; all the inhabitants of the country, who could not retire to Carthage, having taken refuge in this camp. After this, he laid siege to Nepheus, which was reduced in 22 days. AIdruba being disheartened by the defeat of the army, and touched with the misery of the besieged now reduced to the utmost extremity for want of provisions, offered to submit to what conditions the Romans pleased, provided the city was spared; but this was absolutely refused.

Early in the spring, Emilianus renewed the siege of Carthage; and in order to open himself a way into the city, he ordered Laelius to attempt the reduction of Cotho, a small island which divided the two ports. Emilianus himself made a sally attack on the citadel, in order to draw the enemy thither. This stratagem had the desired effect; for the citadel being a place of the greatest importance, most of the Carthaginians hastened thither, and made their utmost efforts to repulse their aggressors. But in the mean time Laelius having, with incredible expedition, built a wooden bridge over the channel which divided Cotho from the isthmus, entered the island, scaled the walls of the fortresses which the Carthaginians had built there, and made himself master of that important post. The proconsul, who was engaged before Byrsa, no sooner understood, by the loud shouts of the troops of Laelius, that he had made himself master of Cotho, than he abandoned the false attack, and unexpectedly fell on the Roman army encamped on the neighboring gate of the city, which he broke terrify.

Then he appeared with his whole army before Byrsa; which so terrified the Carthaginians, who had fled thither for refuge, that first of all 25,000 women, and then 30,000 men, came out of the gates in such a condition as moved pity. They threw themselves prostrate before the Roman general, asking no favour but life. This was readily granted, not only to them, but to all that were in Byrsa, except the Roman defitters, whose number amounted to 900. AIdruba's wife earnestly intreated her husband to suffer her to Cruelty and join the suppliants, and carry with her to the proconsul her two sons, who were as yet very young; but bal.
Afrubal's wife appeared on the roof. There Afrubal's wife spoke the following words: "I, your wife, am食べ to be spared. But in the meantime, your children shall be destroyed."

After this, Afrubal, finding them all resolved to defend themselves to the last breath, committed himself to his wife and children, after which he, in a most cowardly and mean-spirited manner, came and privately threw himself at the conqueror's feet. The Carthaginians in the citadel no longer understood that their commander had abandoned the place, than they threw open the gates, and put the Romans in possession of Byrsa. They had now no enemy to contend with but the Romans; who, being reduced to despair, retreated into the temple of Aesculapius, which was as a second temple within the first. There the proconsul attacked them; and these unhappy wretches, finding there was no way to escape, set fire to the temple. As the flames spread, they retreated from one part of the building to another, till they got to the roof. There Afrubal's wife appeared in her most beautiful attire, and having uttered the most bitter imprecations against her husband, whom the flames were now advancing on, she exclaimed: "Wretch! May heaven curse thee! Thou hast caused these disasters! Thou hast thrown thyself into the flames!"

Having thus spoken, the flames advanced so fast that Afrubal's wife was consumed. Afrubal, however, was not killed, and, with two children, he was saved. He set fire to the temple, and the flames spread to the city, which was plundered. The Romans then destroyed the city, and left it in ruins.}

Afrubal's wife then went to Rome and informed the Senate of the fate of the city. The Senate then ordered the city to be rebuilt. Afrubal was then freed from the Romans, and returned to his native country. He then built a temple in honor of the gods, and from that time on, he lived in peace and tranquility.
Carthage, to which the accent was by

fodder, &c. in depth with the foundations abovementioned, were large enough to hold tallories high, though the walls were but two: they were arched; and, in the lower part, corresponding

facilities for were arched; and, in the lower part, corresponding

removals and was a temple of Apollo, in which was a

broad, and shut up with chains. The first was appropriated to the merchants; and included in

foundations still sunk 32 feet deep, and was four stories high, though the walls were but two: they

were thrown from the ramparts by the

with large keys, in which were placed at equal

were two harbours, so disposed as to have a communication with one another. They had one common entrance 70 feet broad, and shut up with chains. The first was appropriated to the merchants; and included in

furniture and was a temple of Apollo, in which was a

in the middle of it, was lined with large keys, in which were distinct receptacles for securing and sheltering from the weather 220 ships of war. Over these were magazines of all sorts of naval stores. The entrance into each of these receptacles was adorned with two marble pillars of the Ionic order; so that both the harbour and island represented on each side two magnificent galleries. Near this island was a temple of Apollo, in which was a statue of the god all of mufy gold; and the

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as to their religion, manners, &c. being much the same with the Phoenicians, of which they were a colony, the reader is referred for an account of these things to the article Phoenicia.

On the ruins of Carthage there now stands only a small village called Melcha. The few remains of Carthage consist only of some fragments of walls and 17 cisterns for the reception of rain water.

There are three eminences, which are so many mafs of fine marble pounded together, and were in all probability the sites of temples and other distinctive buildings. The present ruins are by no means the remains of the ancient city destroyed by the Romans; who after taking it entirely erased it, and plowed up the very foundations; so truly they adhered to the well-known advice perpetually inculcated by Cato the Elder, Delenda est Carthage. It was again rebuilt by the Gracchi family, who conducted a colony to repopulate it; and continually increasing in splendour, it

became at length the capital of Africa under the Roman emperors. It flourished near 700 years after its first demolition, until it was entirely destroyed by the Saracens in the beginning of the 7th century.

It is a singular circumstance that the two cities of Carthage and Rome should have been built just opposite one to the other; the bay of Tunis and the mouth of the Tiber being in a direct line.

Littora littoribus contraria, fluitibus undas,

Arma armis.

Vigo. Ed. 1. 4.

New-Carthage, Carthage,

New-Carthage, a considerable town of Mexico, in the province of Coftarica. It is a very rich, trading place. W. Long. 86. 7. N. Lat. 9. 5.

CARTHAGENA, a province of South America, and one of the most considerable in New Spain, on account of the great trade carried on by it; for the country itself is neither fertile, rich, nor populous. The capital city, called likewise Carthaginea, is situated in W. Long. 77. N. Lat. 11. on a sandy island, by most writers called a peninsula; which, forming a narrow passage on the south-west, opens a communication with that called Tierra Bomba, as far as Bocca Chica. The little island which now joins them was formerly the entrance of the bay: but it having been filled up by orders of the court, Bocca Chica became the only entrance: this, however, has been filled up since the attempt of Vernon and Wentworth, and the old passage again opened. On the north side the land is so narrow, that, before the wall was begun, the distance from sea to sea was only 35 toises; but afterwards enlarging, it forms another island on this side; so that, excepting these two places, the whole city is entirely surrounded by salt water. To the eastward it has a communication by means of a wooden bridge, with a large suburb called Xemani, built on another island, which is also joined to the continent by a bridge of the same materials. The fortifications both of the city and suburbs are built after the modern manner, and lined with freestone; and, in time of peace, the garrison consists of ten companies of 77 men each, besides militia. The city and suburbs are well laid out, the streets straight, broad, uniform, and well paved. All the houses built of stone or brick, only one story high, well contrived, neat, and adorned with balconies and lattices of wood, which is more durable in that climate than iron, the latter being soon corroded by the acrimonious quality of the atmosphere. The climate is exceedingly unhealthy. The Europeans are particularly subject to the terrible disease called the black vomit, which sweeps off multitudes annually on the arrival of the galleons. It seldom continues above three or four days; in which time the patient is either dead or out of danger, and if he recovers is never subject to a return of the same distemper.

—This disease has hitherto killed all the art of the Spanish physicians; as has also the leprosy, which is very common here. In Carthagena, likewise, that painful tumour in the legs, occasioned by the entrance of the Dracunculus or Guinea-worm, is very common and troublesome. Another disorder peculiar to this country, and to Peru, is occasioned by a little insect called Nigua, so extremely minute, as scarce to be visible to the naked eye. This insect breeds in the durt, infinuates itself into the soles of the feet and the legs, piercing the skin with such facility, that there is no
being aware of it, before it has made its way to the
spear. If it is perceived in the beginning, it is extracted
with little pain; but having once lodged its head, and
pierced the skin, the patient must undergo the pain of an
infection, without which a nodus would be formed, and
a multitude of infects ingendered, which would soon
overspread the foot and leg. One species of the nigra
is venomous; and when it enters the toe, an inflam-
matory swelling, greatly resembling a venereal bubo,
takes place in the groin.

CARTHAGENA, a sea-port town of Spain in the
kingdom of Marcia, and capital of a territory of the
same name; built by Aahribal, a Cartaginian general,
and named after Carthage. It has the chief harbour
in all Spain, but nothing else very considerable; the
bishop's see being transferred to Toledo. In 1760 it
was taken by Sir John Leake; but the Duke of
Berwick retook it afterwards. W. Long. o. 58. N. Lat.
37. 36.

CARTHAMUS, in botany: a genus of the order of
polygamaequalis, belonging to the syngeneia
clis of plants, and in the natural method ranking
under the 49th order, Composite. The calyx is ovate,
imbricated with scales, close below, and augmented
with subovate foliaceous appendices at top.—Of this genus
there are nine species; but the only remarkable one is
the foundation of a saffron-coloured flower. This
is a native of Egypt and some of the warm parts of
Africa. It is at present cultivated in many parts of Eu-
rope, and also in the Levant, from whence great quan-
tities of it are annually imported into Britain for the
purposes of dyeing and painting. It is an annual
plant, and rives with a stiff ligneous stalk, about two
feet and a half or three feet in height, dividing up-
wards into many branches, garnished with oval point-
ed leaves fitting close to the branches. The flowers
grow finge at the extremity of each branch; the heads
of the flowers are large, inclosed in a seally impalement;
each scale is broad at the base, flat, and formed like a
leaf of the plant, terminating in a sharp spine. The
lower part of the impalement spreads open; but the
scales above closely embrace the florets, which are of
a fine saffron colour, and are the part used for the
purposes abovementioned. The good quality of this
commodity is in the colour, which is of a bright saff-
ron hue: and in this the Britth carthamus very of-
ten fails; for if there happens much rain during the
time the plants are in flower, the flowers change to
a dark or dirty yellow, as they likewise do if the
flowers are gathered with any moisture remaining upon
them.—The plants are propagated by seeds, which
should be sown in drills, at two feet and a half distance
from one another, in which the seed should be scat-
tered finely. The plants will appear in leas than a
month; and in three weeks or a month after, it
will be proper to hoe the ground; at which time the plants
should be left six inches distant: after this they will
require a second hoeing; when they must be thinned
to the distance at which they are to remain. If after
this time they are hoed a third time, they will require no
farther care till they come to flower; when, on the
other hand, if the flower is intended for use, the
florets should be cut off from the flowers as they come to
perfection; but this must be performed when they are perfectly dry;
and then they should be dried in a kiln with a moder-
ate fire, in the same manner as the true saffron. But
in those flowers which are propagated for seed, the
Carthusians
florets must be cut off, or the seeds will prove aborti-
tive.—The seeds of carthamus have been celebrated as
a cathartic; but they operate very slowly, and for the
most part disorder the stomach and bowels, especially
when given in infusion: triturated with distilled aro-
matic waters, they form an emulsion less offensive, yet
inferior in efficacy to the more common purgatives.
They are eaten by a species of Egyptian parrot, which
is very fond of them; to other birds or beasts they
would prove a mortal poison.

CARTHUSIANS, a religious order founded in
the year 1085, by one Bruno. The Carthusians, so
called from the defect Carthusae, the place of their
inquisition, are remarkable for the austerity of their
rule. They are not to go out of their cells, except to
church, without leave of their superior; nor speak to
any person without leave. They must not keep any
portion of their meat or drink till next day; their beds
are of straw, covered with a felt; their clothing two
hair-cloths, two cows, two pair of hose, and a cloak,
all coarse. In the refectory, they are to keep their
eyes on the dish, their hands on the table, their atten-
tion on the reader, and their hearts fixed on God.
Women are not allowed to come into their churches.
It is computed that there are 172 houses of Carthus-
ians; whereof five are of Nuns, who practise the same
austeritys as the Monks. They are divided into 16
provinces, each of which has two visitors. There have
been several canonized saints of this order, four cardi-
inals, 70 archbishops and bishops, and a great many
very learned writers.

CARTHUSIAN Powder, the same with kermes-mineral.
See KERMES.

CARTILAGE, in anatomy, a body approaching
to the nature of bones; but lubricious, flexible, and
elastic. See ANATOMY.

CARTILAGINOUS, in ichthyology, a title given
to all fish whose muscles are supported by cartilages
instead of bones; and comprehends the same genera III. 75.
of fish to which Linnaeus has given the name of am-
phibia nantes: but the word amphibia ought properly
to be confined to such animals as inhabit both ele-
ments; and can live, without any inconvenience, for
a considerable time, either on land, or in water; such
tortoises, frogs, and several species of lizards; and,
among the quadrupeds, hippopotamis, &c. &c.
Many of the cartilaginous fish are viviparous, being
excluded from an egg, which is hatched within them.
The egg consists of a white and a yolk; and is lodged
in a case formed of a thick tough substance, not unlike
softened horn: such are the eggs of the ray and shark
kinds. Some again differ in this respect, and are ovi-
parous; such are the flurgeon, and others.

They breathe either through certain apertures be-
neath, as in the rays; on the sides, as in the flarks,
&c. or on the top of the head, as in the pipe-fish:
they have not covers to their gills like the bony
fish.

CARTMEL, a town of Lancashire in England.
It is seated among the hills called Carmel-fells, not far
from the sea, and near the river Kent; adorned with
a very handsome church, built in the form of a creos
like a cathedral. The market is well supplied with
corn, sheep, and fish. W. Long. 2. 43. N. Lat. 54. 15.

CARTON, or CARTOON, in painting, a design
drawn
drawn on strong paper, to be afterwards called through, and transferred on the freth plaster of a wall to be printed in freco. It is also used for a design coloured, for working in Mosaic, tapestry, &c. This from the Italian Cartoni, (scarti "paper," and orn "large,") denoting many sheets of paper pasted on canvas, on which large designs are made, whether coloured or with chalks only. Of these many are to be seen at Rome, particularly by Domenichino. Those by Andrea Mantegna, which are at Hampton Court, were once coloured, but the most famous performances of this sort are, printed in colour. It is also used for a design coloured, and filled with a ball of a pound weight; and sometimes it is made for the guns, being of a ball of half or quarter a pound weight, according to the nature of the gun, tied in form of a bunch of grapes, on a tampion of wood and coated over. These were made in the room of partridge-shot.

CARTRIDGE, in the military art, a case of packboard or parchment, holding the exact charge of a fire-arm. Those for muskets, carabines, and pistols, hold both the powder and ball for the charge; and those of cannon and mortars are usually in cases of packboard or tin, sometimes of wood, half a foot long, and adapted to the caliber of the piece.

CARTRIDGE-BOX, a case of wood or turned iron, covered with leather, holding a dozen musket-cartridges. It is worn upon a belt, and hangs a little lower than the right pocket-hole.

CARTWRIGHT, (William) an eminent divine and poet, born at Northway, near Tewksbury, in Gloucestershire, in September 1611. He finished his education at Oxford; afterwards went into holy orders, and became a most florid preacher in the university. In 1642, he had the place of successor in the church of Salisbury; and, in 1643, was chosen junior proctor in the university. He was also metaphysical reader there. Wit, judgment, elocution, a graceful person and behaviour, occasioned that esteem of him from dean Fell, "That he was the utmost that 'man could come to.'" He was an expert linguist; an excellent orator; and at the same time was esteemed an admirable poet. There are extant of his, four plays, and some poems. He died in 1643, aged 33.

CARGE, carvagium, the name with Carvage.

Henry III. is said to have taken carvage, that is to two marks of silver of every knight's fee, towards the marriage of his sister Isabella to the emperor. Carvage could only be imposed on the tenants in capite. Carvage also denotes a privilege whereby a man is exempted from the service of carvage.

CARUCATURUS, in ancient law books, he that held land in socage, or by plough tenure.

CARUCATE. See Carucate.

CARVER, a cutter of figures or other devices in wood. See Carving.

Carvers answer to what the Romans called sculptores, who were different from calicatores, or engravers, as these last wrought in metal.

Carver is also an officer of the table, whose business is to cut up the meat, and distribute it to the guests. The word is formed from the Latin carpitor, which signifies the same. The Romans also called him carpus, sometimes felitor, flendentis magister, and fructor.

In the great families at Rome, the carver was an officer of some figure. There were masters to teach them the art regularly, by means of figures of animals cut in wood. The Greeks also had their carvers, called dups, q. d. deribitores or distributor. In the primitive times, the master of the feast carved for all his guests. Thus in Homer, when Agamemnon's ambassadors were entertained at Achilles's table, he himself...
himself carved the meat. Of later times, the same office on solemn occasions was executed by some of the chief men of Sparta. Some derive the custom of distributing to every guest his portion, from those early ages when the Greeks first left off feeding on acorns, and learned the use of corn: The new diet was so great a delicacy, that to prevent the guests from quarrelling about it, it was found necessary to make a fair distribution.

In Scotland, the king has a hereditary carver in the family of Arranther.

CARUI, or Carvi, in botany. See Carum.

CARVING, in a general sense, the art or act of cutting or fashioning a hard body by means of some sharp instrument, especially a chisel. In this sense carving includes flatiny and engraving, as well as cutting in wood.

CARVING, in a more particular sense, is the art of engraving or cutting figures in wood. In this sense carving, according to Pliny, is prior both to statuary and painting.

To carve a figure or design, it must first be drawn or pasted on the wood; which done, the rest of the block, not covered by the lines of the design, are to be cut away with little narrow-pointed knives. The wood fitted for the use is that which is hard, tough, and close, as beech, but especially box: to prepare it for carving, it is planed smooth on the wood, and let it dry; which done, they fall to cutting or carving, as above.

CARUM, in botany: a genus of the digynia order, in the natural method ranking under the 45th order, Umbellifera. The fruit is ovate, oblong, and furrated; the petals are carinated below, and emarginated by their bodies. About the size of a myrtle berry, supplied to owe their origin to the breaking off the surface of the paper gently, till all the strokes of the figure appear distinctly. This done, they fall to cutting or carving, as above.

CARUM, in botany: a genus of the digynia order, belonging to the paeonidiæ class of plants; and in the natural method ranking under the 45th order, Umbellifera. The fruit is ovate, oblong, and furriated; the involucrum monophyllous; the petals are carinated or keel-shaped below, and emarginated by their infection.

Species, &c. 1. The carui, or caraway of the shops, grows naturally in many places of Britain. It is a biennial plant, which rises from seeds one year, flowers the next, and perishes soon after the seeds are ripe. It hath a taper root like a parsnip, but much smaller, which runs deep into the ground, sending out many small fibres, and hath a strong aromatic taste. From the root arise one or two smooth, solid, channelled flanks, about two feet high, garnished with winged leaves, having long naked foot-flanks. The hispanicum is also a biennial, and is a native of Spain. It rises with a stronger flank than the former, which seldom grows more than a foot and a half high; but is closely garnished with fine narrow leaves like those of dill. Both these plants are propagated by seeds which ought to be sown in autumn. Sheep, goats, and swine, eat this plant; cows and horses are not fond of it. Parkinson says, the young roots of cara-way are better eating than parsnips. The tender Carumula leaves may be boiled with pot herbs. The seeds have an aromatic smell, and a warm pungent taste. They are used in cakes, incrusted with sugar, as sweet-meats, and distilled with spirituous liquors, for the sake of the flavour they afford. They are in the number of the four greater hot seeds; and frequently employed, as a stomachic and carminatives, in flatulent colics and the like.

CARUNCULA, or caruncle, in anatomy, a term denoting a little piece of flesh, and applied to several parts of the human body. Thus, Caruncula Myrtiformis, in anatomy, fleshy knobs about the size of a myrtle berry, supposed to owe their origin to the breaking of the hymen. See Anatomy, n° 108.

Caruncles in the urethra, proceeding from a goitre, or an ulceration of the urethra, may be reduced by introducing the bougie.

Carus, a sudden deprivation of fenfe and motion, affecting the whole body. See (the Index subjoined to) Medicine.

Carus, (Marcus Aurelius) was raised from a low station, by his great merit, to be emperor of Rome in 282. He showed himself worthy of the empire; he subdued its enemies, and gave the Romans a prospect of happy days, when he was unfortunately killed by lightning in 284.

Carwar, a town of Asia, on the coast of Malabar in the East-Indies, and where the English East-India company have a factory, fortified with two bastions. The valleys about it abound in corn and pepper, which is the chief article of trade. The woods on the mountains abound with quadrupeds, such as bears, wolves, monkeys, wild hogs, deer, civet, and a sort of beeches of a prodigious size. The religion of the natives is Paganism; and they have a great many strange and superstitious customs. E. Long. 73. 7. N. Lat. 15. 0.

Cayrae-Ae, (Stephanus); Caryae, arum, (Pausanias) a town of Laconia, between Sparta and the borders of Messenia: where stood a temple of Diana, thence called Caryatis, idus; whose annual festival, called Caryae, arum, was celebrated by Spartan virgins with dances. An inhabitant, Caryates, and Caryatis; Caryatis apis a Laconian bee, (Stephanus.)

Caryae-arum, (anc. geog.) a place in Arcadia towards the borders of Laconia. Whether from this of Arcadia, or that of Laconia, the Columnæ Caryatis of Vitruvius and Pliny (which were statues of matrons in robes or long robes) took the appellation, is disputed.

Cary, (Lucius) Lord viscount Falkland, was born in Oxfordshire, about the year 1610; a young nobleman of great abilities and accomplishments. About the time of his father's death 1633, he was made gentleman of the privy chamber to king Charles I., and afterwards secretary of state. Before the assembling of the long parliament, he had devoted himself to literature, and every pleasure which a fine genius, a generous disposition, and an opulent fortune, could afford; when called into public life, he stood foremost in all attacks on the high prerogatives of the crown; but when civil convulsions came to an extremity, and it was necessary to choose a side, he tempered his zeal, and
and defended the limited powers that remained to monarchy. Still anxious however for his country, he seems to have dreaded equally the prosperity of the royal party, or that of the parliament; and among his intimate friends, often sadly reiterated the word peace. This excellent nobleman freely exposed his person for the king in all hazardous enterprises, and was killed in the 54th year of his age at the battle of Newberry. In Welwood's memoirs we are told, that whilst he was with the king at Oxford, his majesty went one day to see the public library, where he was shown among other books a Virgil, nobly printed, and exquisitely bound. The lord Falkland, to divert the king, would have his majesty make a trial of his fortune by the Sorres Virgiliame, an usual kind of divination in ages past, made by opening a Virgil. The king opening the book, the page which happened to come up, was that part of Dido's imprecation against Aeneas, iv. 615, &c. which is thus translated by Dryden.

"Oppress'd with numbers in the unequal field,  
His men discourage'd, and himself expell'd;  
Let him for succour sue from place to place,  
Torn from his subjects and his son's embrace," &c.

King Charles seeming concerned at this accident, the lord Falkland, who observed it, would likewise try his own fortune in the same manner; hoping he might fall upon some passage that could have no relation to his cafe, and thereby divert the king's thoughts from any impression the other might make upon him: but the place lord Falkland stumbled upon was yet more suited to his destiny than the other had been to the king's; being the following expressions of Evander, upon the untimely death of his son Pallus, Æn. xi. 152.

"O Pallas! thou hast fail'd thy plaintive word,  
To fight with caution, not to tempt the sword,  
I warn'd thee, but in vain: for well I knew  
What perils youthful ardour would pursue;  
That boiling blood would carry thee too far;  
Young as thou art in dangers, raw to war.  
O curb' thy arms, disfart'rous doom,  
Prelude of bloody fields and fights to come!"

He wrote several things, both poetical and political; and in some of the king's declarations, supposed to be penned by lord Falkland, we find the first regular definition of the English constitution that occurs in any composition published by authority. His predecessor, the first viscount Cary, was ennobled for being the first who gave king James an account of queen Elizabeth's death.

CARY, (Robert) a learned English chronologist, born in Devonshire about the year 1615. On the repossession, he was preferred to the archdeaconry of Exeter; but on some pretext was ejected in 1660, and spent the rest of his days at his rectory of Porlemouth, where he died in 1698. He published "Pala- logenia Chronica," a chronology of ancient times, in three parts, didactic, apodeictical, and canonical; and translated the hymns of the church into Latin verse.

CARYATES, in antiquity, a name of the virgins of the place. During Xerxes's invasion, the Laconians not daring to appear and celebrate the customary solemnity, to prevent incurring the anger of the gods by such an intermission, the neighbouring swains are said to have assembled and sung pastoral or bacchic, which is said to have been the origin of bacchic poetry.

CARYATIDES, or CARArites. See Architecture, no. 56.

CARYL, (Joseph) a divine of the last century, bred at Oxford, and some time preacher to the society of Lincoln's inn, an employment he filled with much applause. He became a frequent preacher before the long parliaments, a licent of their books, one of the assembly of divines, and one of the triers for the approbation of ministers; in all which capacities he shewed himself a man of considerable parts and learning, but with great zeal against the king's person and cause. On the restoration of Charles II. he was silenced by the act of uniformity, and lived privately in London, where, besides other works, he distinguished himself by a laborious Exposition of the Book of Job; and died in 1672.

CARYLL, (John) a late English poet, was of the Roman Catholic persuasion, being secretary to queen Mary the wife of James II. and one who followed the fortunes of his abdicating master; who rewarded him, first with knighthood, and then with the honorary titles of earl Caryll and baron Darford. How long he continued in that service is not known; but he was in England in the reign of queen Anne, and recommended the subject of the "Rape of the Lock" to Mr Pope, who at its publication addressed it to him. He was also the intimate friend of Pope's "Unfortunate Lady." He was the author of two plays: 1. "The English Prince, or the Death of Richard III. 1667," 4to.; 2. "Sir Salomon, or the Cautious Mermaid," 1671, 4to.; and in 1700, he published "The Psalms of David, translated from the Vulgat," 2 vols. In Tonson's edition of Ovid's Epistles, that of "Bricsis to Achilles" is said to be by Sir John Caryll; and in Nichols's Select Collection of Miscellanious Poems, vol. II. p. 1, the first Eclogue of Virgil is translated by the same ingenious poet. He was living in 1717, and at that time must have been a very old man. See three of his letters in the "Additions to Pope," vol. II. p. 114.

CAYOCAR, in botany: A genus of the teregrinia order, belonging to the polyandria class of plants. The calyx is quinquipetale, the petals five, the styles more frequently four. The fruit is a plum, with nepicles, and four furrows netted.

CAYOPHYLLÆI, in botany, the name of a very numerous family or order in Linnaeus's fragments of a natural method: containing, besides the clas of the same name in Tournefort, many other plants, which from their general appearance seem pretty nearly allied to it. The following are the genera, viz. Agrotómena, Cucubalus, Dianthus, Drypis, Gynophila, Lychinis, Saponaria, Silene, Velazia, Alfine, Arearia, Bofonia, Ceraflum, Cherleria, Glinus, Holclea, Leoflingia, Moehringia, Polycarpum, Ssina, Spargula, Stellaria, Minuartia, Mollugo, Ortega, Pharmacum, Queria. All the plants of this order are herbaceous, and
CARYOPHYLLUS, the pike, in botany. See Dianthus.

Caryophyllus, the clove-tree, in botany: A genus of the monotypia order, belonging to the polyandri class of plants; and in the natural method ranking under the 19th order, Hesperideae. The corolla is terrapetalous; the calyx tetraphyllous; the berry monomerofermous below, bicarpellate above, the receptacle of the flower. Of this there is but one species, viz. the aromaticus, which is a native of the Molucca islands, particularly of Amboyna, where it is principally cultivated. The clove-tree resembles, in its bark, the olive; and is about the height of the laurel, which it extremities alfo refembles in its leaves. No verdure is ever feen growing under the 19th order, monofpermous below when gathered, become of a deep brown. The pretty red and hard. When they arrive at this fon for gathering the cloves is from as they dry, they assume a dark yellowifh heart. Large cloths are fpread to receive them, and they are upon the tree, continue to grow till afterwards either dried in the fun or in the fmoke of meal, to make the fingers mart when handled, and the relin contained in this dafs. Their pungency proceeds from the fpice illands: but the degree of moist ure must be more carefully watched in the latter; for there a bag of cloves will, in one night's time, attract so much wa ter, that it may be prefl ed out of them by squeezing them with the hand.

The clove-tree is never cultivated in Europe. At Amboyna the company have allotted the inhabitants 4000 parcels of land, on each of which they were at firft allowed, and about the year 1720 compelled, to plant about 125 trees, amounting in all to 500,000. Each of these trees produces annually on an average more than two pounds of cloves; and confequently the collective produce must weigh more than a million. The cultivator is paid with the specie that is constantly returned to the company, and receives some unbleached cottons which are brought from Cormandel.

CARYOTA, in botany: A genus belonging to the natural order of Pultia. The male calyx is common, the corolla tripartite; the flamina very numeroso: the female calyx the fame; the corolla trirpetite; one petif, and a differmous berry.

CAS, in ancient and middle-age writers, is used to denote a cottage or house.

Cas Santa, denotes the chapel of the holy virgin at Loreto.—The Santa Casa is properly the house, or rather chamber, in which the blessed virgin is faid to have been born, where he was betrothed to her fpoufe Joseph, where the angel faunted her, the Holy Ghoft overshadowed her, and by confequence where the Son of God was conceived or incarnated. Of this building the Catholics tell many wonderful stories too childish to tranfcribe. The Santa Casa or holy chamber conſists of one room, forty-four spans long, eighteen broad, and twenty-three high. Over the chimney, in a niche, flands the image called the great Madona or Lady, four feet high, made of cedar, and, as they fay, wrought by St. Luke, who was a carver as well as a phyfician. The mantle or robe she has on, is covered with innumerable jewels of ineffable value. She has a crown, given her by Louis XIII. of France, and a little crown for her fon.

Casal, a strong town of Italy in Mountferrat, with a citadel and a bishoips. It was taken by the French from the Spaniards in 1649; and the duke of Mantua fold it to the French in 1681. In 1695 it was taken by the allies, who demolished the fortifications; but the French retook it, and fortified it again. The king of Sardinia became master of it in 1706, from whom the French took it in 1745; however, the king of Sardinia got possession again in 1746. It is fed on the river Po, in E. Long. 6. 37. N. Lat. 54. 7.

Casal-Maggiore, a small strong town of Italy, in the duchy of Milan, fed on the river Po. E. Long. 11. 5. N. Lat. 45. 6.

Casa Nova (Marc Antony) a Latin poet, born...
CASAN, a considerable town of Asia, and capital of a kingdom of the same name in the Ruffian empire, with a strong castle, a citadel, and an archbishop's see. The country about it is very fertile in all sorts of fruits, corn, and pumkes. It carries on a great trade in furs, and furnishes wood for the building of ships.

The kingdom of Casan is bounded on the north by Permia, on the east by Siberia, on the south by the river Wolga, and on the west by the province of Moscow. E. Long. 53. 25. N. Lat. 55. 28.

CASAS, (Bartolomew de la) bishop of Chiapa, distinguished for his humanity and zeal for the conversion of the Indians, was born at Seville in 1474; and went with his father, who failed to America, with Christopher Columbus in 1493. At his return to Spain he embraced the faith of a ecclesiastic, and obtained a curacy in the island of Cuba; but some time after quitted his cure in order to procure liberty for the Indians, whom he saw treated by the Spaniards in the most cruel and barbarous manner, which naturally gave them an unconquerable aversion to Christianity. Bartolomew excelled himself with extraordinary zeal, for 50 years together, in his endeavours to persuade the Spaniards that they ought to treat the Indians with equity and mildness; for which he suffered a number of perjuries from his countrymen. At last the court, moved by his continual remonstrances, made laws in favour of the Indians, and gave orders to the governors to observe them, and fee them executed. He died in Madrid in 1566, aged 92. He wrote several works, which breathed nothing but humanity and virtue. The principal of them are, 1. An account of the destruction of the Indies. 2. Several treatises in favour of the Indians, against Dr Sepulveda, who wrote a book to justify the inhuman barbarities committed by the Spaniards. 3. A very curious, and now scarce, work in Latin, on this question, "Whether kings or princes can, consistently with conscience, or in virtue of any right or title, alienate their subjects, and place them under the dominion of another sovereign?"

CASATI, (Paul) a learned Jesuit, born at Placentia in 1617, entered early among the Jesuits; and, after having taught mathematics and divinity at Rome, was sent into Sweden to labour amongst the Swedes, whom he prevailed on to embrace the popish religion. He wrote, 1. Vacuum praefcriptum. 2. Terra machinix mota. 3. Mechanicorum, libri 10. 4. De Igne Disputationes; which is much esteemed. 5. De aqua, Disputationes. 6. Hydrostatic Disputationes. 7. Optica Disputationes; which is remarkable that he wrote this treatise on optics at 88 years of age, and after he was blind. He also wrote several books in Italian.

CASAUDON, (Laas) was born at Geneva in 1559; and Henry IV. appointed him his library-keeper in 1603. After this prince's death, he went into England with Sir Henry Wotton, ambassador from King James I. where he was kindly received and engaged in writing against Baronius's annals: he died not long after this, in 1614; and was interred in Westminster-abbey, where a monument was erected to him. He was greatly skilled in the Greek and in criticism; published several valuable commentaries; and received the highest elegiums from all his cotemporaries.

CASAUDON, (Merio) son of the preceding, was born at Geneva in 1599. He was bred at Oxford, and took the degree of master of arts in 1621. The same year he published a book in defence of his father against the calumnies of certain Roman Catholics; which gained him the favours of King James I. and a considerable reputation abroad. He was made prebendary of Canterbury by archbishop Laud. In the beginning of the civil war he left all his spiritual promotions, but still continued to publish excellent works. Oliver Cromwell, then lieutenant-general of the parliament's forces, would have employed his pen in writing the history of the late war; but he declined it, owning that his subject would oblige him to make such reflections as would be ungrateful, if not injurious, to his lordship. Notwithstanding this answer, Cromwell, sensible of his worth, ordered three or four hundred pounds to be paid him by a bookseller in London whose name was Cromwell, on demand, without requiring from him any acknowledgment of his benefactor. But this offer he rejected, though his circumstances were then mean. At the same time it was proposed by his friend Mr Greaves, who belonged to the library at St James's, that, if Casaubon would gratify Cromwell in the request above-mentioned, all his father's books which were then in the royal library, having been purchased by King James, should be restored to him, and a pension of 300 l. a-year paid to the family as long as the youngest son of Dr Casaubon should live; but this also was refused. He likewise refused handsome offers from Christina queen of Sweden, being determined to spend the remainder of his life in England. At the restoration he recovered all his preferments, and continued writing till his death in 1671. He was the author of an English translation of Marcus Aurelius Antoninus's meditations, and of Lucius Florus; editions of several of the classics, with notes; a treatise of life and custom; a treatise of ethnology; with many other works; and he left a number of MSS. to the university of Oxford.

CASURINA, in botany: A genus of the monarchia order, belonging to the monocœa class of plants. The male has the calyx of the amenum; the corolla a bipartite small scale. The female has a calyx of the amenum, no corolla; the sytle bipartite.

CASCADE, a steep fall of water from a higher into a lower place. The word is French, formed from the Italian catarata, which signifies the same; of catarata, to fall; and that from the Latin cataris. Cascades are either natural, as that at Tivoli, &c. and artificial, as those of Verailles, &c. and either falling with gentle descent, as those of Sceaux; or in form of a buffet, as at Trianon; or down steps, in form of a perron, as at St. Clois; or from facade to facade, &c.

CASCAIS, a town of Estremadura in Portugal, situated at the mouth of the river Tagus, 17 miles east of Lisbon. W. Long. 10. 15. N. Lat. 38. 40.

CASCARILLA. See CLUTIA and CRETON.

CASE, among grammarians, implies the different infections.
C A S [ 2 2 2 ] C A S

indences or terminations of nouns, serving to express the different relations they bear to each other, and to the things they represent. See Grammar.

Case also denotes a receptacle for various articles; as a case of knives, of lancets, of pilots, &c.

Case, in printing, a large flat oblong frame placed sloping, divided into several compartments or little square cells; in each of which are lodged a number of types or letters of the same kind, whence the composer takes them out, each as he needs it, to compose his matter. See Printing.

Case is also used for a certain numerous quantity of divers things. Thus a case of crown-glass contains usually 24 tables, each table being nearly circular, and about three feet fix inches diameter; of Newcastle glass, 35 tables; of Normanby glass, 25.

Case-hardening of Iron, is a superficial conversion of that metal into steel, by the ordinary method of conversion, namely by cementation with vegetable or animal coals. This operation is generally practised upon small pieces of iron wrought into tools and instruments to which a superficial conversion is sufficient; and it may be performed conveniently by putting the pieces of iron to be case-hardened, together with the cement, into an iron box, which is to be closely shut and exposed to a red heat during some hours. By this cementation a certain thickness from the surface of the iron will be converted into steel, and a proper hardness may be afterwards given by sudden extinction of the heated pieces of converted iron in a cold fluid. See Steel.

Case-shot, in the military art, musket-balls, flones, old iron, &c. put into cafes, and shot out of great guns.

Case-mate, or Case-mate, in architecture, a hollow moulding, which some architects make one-sixth of a circle, and others one-fourth. Case-mate is also used in building, for a little moveable window, usually within a larger, being made to open or turn on hinges.

Case-men, in fortification, lodgings built in garrison-towns, generally near the rampart, or in the walle places of the town, for lodging soldiers of the garrison. There are usually two beds in each casern for four soldiers to lie, who mount the guard alternately; the third part being always on duty.

Caseerta, an episcopal town of Italy in the kingdom of Naples, and in the Terra di-Lavoro, with the title of a duchy, seated at the foot of a mountain of the same name, in E. Long. 15° 5'. N. Lat. 41° 5'.

Cases, (Peter-James) of Paris, the most eminent painter of the French school; the churches of Paris and of Versailles abound with his works. He died in 1754, aged 79.

Cash, in a commercial style, signifies the stock or ready money which a merchant or other person has in his present dispoal to negotiate; so called from the French term caisse, i.e. chaff or caffer for the keeping of money.

M. Savary shows that the management of the cash of a company is the most considerable article, and that wherein its good or ill success chiefly depends.

Cash-book. See Book-keeping.

Cashel, or Cashel, a town of Ireland in the county of Tipperary, and province of Munster, with an archbishop's see. The ruins of the old cathedral testify its having been an extensive as well as handsome Gothic structure, boldly towering on the celebrated rock of Cashel, which taken together form a magnificent object, and bear honourable testimony to the labour and ingenuity, as well as the piety and zeal, of its former inhabitants. It is seen at a great distance, and in many directions. Adjoining it are the ruins of the chapel of Cormac M'Culilnan, at once king and archbishop of Cashel, supposed to be the first stone building in Ireland; and feems, by its rude imitation of pillars and capitals, to have been copied after the Greek architecture, and long to have preceded that which is usually called Gothic. Cormac M'Culilnan was a prince greatly celebrated by the Irish historians for his learning, piety, and valour. He wrote, in his native language, a history of Ireland, commonly called the "Psalter of Cashel", which is still extant, and contains the most authentic account we have of the annals of the country to that period, about the year 900. On the top of the rock of Cashel, and adjoining the cathedral, is a lofty round tower, which proudly defied the too successful attempts of archbishop Price, who in this century unroofed and thereby demolished the ancient cathedral founded by St Patrick. In the choir arc the monuments of M. Magrath, archbishop of this see in the reign of Queen Elizabeth, and some other curious remains of antiquity. Cashel was formerly the royal seat and metropolis of the kings of Munster; and on the ascent to the cathedral is a large stone on which every new king of Munster was, as the inhabitants report from tradition, solemnly proclaimed. Cashel is at present but small to what we may suppose it to have been in ancient days. The archbishop's palace is a fine building. Here is a very handsome market house, a feions house, the county infirmary, a charter-school for twenty boys and the same number of girls, and a very good barrack for two companies of foot. The present archbishop Dr Agar hath finished a very elegant church begun by his predecessor, W. Long, 7. 36. N. Lat. 52° 16'.

Cashew-nut. See Anacardium.

Cashier, the cash-keeper; he who is charged with the receiving and paying the debts of a society.

Cashiers of the Bank, are officers who sign the notes that are illued out, examine and mark them when returned for payment, &c.

Cashmir, a province of Asia in the dominions of the Mogul. It is situated at the extremity of Hindoostan, northward of Lahore, and is bounded on the one side by a ridge of the great Caucasus, and on the other by the little Tartarian Thibet and Musulman. The extent of it is not very considerable; but being girt in by a zone of hills, and elevated very considerably above an arid plain, which stretches many miles around it, the fenes which it exhibits are wild and picturesque. Rivers, hills, and valleys, charmingly diversify the landscape. Here, Mr Sullivan informs us, a cascade rushes from a foaming precipice; there a tranquil stream glides placidly along; the tinkling rill too, founds amidst the groves; and the feathered choristers sing the song of love, close sheltered in the glade.
At what time Calhunire came under the dominion of the Mogul government, and how long, and in what manner it was independent, before it was annexed to the territories of the house of Timur, are points that are beyond our present purpose. Though inconsiderable as to its revenues, it was uniformly held in the highest estimation by the emperors of Hindoostan. Thither they repaired, in the plenteous of their great deeds, when the affairs of state would admit of their absence; and there they divested themselves of form and all the oppressive ceremony of state. The royal manner of travelling to Calhunire was grand, though tedious and unwieldy, and shewed, in an eminent degree, the splendid and magnificent nature of an eastern potentate. Arrangtzebe, we are told, seldom began his march to the affairs of men, besides he was on the road, which was beyond our tendants of his feraglio, and that to its revenues, it was uniformly held aerailed the defiles of all the rivers that supply the country, together with the firearms which continually pour from its mountains, enables the husbandman to cultivate with ease the soil he appropriates to agriculture; whilst the gardener's labour is amply repaid in the abundant produce of his fruit. In short, nature wears her gayest clothing in this enchanting spot. The rivers supply the inhabitants with almost every species of fish; the hills yield sweet herbage for the cattle; the plains are covered with grass of various denominations, and the woods are flored with variety of game. The Calfmireans, according to our author, seem a race distinct from all others in the East: their persons are more elegant, and their complexions more delicate and more tinged with red. They have several curious manufactures much valued in India. They are all Mahometans or Idolaters. Calhunire is the capital town.

CASIMIR, the name of several kings of Poland. See (History of) Poland.

CASIMIR, (Matthias Sorbiewski) a Polith Jesuit, born in 1597. He was a most excellent poet; and is, says M. Baillet, an exception to the general rule of Agritile and the other ancients, which teaches us to expect nothing ingenious and delightful from the Horace elixers. His odes, epodes, and epigrams, have been thought not inferior to those of the finest wits of Greece and Rome. Dr Watts has translated one or two of his small pieces, which are added to his Lyric Poems. He died at Warsaw in 1640, aged 43. There have been many editions of his poems, the best of which is that of Paris, 1759.

CASING of TIMBER-WORK, among builders, is the plastering the house all over the outside with mortar, and then flaking it while wet by a ruler, with the corner of a trowel, to make it resemble the joints of free-stone. Some direct it to be done upon heart-laths, because the mortar would, in a little time, decay the sap-laths; and to lay on the mortar in two thicknesses, viz. a second before the first is dry.

CASK, a piece of defensive armour with which to cover the head and neck; otherwise called the head-piece and helmet. The word is French, casque, from caisse, a diminutive of capis a helmet. Le Gentille observes, that anciently, in France, the gens d'armes all wore casques. The king wore a casque gilt; the dukes and counts silvered; gentlemen of extraction polished steel; and the rest plain iron.

The cask is frequently seen on ancient medals, where we may observe great varieties in the form and fashion thereof; as the Greek fashion, the Roman fashion, &c. F. Joubert makes it the most ancient of all the coverings of the head, as well as the most universal. Kings, emperors, and even gods themselves, are seen therewith. That which covers the head of Rome has usually two wings like those of Mercury: and that of some kings is furnished with horns like those of Jupiter Ammon; and sometimes barely bulls or rams horns, to express uncommon force.

CASK, in heraldry, the same with helmet. See HERALDRY, No. 45.

CASK, a vessel of capacity, for preserving liquors of divers kinds; and sometimes also dry goods, as sugar, almonds, &c. A cask of sugar is a barrel of that commodity, containing from eight to eleven hundred weight. A cask of almonds is about three hundred weight.

CASKET, in a general sense, a little cofier or cabinet. See CABINET.

CASKETS, in the iea language, are small ropes made of sinnet, and fastened to gromets, or little rings upon the yards; their use is to make fast the fall to the yard when it is to be furled.

CASLON, (William) eminent in an art of the greatest consequence to literature, the art of lettering, was born in 1609, in that part of the town of Hale Owen which is situated in Shropshire. The king justly attained the character of being the Coryphaeus in that employment, he was not brought up to the busines; and it is observed by Mr Mores, that this handy-work is so concealed among the artificers of it, that he could not discover that any one had taught it to another, but every person who had used it had learned it of his own genuine inclination. Mr Caflon served a regular apprenticeship to an engraver of ornaments on gun-barrels; and after the expiration of his term, carried on this trade in Vine-street, near the Minories. He did not, however, solely confine his ingenuity to that instrument; but employed himself likewise in making tools for the book-binders, and for the chasing of silver plate. Whilft he was engaged in this busines, the elder Mr Bowyer accidentally saw, in a bookbeller's shop, the lettering of a book uncommonly neat; and enquiring who the artist was by whom the letters were made, was hence induced to seek an acquaintance with Mr Caflon. Not long after, Mr Bowyer took Mr Caflon to Mr James's foundery, in Bartholomew-cloke. Caflon had never before that time seen any part of the busines; and being asked by his friend, if he thought he could undertake to cut types, he
he requested a single day to consider the matter, and then replied that he had no doubt but he could. Upon this answer, Mr Bowyer, Mr Bettenham and Mr Watts had such a confidence in his abilities, that they lent him £500 to begin the undertaking, and he applied himself to it with equal affiduity and success. In 1720, the society for promoting Christian knowledge, in consequence of a representation from Mr Solomon Negri, a native of Damascus in Syria, who was well skilled in the Oriental tongues, and had been professor of Arabic in places of note, deemed it expedient to print, for the use of the Eastern churches, the New Testament and Psalter in the Arabic language. These were intended for the benefit of the poor Christians in Palestine, Syria, Mesopotamia, Arabia, and Egypt, the constitution of which countries did not permit the exercise of the art of printing. Upon this occasion Mr Cahan was pitched upon to cut the font; in his specimens of which he distinguished it by the name of English Arabic. Under the farther encouragement of Mr Bowyer, Mr Bettenham, and Mr Watts, he proceeded with vigour in his employment; and he arrived at length to such perfection, that he not only freed England from the necessity of importing types from Holland, but in the beauty and elegance of those made by him he so far exceeded the productions of the best artificers, that his workmanship was frequently exported to the Continent. In this manner he became, in process of time, the most capital one that existed in that or in any other country. Having acquired opulence in the course of his employment, he was put into the commission of the peace for the county of Middlesex. Towards the latter end of his life, his eldest son being in partnership with him, he retired in a great measure from the active execution of business. His death happened in January 1766.

CASP. [224]  

Cipjan.

Caspian.

Caspian Sea, a large lake of salt water in Asia, bounded by the province of Atrakhan on the north, and by part of Persia on the south, east, and west. It is upwards of 400 miles long from north to south, and 300 broad from east to west. This sea forms several gulfs, and embraces between Atrakhan and Astrabad an incredible number of small islands. Its bottom is mud, but sometimes mixed with shells. At the distance of some German miles from land it is 500 fathoms deep; but on approaching the shore it is every where so shallow, that the smallest vessels, if loaded, are obliged to remain at a distance.

When we consider that the Caspian is inclosed on all sides by land, and that its banks are in the neighbourhood of very high mountains, we easily see why the navigation in it should be perfectly different from that in every other sea. There are certain winds that dominate over it; with such absolute sway, that vessels are often deprived of every resource; and in the whole extent of it there is not a port that can truly be called safe. The north, north-east, and east winds, blow most frequently, and occasion the most violent tempests. Along the eastern shore the east winds prevail; for which reason vessels bound from Persia to Atrakhan always direct their course along this shore.

Although the extent of the Caspian Sea is immense, the variety of its productions is exceedingly small. This undoubtedly proceeds from its want of communication with the ocean, which cannot impart to it any portion of its inexhaustible stores. But the animals which this lake nourishes multiply to such a degree, that the Russians, who alone are in condition to make them turn to account, justly consider them as a never failing source of profit and wealth. It will be understood that we speak of the fish of the Caspian and of its fisheries, which make the sole occupation and principal trade of the people inhabiting the banks of the Wolga and of the Yaik. This business is distinguished into the great and lesser fisheries. The fish comprehended under the first division, such as the flurgeon and others, abound in all parts of the Caspian as well as in the rivers that communicate with it, and which ascend at spawning-time. The small fishes, such as the salmon and many others, observe the general law of quitting the salt waters for the fresh, nor is there an instance of one of them remaining constantly in the sea.

Seals are the only quadrupeds that inhabit the Caspian; but they are there in such numbers as to afford the means of subsistence to many people in that country as well as in Greenland. The varieties of the species are numerous, diversified, however, only by the colour. Some are quite black, others quite white; there are some whith, some yellowish, some of a mouse-colour; and some streaked like a tiger. They crawl by means of their fore-feet upon the islands, where they become the prey of the common and the men who kill them with long clubs. As soon as one is dispatched, he is succeeded by several who come to the assistance of their unhappy companion, but come only to share his fate. They are exceedingly tenacious of life, and endure more than thirty hard blows before they die. They will even live for several days after having received many mortal wounds. They are most terrified by fire and smoke; and as soon as they perceive them, retreat with the utmost expedition to the sea. These animals grow to very fat, that they look rather like oil-bags than animals. At Atrakhan is made a sort of grey soup with their fat mixed with pot-sauce, which is much valued for its property of cleansing and taking grease from woolen stuffs. The greatest numbers of them are killed in spring and autumn. Many small vessels go from Atrakhan merely to catch seals.

If the Caspian has few quadrupeds, it has in proportion full fewer of those natural productions which are looked upon as proper only to the sea. There have never been found in it any zoophytes, nor any animal of the order of molusca. The fame may almost be said of shellfish; the only ones found being three or four species of cockle, the common mussel, some species of flails, and one or two others.

But to compensate this deficiency, it abounds in birds of different kinds. Of those that frequent the shores there are many species of the goose and duck kind, of the flork and heron, and many others of the wader tribe. Of birds properly aquatic, it contains the grebe, the crested dived, the pelican, the cormorant, and almost every species of gull. Crows are so fond of fish, that they haunt the shores of the Caspian in prodigious multitudes.

The waters of this lake are very impure, the great numbers of rivers that run into it, and the nature of its bottom, affecting it greatly. It is true, that in general the waters are salt; but though the whole western shore extends...
Caspian. extends from the 46th to the 33rd degree of north latitude, and though one might conclude from analogy that these waters would contain a great deal of salt, yet experiments prove the contrary: and it is certain that the saltiness of this sea is diminished by the north, north-east, and north-west winds; although we may fairly conclude, that it owes its saltiness to the mines of salt which lie along its two banks, and which are either already known or will be known to posterity. The depth of these waters also diminishes gradually as you approach the mouth of the river; and the saltiness in the same way grows less in proportion to their proximity to the land, the north winds not unfrequently causing the rivers to discharge into it vast quantities of troubled water impregnated with clay. These variations which the sea is exposed to are more or less considerable according to the nature of the winds; they affect the colour of the river waters to a certain distance from the shore, till these mixing with those of the sea, which then assume the saltiness, the fine green colour appears, which is natural to the ocean, and to which those of water that are impregnated with naphtha. It is well known, that besides its salt taste, all seawater has a sensible bitterness, which must be attributed not only to the salt itself, but to the mixture of different substances that unite with it, particularly to different sorts of alum, the ordinary effect of different combinations of acids. Besides this, the waters of the Caspian have another taste, bitter too, but quite different, which affects the tongue with an impression similar to that made by the bile of animals; a property which is peculiar to this sea, though not equally sensible at all seasons. When the north and north-west winds have raged for a considerable time, this bitter taste is sensibly felt; but when the wind has been south, very imperfectly. We shall endeavour to account for this phenomenon.

The Caspian is surrounded on its western side by the mountains of Caucasus, which extend from Derbent to the Black Sea. These mountains make a curve near Afrakhan, and directing their course towards the eastern shore of the Caspian, lose themselves near the mouth of the Jâf, where they become secondary mountains, being disposed in strata. As Caucasus is an inexhaustible magazine of combustible substances, it consequently lodges an astonishing quantity of metals in its bowels. Accordingly, along the foot of this immense chain of mountains, we sometimes meet with hot springs, sometimes springs of naphtha of different quality; sometimes we find native sulphur, mines of vitriol, or lakes heated by internal fires. Now the foot of mount Caucasus forming the immediate western shore of the Caspian Sea, it is very easy to imagine that a great quantity of the constituent parts of the former must be communicated to the latter: but it is chiefly to the naphtha, which abounds so much in the countries which surround this sea, that we must attribute the true cause of the bitterness peculiar to its waters; for it is certain that this bitumen flows from the mountains, sometimes in all its purity, and sometimes mixed with other substances which it acquires in its passage through subterranean channels, from the most inferior parts of these mountains to the sea, where it falls to the bottom by its specific gravity. It is certain too, that the north and north-west winds doth the greatest quantities of this naphtha; whence it is evident that the bitter taste must be most sensible when these winds prevail. We may also conjecture why this sea is not so strong at the surface as in the neighbourhood of the shore, the waters there being less impregnated with salt, and the naphtha which is united with the water by the salt, being then either carrried to a distance by the winds or precipitated to the bottom.

But it is not a bitter taste alone that the naphtha communicates to the waters of the Caspian: these waters were analysed by M. Gmelin, and found to contain, besides the common sea-salt, a considerable proportion of Glauber-salt, intimately united with the former, and which is evidently a production of the naphtha.

As the waters of the Caspian have no outlet, they are dischargeth by subterranean canals through the earth, where they deposit beds of salt; the surface of which corresponds with that of the sea. The two great deferts which extend from it to the exit as well as well off the banks of a fine earth, in which the salt is formed by efflorefcence into regular crystals; for which reason salt showers and dew are exceedingly common in that neighbourhood. The salt of the marshes at Afrakhan, and that found in efflorefcence in the deserts, is by no means pure sea-salt, but much debased by the bitter Glauber salt we mentioned above. In many places indeed it is found with crystals of a lozenge shape, which is peculiar to it, without any cubical appearance, the form peculiar to crystals of sea-salt.

A great deal has been written on the successive augmentation and decrease of the Caspian sea, but with little truth. There is indeed to be perceived in it a certain rise and fall of its waters; in which, however, no observation has ever discovered any regularity.

Many, suppose (and there are strong presumptions in favour of the supposition), that the shores of the Caspian were much more extensive in ancient times than they are at present, and that it once communicated with the Black Sea. It is probable too, that the level of this last sea was once much higher than it is at present. If then it be allowed, that the waters of the Black Sea, before it procured an exit by the Straits of Constaninople, rose several fathoms above their present level, which from many concuring circumstances may easily be admitted, it will follow, that all the plains, of the Crimea, of the Kuman, of the Wolga, and of the Jâf, and those of Great Tartary beyond the lake of Arat, in ancient times formed but one sea, which embraced the northern extremity of Caucasus by a narrow strait of little depth; the vellites of which are still obvious in the river Manych.
Cassander, determined to obtain their portraits, because in that branch he excelled beyond competition. The Grand Duke of Tuscany, who was an excellent judge of merit in all professions, and as liberal an encourager of it, invited Niccolò to his court; and he there painted the portraits of that prince and the princes Violante his consort. Those performances procured him uncommon applause, as well as a noble gratitude, and he was employed and carried by the principal nobility of Florence. Besides several historical subjects painted by this master while he resided in that city, one was a very capital design: The subject of it was the Conspicuity of Catiline; it consisted of nine figures as large as life, down to the knees; and the two principal figures were represented as with one hand joined in the presence of their companions, and in their other hand holding a cup of blood. Some of the English nobility on their travels sat to him for their portraits; and to paint her portrait; in which he succeeded so marks of favour and honour; but he had not the time, dying in London, universally regretted, in the 19th year of his reign.

Cassandra, in fabulous history, the daughter of Priam and Hecuba, was beloved of Apollo, who promised to bellow on her the spirit of prophecy, provided she would consent to his love. Cassandra seemed to accept the proposal; but had no sooner obtained that gift, than she laughed at the temple, and broke her word. Apollo, being enraged, avenged himself by causing no credit to be given to her predictions; hence she in vain prophesied the ruin of Troy. Ajax, the son of Oileus, having ravished her in the temple of Minerva, he was struck with thunder. She fell into the hands of Agamemnon, who loved her to distraction; but in vain did she predict that he would be assassinated in his own country. He was killed, with her, by the intrigues of Clytemnestra; but their death was avenged by Orestes.

Casano, a town of Italy in the duchy of Milan, rendered remarkable by an obstinate battle fought there between the Germans and French in 1705. It is subject to the Hous of Austria, and is seated on the river Adda. In E. Long. 10. 10. N. Lat. 45. 20. Casano, a town of Italy in Calabria citerior, in the kingdom of Naples, with a bishop's see. E. Long. 16. 20. N. Lat. 39. 55. Cassavi, or Cassada. See Jatropha.

Cassel, a town of French Flanders, and capital of a chatelany of the same name: It is seated on a mountain, where the terrace of the castle is full to be seen; and from whence there is one of the finest prospects in the world; for one may see no less than 32 towns, with a great extent of the sea, from whence it is distant 15 miles. E. Long. 2. 27. N. Lat. 50. 48. Cassel, the capital city of the landgrave of Hesse-cassel, in the circle of the Upper Rhine in Germany; (see Hesse-cassel). It is divided into the Old, New, and High towns. The New Town is built, the houses being of stone, and the streets broad. The houses of the Old Town, which is within the walls, are mostly of timber; but the streets are broad, and the market-places spacious. The place is strongly fortified, but the fortifications are not regular. It contains about 32,000 inhabitants, of whom a great proportion are French Protestants. Thence have established
CASSIA, in botany: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 33rd order, *Lomertiae.* The calyx is pentaphyllous; petals five; anther three upper, three lower; three-beaked; a legnorium plant. There are 30 species, all of them natives of warm climates. The most remarkable are:

1. The filla or purging cassia of Alexandria. It is a native of Egypt and both Indies, where it rises to the height of 40 or 50 feet, with a large trunk, divided into many branches, garnished with winged leaves, composed of five pairs of fjer-shaped lobes, which are smooth, having many transverse nerves from the midrib to the border. The flowers are produced in long spikes at the end of the branches, each standing upon a pretty long footstalk; these are composed, like the former, of fine yellow concave petals, which are succeeded by cylindrical pods from one to two feet long, with a dark brown woody shell, having a longitudinal seam on one side, divided into many cells by transverse partitions, each containing one or two oval, smooth, compressed seeds, lodged in a blackish pulp, which is used in medicine. There are two sorts of this drug in the shops; one brought from the Easft Indies, the other from the Orient; the canes or pods of the latter are generally large, rough, thick-rinded, and the pulp nauseous; those of the former are less, smoother, the pulp blacker, and of a sweeter taste; this is preferred to the other. Such pods should be choosen as are weighty, new, and do not make a rattling noise (from the seeds being loose within them) when shaken. The pulp should be of a bright shining black colour, and a sweet taste, not harsh, which happens from the fruit being gathered before it has grown fully ripe, or fouriyr, which it is apt to turn upon keeping: it should neither be very dry nor very moist, nor at all mouldy; which, from its being kept in damp cellars or moistened, in order to increase its weight, it is very subject to be. Greatest part of the pulp dissolves both in water and in rectified spirit, and may be extracted from the cane by either. The shops employ water, boiling the bruised pod therein, and afterwards evaporating the solution to a due consistence. This pulp is a gentle laxative medicine, and frequently given in a dose of some drams, in collyve habits. Some direct a dose of two ounces or more as a cathartic, in inflammatory cases, where the more acid purgatives have no place: but in these large quantities it generally nauseates the stomach, produces flatulencies, and sometimes gripings of the bowels; especially if the cassia be not of a very good kind: these effects may be prevented by the addition of aromatics, and exhibiting it in a liquid form. Geoffroy says, it does excellent service in the painful tension of the belly, which sometimes follows the imprudent use of antimoniculz; and that it may be advantageously united with the more acid purgatives, or antimonic emetics, or employed to abate their force. Vallesfreri relates that the purgative virtue of this medicine is remarkably promoted by manna; that a mixture of four drams of cassia, and two of manna, purges as much as twelve drams of cassia or thirty-two of manna alone. Severtius observes, that the urine is apt to be turned of a green colour by the use of cassia: and sometimes, where a large quantity has been taken, blackish. This drug gives name to an officinal electuary, and is an ingredient also in another.

2. The cassia fennia is a shrubby plant cultivated in Persia, Syria, and Arabia, for the leaves, which form a considerable article of commerce. They are of an oblong figure, sharp-pointed at the ends, about a quarter of an inch broad, and not a full inch in length, of a lively yellowish green colour, a faint not very disagreeable smell, and a fishescr, bitterish, nauseous taste. They are brought from the above places, dried and picked from the stalks, to Alexandria in Egypt, and thence imported into Europe. Some inferior sorts are brought from Tripoli and other places; these may easily be distinguished by their being either narrower, longer, and sharper pointed; or larger, broader, and round pointed, with small prominent veins; or large and obtuse, of a fresh green colour, without any yellow cast. Senna is a very useful cathartic, operating mildly, and yet effectually; and, if judiciously doled and managed, rarely occasioning the ill consequences which too frequently follow the exhibition of the stronger purges. The only inconveniences complained of in this drug are, its being apt to gripe, and its nauseous smell. The gripping quality depends upon a resinous substance, which, like the other bodies of this class, is naturally disposed to adhere to the coats of the intestines. The more this resin is divided by such matters as take off its tenacity, the less adhesive, and consequently the less irritating and gripping it will prove; and the less it is divided, the more gripping; hence senna given by itself, or infusions made in a very small quantity of fluid, gripe severely, and purge less than when diluted by a large portion of suitable menstruum, or divided by mixing the infusion with oily emulsions. The ill flavour of this drug is said to be abated by the addition of water-spirit; but we cannot conceive that this plant, whose smell is manifestly fecid and the taste nauseous and bitter, can at all improve those of senna; others recommend bohea tea, though neither has this any considerable effect. The smell of senna resists in its most volatile parts, and may be discharged by lightly boiling infusions of it made in water: the liquor thus freed from the peculiar flavour of the senna, may be easily rendered grateful to the taste, by the addition of any proper aromatic tincture or distilled water. The colleges both of London and Edinburgh have given several formulae for the exhibition of this article, such as those of infusion, powder, tincture, and electuary. The dose of senna in infusorion, is from a scruple to a dram; in infusion, from one to three or four drams. It has been customary to reject the peculics of the leaves of senna as of little or no use: Geoffroy however observes, that they are not much inferior in efficacy to the leaves themselves. The pods or seed vessels met with among the senna brought to us, are by the college of Brulmofer preferred to the leaves: they are less apt to gripe, but proportionately less purgative. 

CASSIA-Ligneæ. See LAURUS.
CASSIA, in botany. SCUTELARIA.
CASSIDA, in zoology, a genus of insects belonging to the class of Lepidoptera.
Plate CXVI.

CASMER, or Casmer, the name of a thin tweed woolen cloth, much in fashion for summer use.

CASSIMIRE or Cashmere. See Cashmere.

Cassine, in botany: A genus of the trigynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 23d order, Duflofæ. The calyx is quinquepartite; the petals are five; and the fruit is a triferpermous berry. There are three species, all of them natives of warm climates.

Of these the most remarkable is the yapon, which is a native of the maritime parts of Virginia and Carolina. It rises to the height of ten or twelve feet, having out branches from the ground upward, garnished with spear shaped leaves placed alternately, which continue green through the year. The flowers are produced in close whorls round the branches, at the footstalks of the leaves; they are white, and divided into five parts, almost to the bottom. The berries are of a beautiful red colour, and as they continue most part of the winter upon the plants without being touched by the birds, we may reasonably conclude that they are polldied of a poisonous quality; as few of the wholesome innocent fruits escape their depredations. The Indians, however, have a great veneration for this plant, and at certain seasons of the year come in great numbers to fetch away the leaves. On such occasions their usual custom, says Miller, is to make fire upon the ground, and, putting on it a great kettle full of water, they throw in a large quantity of yapon leaves; and when the water has boiled sufficiently, they drink large draughts of the decoction out of the kettle; which seldom fails to vomit them very feverishly. In this manner, however, they continue drinking and vomiting for three days together, until they imagine themselves sufficiently cleansed; they then gather every one a bundle of the shrub, and carry it home with them.—In the operation of these leaves by vomiting, those who have tasted of them say, that there is no nausea feintation or pain. The matter discharging comes away in a full stream by the mouth, without any violence, or so much as dispoing the patient to reach, or decline his head. The Spaniards who live near the gold mines of Peru, are frequently obliged to drink an infusion of this herb in order to moisten their breaths; without which they are liable to a sort of suffocation, from the strong metallic exhalations that are continually proceeding from the mines. In Paraguay, the Jesuits make a great revenue by importing the leaves of this plant into many countries under the name of Paraguay or South-sea tea, which is drunk in the same manner as that of China or Japan is with us. It is with difficulty preserved in England.

Cassini, Johannes Dominicus) a most excellent astronomer, born at Piedmont, in 1652. His early proficiency in astronomy procured him an invitation to be mathematical professor at Bologna when he was no more than 15 years of age; and a comet appearing in 1652, he discovered that comets were not accidental meteors, but of the same nature, and probably governed by the same laws, as the planets. In the same year he solved a problem given up by Kepler and Bullialdus as insolvable, which was, to determine geometrically the apogee and eccentricity of a planet from its true and mean place. In 1665, he was appointed inspector-general of the fortifications of the castle of Urbino, and had afterwards the care of all the rivers in the ecclesiastical state: he still however prosecuted his astronomical studies, by discovering the revolution of Mars round his own axis; and, in 1666, published his theory of Jupiter's satellites. Cassini was invited into France by Louis XIV. in 1669, where he settled as the first professor in the royal observatory. In 1672, he demonstrated the line of Jupiter's diurnal rotation; and in 1689, discovered four more satellites belonging to Saturn, Huygens having found one before. He inhabited the royal observatory at Paris more than forty years; and when he died in 1712, was succeeded by his own son James Cassini.

Cassiodorus, (Marcus Aurelius) secretary of state to Theodoric king of the Goths, was born at Squillace, in the kingdom of Naples, about the year 470. He was conful in 514, and was in great credit under the reigns of Athalaric and Vitiges; but at seventy years of age retired into a monastery in Calabria, where he amused himself in making fun-dials, water hour-glasses, and perpetual lamps. He also formed a library; and composed several works, the best edition of which is that of father Garret, printed at Rome in 1679. Those most esteemed are his Divine Institutions, and his Treatise on the Soul. He died about the year 622.

Cassiopeia, in fabulous history, wife to Cepheus king of Ethiopia, and mother of Andromeda. She thought herself more beautiful than the Nereides, who desired Neptune to revenge the affront; so that he sent a sea-monster into the country, which did much harm. To appease the god, her daughter Andromeda was exposed to the monster, but was rescued by Perseus; who obtained of Jupiter, that Cassiopeia might be placed after his death among the stars: hence the constellation of that name.

Cassiopeia, in astronomy, one of the constellations of the northern hemisphere, situated next to Cepheus. In 1672, there appeared a new star in this constellation, which first surpassed in magnitude and brightness Jupiter himself; but it diminished by degrees, and at last disappeared at the end of eighteen months. It alarmed all the astronomers of that age, many of whom wrote dissertations on it; among the rest Tycho Brahe, Kepler, Maurolycus, Lyceus, Gramineus, &c. Beza, the landgrave of Hesse, Kofa, &c. wrote to prove it a comet, and the same which appeared to the Magi at
CASSUARIO, a town of India, in Afa, situated on the river Gangas, in the province of Bengal. E. Long. 87, and N. Lat. 24. 

CAST, is peculiarly used to denote a figure or small flane of bronze. See Bronze. 

CAST, among the founders, is applied to tubes of wax fitted in divers parts of a mould of the same matter; by means of which, when the wax of the mould is removed, the melted metal is conveyed into all the parts which the wax before policed. 

CAST, also denotes a cylindrical piece of brass or copper, slit in two, lengthwise, used by the founders in foundry, to form a canal or conduit in their moulds, whereby the metal may be conveyed to the different pieces intended to be cast. 

CAST, among plumbers, denotes a little brass funnel at one end of a mould, for casting pipes without soldering, by means of which the melted metal is poured into the mould. 

CAST, or Caff, in speaking of the eastern affairs, denotes a tribe, or number of families, of the same rank and profession. The division of a nation into casts chiefly obtains in the dominions of the Great Mogul, kingdom of Bengal, island of Ceylon, and the great peninsula opposite thereto. In each of these there are, according to father Martin, four principal casts, viz. the cast of the baniins, which is the first and most noble; the cast of the rajas, or princes, who pretend to be defended from divers royal families; the cast of the choutres, which comprehends all the artificers; and that of the parias, the lowest and most contemptible of all: though Henry Lord, it must be observed, divides the Indians about Surat into four casts, somewhat differently from Martin, viz. into brahins, or priests; cuttay, or soldiers; shuddary, which we call baniins, or merchants; and wafe, the mechanics or artificers. Every art and trade is confined to its proper cast, nor is allowed to be exercised by any but those whose fathers professed the same. So that a tailor's son can never rise to be a painter, nor a painter's son fall to be a tailor; though there are some employments that are proper to all the casts, e.g. every body may be a soldier, or a merchant. There are also divers casts which are allowed to till the ground, but not all. The cast of parias is held infamous, so much so that it is a disgrace to have any dealings or conversation with them; and there are some trades in the cast of choutres, which debase their professors almost to the same rank. Thus shoemakers, and all artificers in leather, as also fishermen, and even shepherds, are reputed no better than parias. 

CASTAGNO, (Andrea Dal) historical painter, was born at a small village called Castagno, belonging to the territory of Tuscany, in 1469; and being deprived of his parents, was employed by his uncle to attend the herds of cattle in the fields; but, having accidentally seen an ordinary painter at work in the country, he obtained him for some time with surprize and attention, and afterwards made such efforts to imitate him, as astonished all who saw his productions. The extraordinary genius of Andrea became at last a common topic of discourse in Florence; and so far excited the curiosity of Bernardetto de Medici, that he sent for Andrea; and perceiving that he had promising talents, he placed him under the care of the best
CASTALIO, (Sebastian), was born at Chezillon, on the Rhone, in the year 1515. Calvin conceived such an esteem and friendship for him, during the stay he made at Strasbourg in 1540 and 1541, that he lodged him some days at his house, and procured him a regent's place in the college of Geneva. Castalio, after continuing in this office near three years, was forced to quit it in the year 1544, on account of some particular opinions which he held concerning Solomon's song, and Christ's descent into hell. He retired to Basel, where he made Greek professor, and died in that place in 1564, aged 48. He incurred the high displeasure of Calvin and Theodore Beza, for differing with them concerning predestination and the punishment of heretics. His works are very considerable both on account of their quality and number. In 1545, he printed at Basel four books of dialogues, containing the principal histories of the Bible in elegant Latin; so that youth might thereby make a proficiency in piety and in the Latin tongue at the same time. But his principal work is a Latin and French translation of the scriptures. He began the Latin translation at Geneva in 1542, and finished it at Basel in 1550. It was printed at Basel in 1551, and dedicated by the author to Edward VI. king of England. The French version was dedicated to Henry II. of France, and printed at Basel in 1555. The fault which has been most generally condemned in his Latin translation, is the affectation of using only classical terms.

CASTALENAS, CASTAGNETTES, or CASTANET-TAS, a kind of musical instrument, wherewith the Moors, Spaniards, and Bohemians, accompany their dances, farands, and guitars. It consists of two little round pieces of wood dried, and hollowed in manner of a spoon, the concavities whereof are placed on one another, fastened to the thumb, and beat from time to time with the middle finger, to direct their motion and cadences. The castanets may be beat either nine times in the space of one measure, or four times of a minute.

CASTANOVITZ, a town of Croatia, situated on the river Una, which divides Chriftendom from Turkey. E. Long. 17° 20'. N. Lat. 45° 40'. It is subject to the Houfe of Aultra.

CASTEL, (Lewis Betrand), a learned Jesuit, was born at Monpeller in 1688, and entered among the Jesuits in 1702. He studied polite literature in his youth; and at length applied himself entirely to the study of mathematics and natural philosophy. He distinguished himself by writing on gravity; the mathematics; and on the music of colours, a very whimsical idea, which he took great pains to reduce to practice. His piece on gravity, entitled Traité de la Penfateur universelle, was printed at Paris, in 1724. He afterwards published his Mathematique universelle; which occasioned his being unanimously chosen a fellow of the Royal Society of London, without the least solicitation. He was also a member of the academies of Bourdeaux and Rouen; but his Clefus oculaire made the most noise; and he spent much time and expence in making an harpsichord for the eye, but without success. He also wrote for and against Sir Isaac Newton, and published several other works; the principal of which are, Le Plan de l'Artabesque, and a treatise entitled Optique de Couleur. He led a very exemplary life, and died in 1757.

CASTELAMARA, a town of Italy, in the kingdom of Naples, and in the lither Principato, with a bishop's see and a good harbour. E. Long. 14° 25'. N. Lat. 41° 40'.

CASTEL-ARAGONESE, a strong town of Italy, in the island of Sardinia, with a bishop's see, and a good harbour. It is seated on the N.W. coast of the island, in E. Long. 8° 57'. N. Lat. 40° 56'.

CASTEL-BONDE, a town of Portugal, and capital of the province of Beira; seated on the river Lym, 32 miles N.W. of Alcantara. W. Long. 8° 0'. N. Lat. 39° 35'.

CASTEL-FOLIAT, a very small, but well-fortified frontier town of the Bolognese, in Italy, belonging to the Pope.

CASTEL-de-VIDE, a small strong town of Alentejo. It was taken by Philip V. W. Long. 6° 25'. N. Lat. 39° 15'.

CASTEL-FOLIAT, a town of Spain, in Catalonia, seated on an inaccessible eminence, between Gironne and Campredon,
CASTEL, (Bernard) an Italian painter, was born at Genoa, in 1557; and excelled in colouring and in portraits. He was the intimate friend of Tasso, and took upon himself the task of designing and etching the figures of his Jerusalem Delivered. He died at Genoa in 1629.

Valerio Castelli, one of his sons, was born at Genoa in 1625, and surpassed his father. He particularly excelled in painting battles; which he composed with spirit, and executed with so pleasing a variety, and so great freedom of hand, as gained him universal applause. His horses are admirably drawn, thrown into attitudes that are natural and becoming, full of motion, action, and life. In that style of painting he showed all the fire of Tintoretto, united with the fine taste of composition of Paolo Veronese. He died in 1659. The works of this master are not very frequent; but they are deservedly held in very high esteem. It is believed that a greater number of his easel pictures are in the collections of the nobility and gentry of England, than in any other part of Europe.

CASTELLORUM OPERATIO, castle-work, or service and labour done by inferior tenants for the building and upholding of castles of defence; towards which some gave personal assistance, and others paid their contributions. This was one of the three necessary charges to which all lands among the Anglo-Saxons were expressly subject.

CASTELVETRO, (Lewis) a native of Modena, of the 16th century, famous for his Comment on Ariosto’s Poetics. He was prosecuted by the inquisition for a certain book of Melanthon, which he had translated into Italian. He retired to Baill, where he died.

CASTIGATION, among the Romans, the punishment of an offender by blows, or beating with a wand or switch. Castigation was chiefly a military punishment; the power of inflicting which on the foldiery was given to the tribunes. Some make it of two kinds; one is called flagellation; the other with rods, called flagellatio: the latter was the most dishonourable.

CASTIGATORY for SCOLDS. A woman indicted for being a common scold, if convicted, shall be placed in a certain engine of correction, called the trebucke, castigator, or cucking-flood; which, in the Saxon language, signifies the folding-flood; though now it is frequently corrupted into the ducking-flood; because the residue of the judgment is, that, when she is placed therein, she shall be plunged in water for her punishment.

CASTIGLIONE, (Giovanni Benedetto) a celebrated painter, was born at Genoa in 1616. His first master was Gio-Battista Paggi. Afterwards he studied under Andrea Ferrari; and lastly perfected himself from the instructions of Anthony Van Dyke, who at that time resided at Genoa. He painted portraits, historical pieces, landscapes, and castles: in the latter of which he is said chiefly to have excelled; as also in fairs, markets, and all kinds of rural scenes. By this master we have also a great number of etchings, which are all spirited, free, and full of taste. The effect is, in general, powerful and pleasing; and many of them have a more harmonized and finished appearance, than is usual from the
CASTILGIONI, the point, to little assisted by the graver. His drawing of the naked figure, though by no means correct, is notwithstanding managed in a style that indicates the hand of the master.

His son, Francesco, was bred under himself, and excelled in the same subjects; and it is thought that many good paintings which are ascribed to Benedetto, and a fresco that has been seen at Palma, or in modern collections, are copies after his by his son Francesco, or perhaps originals of the younger Castiglione.

CASTIGLIONE, a small, but strong town of Italy, in Mantua, with a castle. It was taken by the Germans in 1701, and the French defeated the Imperialists near it in 1706. E. Long. 10. 29. N. Lat. 43° 23'.

CASTIGLIONI, (Balthazar) an eminent Italian nobleman, descended from an illustrious and ancient family, and born at his own villa at Calémino in the duchy of Milan in 1478. He studied painting, sculpture, and architecture, as appears from a book he wrote in favour of these arts; and excelled so much in these that Raphael Urbino, and Buonaroti, though incomparable artists, never thought their works complete without the approbation of Count Castiglione. When he was 26 years of age, Guido Ubaldo, Duke of Urbino, sent him ambassador to Pope Julius II. He was sent upon a second embassy to Louis XII. of France, and upon a third to Henry VII. of England. After he had dispatched his business here, he returned, and began his celebrated work intitled the Courrier; which he completed at Rome in 1516. This work is full of moral and political instruction; and if we seek for the Italian tongue in perfection, it is said to be no where better found than in this performance. A version of this work, together with the original Italian, was published at London in 1727, by A. P. Castiglione, a gentleman of the family, who resided there under the patronage of Dr Gibson bishop of London. Count Castiglione was sent by Clement VII. to the court of the Emperor Charles V. in quality of legate, and died at Toledo in 1529.

CASTILE, (New) or THE KINGDOM OF TOLEDO, a province of Spain, bounded on the north by Old Castile, on the east by the kingdoms of Aragon and Valencia, on the south by that of Murcia and Andalusia, and on the west by the kingdom of Leon. It is divided into three parts; Aragon to the north, Mancha to the east, and Sierra to the south. Madrid is the capital. Both these provinces are very well watered with rivers, and the air is generally pure and healthy; but the land is mountainous, dry, and uncultivated, through the laziness of the inhabitants. The north part produces fruits and wine, and the south good pithers and fine wool. These provinces are divided by a long chain of mountains, which run from east to west.

CASTLE, (Old) a province of Spain, with the title of a kingdom. It is about 192 miles in length, and 115 in breadth; bounded on the south by New Castile, on the east by Aragon and Navarre, on the north by Biscay and Atbara, and on the west by the kingdom of Leon and Galicia. Castille de Oro, a large and fertile country in South America, lying to the west of Oroonoko. It comprehends eight governments; viz. Terra Firma,
Casting. calt or mold thus formed may be taken off from the subject entire.

When the model or original subject is of a round or erect form, a different method must be pursued; and the mold must be divided into several pieces: or, if the subject consists of detached and projecting parts, it is frequently most expedient to cast such parts separately, and afterwards join them together.

Where the original subject or mold forms a round, or spherial, or any part of such round or spherial, more than one half the plaster must be used without any frame to keep it round the model; and must be tempered with water to such a consistence, that it may be wrought with the hand like very soft paste; but though it must not be so fluid as when prepared for flat figured models, it must yet be as moist as is compatible with its cohering sufficiently to hold together; and being thus prepared, it must be put upon the model, and compreded with the hand, or any flat instrument, that the parts of it may adapt themselves in the most perfect manner, to those of the subject, as well as be compact with respect to themselves. When the model is so covered to a convenient thickness, the whole must be left at rest till the plaster be set and firm, so as to bear dividing without falling to pieces, or being liable to pull out of its form by flight violence; and it must then be divided into pieces, in order to its being taken off from the model, by cutting it with a knife with a very thin blade; and being divided, must be cautiously taken off, and kept till dry; but it must be always carefully observed, before the separation of the parts be made, to snatch them crofs the joints, or lines of the division, at proper distances, that they may with safety and certainty be properly conjoined again; which would be much more precarious and troublesome without such directive marks. The art of properly dividing the molds, in order to make them separate from the model, requires more dexterity and skill than any other thing in the art of casting; and does not admit of rules for the most advantageous conduct of it in every case. Where the subject is of a round or spherial form, it is best to divide the mold into three parts, which will then easily come off from the model; and the same will hold good of a cylinder, or any regular curve figure.

The mold being thus formed, and dry, and the parts put together, it must be first greased, and placed in such a position that the hollow may lie upwards, and then filled with plaster mixed with water, in the same proportion and manner as was directed for the casting the mold; and when the cast is perfectly set and dry, it must be taken out of the mold, and repaired where it is necessary; which finishes the operation.

This is all that is required with respect to subjects where the surfaces have the regularity abovementioned: but where they form curves which intersect each other, the conduct of the operation must be varied with respect to the manner of taking the cast of the mold from off the subject or model; and where there are long projecting parts, such as legs or arms, they should be wrought in separate casts. The operator may easily judge from the original subjects, what parts will come off together, and what require to be separated; the principle of the whole consisting only in this, that where under-workings, as they are called, occur, that is, wherever a straight line drawn from the bulge or inflection of any projection, would be cut or crooked, by any part of such projection, such part cannot be taken off without a division; which must be made either in the place where the projection would cross the straight line; or, as that is frequently difficult, the whole projection must be separated from the main body, and divided also lengthwise into two parts: and where there are no projections from the principal surfaces, but the body is so formed as to render the surface a composition of such curves, that a straight line being drawn parallel to the surface of one part would be cut by the outline, in one or more places, of another part, a division of the whole should be made, so as to reduce the parts of it into regular curves, which must then be treated as fixes.

In larger masses, where there would otherwise be a great thickness of the plaster, a corps or body may be put within the mold, in order to produce a hollow in the cast: which both saves the expense of the plaster, and renders the cast lighter.

This corps may be of wood, where the forming a hollow of a straight figure, or a conical one with the basis outward, will answer the end; but if the cavity require to be round, or of any curve figure, the corps cannot be then drawn while entire; and consequently should be of such matter as may be taken out piece-meal. In this case, the corps is best formed of clay; which must be worked upon wires to give it tenacity, and suspended in the hollow of the mold, by crossed wires lying over the mouth; and when the plaster is sufficiently set to bear handling, the clay must be picked out by a proper instrument.

Where it is desired to render the plaster harder, the water with which it is tempered should be mixed with parchement size properly prepared, which will make it very firm and tenacious.

In the same manner, figures, busts, &c. may be cast of lead, or any other metal, in the molds of plaster: only the expence of plaster, and the tediousness of its becoming sufficiently dry, when in a very large mass, to bear the heat of melted metal, renders the use of clay, compounded with some other proper materials, preferable where large subjects are in question. The clay, in this case, should be washed over till it be perfectly free from gravel or flones; and then mixed with a third or more of fine sand to prevent its cracking; or, instead of sand, coal-ashes sifted fine may be used. Whether plaster or clay be employed for the casting in metal, it is extremely necessary to have the mold perfectly dry; otherwise the moisture being rarified, will make an explosion that will blow the metal out of the mold, and endanger the operator, or at least crack the mold in such a manner as to frustrate the operation. Where the parts of a mold are larger, or project much, and consequently require a greater tenacity of the matter they are formed of to keep them together, flocks of cloth, prepared like those designed for paper-hangings, or fine cotton plucked or cut till it is very short, should be mixed with the ashes or sand before they are added to the clay to make the composition for the mold. The proportion should be according to the degree of cohesion required; but a small quantity will answer the end, if the other ingredients
of the composition be good, and the parts of the mold properly linked together by means of the wires above directed.

There is a method of taking casts in metals from small animals, and the parts of vegetables, which may be practiced for some purposes with advantage: particularly for the decorating grooves or rock-work, where nature is imitated. The proper kinds of animals are lizards, snakes, frogs, birds, or insects: the casts of which, if properly coloured, will be exact representations of the originals.

This is to be performed by the following method. A coffin or proper chest for forming the mold being prepared of clay, or four pieces of boards fixed together, the animal or parts of vegetables must be suspend

ed in it by a string; and the leaves, tendrils, or other detached parts of the vegetables, or the legs, wings, &c. of the animals, properly separated and adjusted in their right position by a small pair of pincers; a due quantity of plaster of Paris and calcined talc, in equal quantities, with some alum plumbum, must then be tempered with water to the proper confidence for casting; and the subject from whence the cast is to be taken, as also the sides of the coffin, moulded with spirit of wine. The coffin or chest must then be filled with the tempered composition of the plaster and talc, putting at the same time a piece of straight stick or wood to the principal part of the body of the subject, and pieces of thick wire to the extremities of the other parts, in order that they may form, when drawn out after the matter of the mold is properly set and firm, a channel for pouring in the melted metal, and vents for the air; which otherwise, by the rarefaction it would undergo from the heat of the metal, would blow it out or burst the mold. In a short time the plaster and talc will set and become hard, when the stick and wires may be drawn out, and the frame or coffin in which the mold was cast taken away; and the mold must then be put first into a moderate heat, and afterwards, when it is as dry as can be rendered by that degree, removed into a greater; which may be gradually increased till the whole be red-hot. The animal, or part of any vegetable, which was included in the mold, will then be burnt to a coal; and may be totally calcined to ashes, by blowing for some time gently into the channel and passages made for pouring in the metal, and giving vent to the air, which will, at the same time that it destroys the remainder of the animal or vegetable matter, blow out the ashes. The mold must then be suffered to cool gently; and will be perfect; the destruction of the substance of the animal or vegetable having produced a hollow of a figure correspondent to it: but it may be nevertheless proper to shake the mold, and turn it upside down, as also to blow with the bellows into each of the air-vents, in order to free it wholly from any remainder of the ashes; or, where there may be an opportunity of filling the hollow with quicksilver without expense, it will be found a very effectual method of clearing the cavity, as all dust, ashes, or small detached bodies will necessarily rise to the surface of the quicksilver, and be poured out with it. The mold being thus prepared, it must be heated very hot when used, if the cast be made with copper or brass: but a less degree will serve for lead or tin: and the matter being poured in, the mold must be gently struck, and then suffered to rest till it be cold: at which time it must be carefully taken from the cast, but without the least force; for such parts of the matter as appear to adhere more strongly, must be softened by soaking in water, till they are entirely loosened, that none of the more delicate parts of the cast may be broken off or bent.

Where the alum plumbum, or talc, cannot easily be procured, the plater may be used alone; but it is apt to be calcined by the heat used in burning the animal or vegetable from whence the cast is taken, and to become of too incohering and crumbly a texture; or, for cheapness, Sturbridge or any other good clay, washed over till it be perfectly fine, and mixed with an equal part of sand, and some clucks cut small, may be employed. Pounded pumice stone and plaster of Paris, taken in equal quantities, and mixed with washed clay in the same proportion, is said to make excellent molds for this and parallel uses.

Casts of metals, or such small pieces as are of a similar form, may be made in plater by the method directed for bars relieves.

Indeed there is nothing more required than to form a mold by laying them on a proper board; and having surrounded them by a rim made of a piece of a card, or any other pasteboard, to fill the rim with soft tempered plaster of Paris; which mould, when dry, will serve for several casts. It is nevertheless a better method to form the mold of melted sulphur; which will produce a sharper impression in the cast, and be more durable than those made of plaster.

The casts are likewise frequently made of sulphur, which being melted must be treated exactly in the same manner as the plaster.

For taking casts from medals, Dr Lewis recommends a mixture of flowers of brimstone and red lead: equal parts of these are to be put over the fire in a ladder, till they become to the confidence of paper; then they are kindled with a piece of paper, and stirred for some time. The vessel being afterwards covered close, and continued on the fire, the mixture grows fluid in a few minutes. It is then to be poured on the metal, previously oiled and wiped clean. The casts are very neat; their colour sometimes a pretty deep black, sometimes a dark grey: they are very durable; and when polished, may be washed clean in spirits of wine.

Dr Leston recommends tin-foil for taking off casts from metals. The thinnest kind is to be used. It should be laid over the subject from which the impression is to be taken, and then rubbed with a brush, the point of a skewer, or a pin, till it has perfectly received the impression. The tin-foil should now be pared close to the edge of the medal, till it is brought to the same circumference: the medal must then be reversed, and the tin-foil will drop off into a chip-box or mold placed ready to receive it. Thus the concave side of the foil will be uppermost, and upon this plater of Paris, prepared in the usual manner may be poured. When dry, the whole is to be taken out, and the tin-foil flickling on the plater will give a perfect representation of the medal, almost equal in beauty to silver. If the box or mold is a little larger than the medal, the plater running round the tin-foil will give the appearance of a white frame or circular border.
Califs, or piece of a familiar form; and having heated it red-hot, hold it over a vessel containing water, and touch it very slightly with a roll of sulphur, which will immediately dissolve it, and make it fall in drops into the water. As much iron as may be wanted being thus dissolved, pour the water out of the vessel, and pick out the drops formed by the melted iron from those of the sulphur, which contain little or no iron, and will be distinguishable from the other by their colour and weight. The iron will, by this means, be rendered fusible, so that it will run with less heat than is required to melt lead; and may be employed for making califs of medals, and many other such purposes, with great convenience and advantage.

Impressions of medals, having the same effect as califs, may be made also of inglafs glue, by the following means. Melt the stigglass, beaten, as when commonly used, in an earthen pipkin, with the addition of as much water as will cover it, stirring it gently till the whole is dissolved; then with a brush of camel’s hair, cover the medal, which should be previously well cleaned and warmed, and then laid horizontally on a board or table, greased in the part around the medal. Let them rest afterwards till the glue be properly hardened; and then, with a pin, raise the edge of it; and separate it carefully from the medal: the cast will be thus formed by the glue as hard as horn; and so light, that a thousand will scarcely weigh an ounce. In order to render the relief of the medal more apparent, a small quantity of carmine may be mixed with the melted inglafs; or the medal may be previously coated with leaf-gold by brushing on it, and then laying it on the leaf, which will by that means adhere to it; but the use of leaf-gold is apt to impair a little the sharpness of the impression.

Impressions of medals may be likewise taken in putty; but it should be the true kind made of calks of tin, and drying oil. These may be formed in the molds, previously taken in platter or sulphur; or molds may be made in its own substance, in the manner directed for those of the platter. These impressions will be very sharp and hard; but the greatest disadvantage that attends them, is their drying very slowly, and being liable in the mean time to be damaged.

Impressions of prints, or other engravings, may be taken from copper-plates, by cleaning them thoroughly, and pouring plaster upon them: but the effect in this way is not strong enough for the eye; and therefore the following method is preferable, where such impressions on platter are desired.

Take vermillion, or any other coloured pigment, finely powdered, and rub it over the plate: then pass a folded piece of paper, or the flat part of the hand, over the plate, to take off the colour from the lights or parts where there is no engraving: the proceeding must then be the same as where no colour is used. This last method is also applicable to the making of impressions of copper-plates on paper with dry colours: for the plate being prepared as here directed, and laid on the paper properly moistened, and either placed under the rolling-press, or any other way strongly forced down on the paper, an impression of the engraving will be obtained.

Impressions may be likewise taken from copper-plates, either on platter or paper, by means of the smoke of a candle or lamp: if, instead of rubbing them with any colour, the plate be held over the candle or lamp till the whole surface become black, and then wiped off by the flat of the hand, or paper.

These methods are not, however, of great use in the case of copper-plates, except where impressions may be desired on occasions where printing-ink cannot be procured: but as they may be applied likewise to the taking impressions from snuff-boxes, or other engraved subjects, by which means designs may be instantly borrowed by arists or curious persons, they may in such instances be very useful.

The expedient of taking impressions by the smoke of a candle or lamp may be employed also for botanical purposes in the case of leaves, as a perfect and durable representation of not only the general figure, but the contexture and disposition of the larger fibres, may be extemporaneously obtained at any time. The same may be nevertheless done in a more perfect manner, by the use of linseed oil, either alone, or mixed with a small proportion of colour, where the oil can be conveniently procured: but the other method is valuable in a considerable point of the being practicable at all times, and in all places, within the time that the leaves will keep fresh and plump. In taking these impressions, it is proper to bruise the leaves, so as to take off the projections of the large ribs, which might prevent the other parts from plying to the paper.

Leaves, as also the petals, or flower-leaves, of plants, may themselves be preferred on paper, with their original appearance, for a considerable length of time, by the following means.—Take a piece of paper, and rub it over with inglafs glue, treated as above directed for taking impressions from medals; and then lay the leaves in a proper position on the paper. The glue laid on the paper being fer, bruise over the leaves with more of the same; and that being dry likewise, the operation will be finished, and the leaves fix secured from the air and moisture, that they will retain their figure and colour much longer than by any other treatment.

Butterflies, or other small animals of a flat figure, may also be preferred in the same manner.

Casting of feathers is more properly called moulding orewing.

A horse casts his hair, or coat, at least once a-year, viz. in the spring when he casts his winter coat; and sometimes, at the close of autumn, he casts his summer coat, in case he has been ill kept. Horses also sometimes cast their hoofs, which happens frequently to coach-horses brought from Holland: these, being bred in a moist marshy country, have their hoofs too flabby: so that coming into a drier soil, and left juicy proven-
CASTLE, a fortefis, or place rendered defensible either by nature or art. It frequently signifies in Britisn the principal habitation of noblemen. In the time of Henry II., there were no less than 1155 caftles in England, each of which contained a monarch.

CASTLES, walled with flone, and designed for residence as well as defence, are, for the moft part, according to Mr Grote, of no higher antiquity than the conquest: for although the Saxons, Romans, and even, according to some writers on antiquity, the ancient Britons, had caftles built with flone; yet thefe were both few in number, and, at that period, through neglect or invasions, either destroyed, or so much decayed, that little more than their ruins were remaining. This is attested by many of the historians and antiquaries, and assigned as a reason for the facility with which William made himself master of that country.

This circumstance was not overlooked by so good a general as the Conqueror; who, effectually to guard against invasions from without, as well as to awe his newly acquired subjects, immediately began to erect castles all over the kingdom, and likewise to repair and augment the old ones. Besides, as he had parcelled out the lands of the English amongst his followers, they, to protect themselves from the refentment of those so defpoited, built strong holds and caftles on their estates. This likewise caused a considerable increase of these fortresses; and the turbulent and unsettled state of the kingdom in the succeeding reigns, served to multiply them prodigiously, every baron or leader of a party building castles; infomuch, that towards the latter end of the reign of King Stephen, they amounted to the almost incredible number of 1115.

As the feudal system gathered strength, these castles became the heads of baronies. Each caftle was a manor: and its feuitaire, owner, or governor, the lord of that manor. Markets and fairs were directed to be held there; not only to prevent frauds in the king’s duties or customs, but also as they were elected places where the laws of the land were observed, and as which had a very particular privilege. But this good order did not long last: for the lords of caftles began to arrogate to themselves a royal power, not only within their caftles, but likewise its environs; exercising judicature both civil and criminal, coin of money, and arbitrarily fixing forage and provision for the subsistence of their garrisons, which they afterwards demanded as a right: at length their infolence and oppression grew to such a pitch, that according to William of Newbury, “there were in England as many kings, or rather tyrants, as lords of caftles;” and Matthew Paris fays them, very real devils and dens of thieves.

Casts were not solely in the possession of the crown and the lay barons, but even bishops had these fortresses; though it seems to have been contrary to the canons, from a plea made use of in a general council, in favour of King Stephen, who had seized upon the strong caftles of the bishops of Lincoln and Salisbury. This prohibition (if such existed) was however very little regarded; as in the following reigns many strong places were held, and even defended, by the ecclesiastics: neither was more obedience afterwards paid to a decree made by the Pope at Viterbo, the fifth of the kalends of June 1220, wherein it was ordained, that no person in England should keep in his hands more than two of the king’s caftles.

The licentious behaviour of the garrisons of these places becoming insupportable, in the treaty between King Stephen and Henry II., when only duke of Normandy, it was agreed, that all the caftles built within a certain period should be demolished; in consequence of which many were actually razed, but not the number stipulated.

The few caftles in being under the Saxon government, were probably, on occasion of war or invasions, garrisoned by the national militia, and at other times lightly guarded by the domestics of the princes or great personages who resided therein; but after the conquest, when all the estates were converted into baronies held by knight’s service, caftle-guard coming under that denomination, was among the duties to which particular tenants were liable. From these services the bishops and abbots, who till the time of the Normans had held their lands in frank almoign, or free alms, were, by this new regulation, not exempted; they were not indeed, like the laity, obliged to personal service, it being sufficient that they provided fit and able perons to efficaciate in their stead. This was however at first stoutly opposed by Anfelm archbishop of Canterbury; who being obliged to find some knights to attend King William Rufus in his wars in Wales, complained of it as an innovation and infringement of the rights and immunities of the church.

It was no uncommon thing for the Conqueror and the kings of those days, to grant estates to men of approved fidelity and valour, on condition that they should perform castlegate in the royal caftles, with a certain number of men, for some specified time; and sometimes they were likewise bound by their tenures to keep in repair and guard some particular tower or bulwark, as was the case at Dover caftle.

In process of time these services were commuted for annual rents, sometimes fyled ward-penny, and way-fee, but commonly caftle-guard rents, payable on fixed days, under prodigious penalties called farstaid. At Rochester, if a man failed in the payment of his rent of caftle-guard on the feast of St Andrew, his debt was doubled every tide during the time for which the payment was delayed. These were afterwards restrained by an act of parliament made in the reign of King Henry VIII. and finally annihilated, with the tenures by knight’s service, in the time of Charles II. Such caftles as were private property were guarded either by mercenary folders, or the tenants of the lord or owner.

Casts which belonged to the crown, or fell to it either by forfeiture or escheat (circumstances that frequently happened in the diluted reigns of the feudal times), were generally committed to the custody of some faithful person, who seems to have been indifferently styled governor and constable. Sometimes also they were put into the possession of the sheriff of the county, who
The materials of which castles were built, varied according to the places of their erection; but the manner of their construction seems to have been pretty uniform. The outside of the walls were generally built with the stones nearest at hand, laid as regularly as their shapes would admit; the infills were filled up with the like materials, mixed with a great quantity of fluid mortar, which was called by the workmen grunt-work.

The general shape or plan of these castles depended entirely on the caprice of the architects, or the form of the ground intended to be occupied: neither do they seem to have confined themselves to any particular figure in their towers; square, round, and polygonal, oftentimes occurring in the original parts of the same building.

The situation of the castles of the Anglo-Norman kings and barons, was most commonly on an eminence, and near a river; a situation on several accounts eligible. The whole face of the castle (which was frequently of great extent and irregular figure) was surrounded by a deep and broad ditch, sometimes filled with water, and sometimes dry, called the fossa. Before the great gate was an outwork, called a barbacan, or ante-walled, which was a strong and high wall, with turrets upon it, designed for the defence of the gate and draw-bridge. On the inside of the ditch stood the wall of the castle, about eight or ten feet thick, and between 20 and 30 feet high, with a parapet, and a kind of embrasures, called crennells, on the top. On this wall at proper distances square towers of two or three stories high were built, which served for lodging some of the principal officers of the proprietor of the castle, and for other purposes; and on the inside were erected lodgings for the common servants or retainers, granaries, stordehouses, and other necessary offices. On the top of this wall, and on the flat roofs of these buildings, stood the defenders of the castle, when it was beleaguered and from thence discharged arrows, darts, and stones, on the besiegers. The great gate of the castle stood in the course of this wall, and was strongly fortified with a tower on each side, and rooms over the passage, which was closed with thick folding-doors of oak, often plated with iron, and with an iron portcullis or grate let down from above. Within this outward wall was a second or inner wall, which served for lodging the largest and most perfect castles, the outer bailey, or bal­lium, in which stood commonly a church or chapel. On the inside of this outer bailey was another ditch, wall, gate, and towers, inclosing the inner bailey or court, within which the chief tower or keep was built. This was a very large square fabric, four or five stories high, having small windows in prodigious thick walls, which rendered the apartments within it dark and gloomy. This great tower was the palace of the prince, prelate, or baron, to whom the castle belonged, and the residence of the constable or governor. Under ground were dismal dark vaults, for the confinement of prisoners, which made it sometimes be called the dungeon.

In this building also was the great hall, in which the owner displayed his hospitality, by entertaining his numerous friends and followers. At one end of the great halls of castles, palaces, and monasteries, there was a place raised a little above the rest of the floor, called the deis, where the chief table stood, at which persons of the highest rank dined. Though there was unquestionably great variations in the structure of castles, yet the most perfect and magnificent of them seem to have been constructed nearly on the above plan. Such, to give one example, was the famous castle of Bedford, as appears from the following account of the manner in which it was taken by Henry III. A.D. 1224. The castle was taken by four assaults. "In the first was taken the barbacan; in the second the outer baillia; at the third attack, the wall by the old tower was thrown down by the miners, where, with great danger, they poiffessed themseves of the inner baillia, through a chink; at the fourth assault the miners set fire to the tower, so that the smoke burst out, and the tower itself was cloven to that degree, as to show visibly some broad chinks; whereupon the enemy surrendered." See a representation of a castle in Plate CXXXVII, where 1 is the barbican, 2, the ditch or moat; 3 the wall of the outer baillium, 4 outer baillium, 5 the artificial mount, 6 the wall of the inner baillium, 7 the inner baillium, 8, the keep or dungeon.

Before the accession of James VI. to the throne of England, the situation of Scotland was such, that every baron's house was more or less fortified, according to the power and consequence of its lord, or according to the situation of the castle. Near Edinburgh or Stirling, where the inhabitants were more pollinised in their annals, and overawed by the fear of government, no more was necessary than towers capable of resisting the curfew attack of robbers and thieves, who never durst flop to make a regular investment, but plundered by forpride, and, if repulsed, instantly fled away. Such was Melville Castle. It is not so much composed of a strong built tower of three stories, embattled at the top, and was sufficiently strong to resist a sudden attack, undissembled by artillery, or other engines of war. But, when further removed, as in Perthshire, Invernesshire, or Aberdeenshire, then it was necessary to better defend, and the aids of a peel or dungeon, with outer walls, moat, and wet ditch, barbakin, &c. added to enable the powerful lord to resist the formidable attack of his powerful adversary. The history of Scotland, so late as the reign of the Stewart family, affords a number of melancholy instances of invertebrate feuds among the greater and lesser barons of that period; by which method of fortification then in use was seldom adequate to the defence of the castle against the storm or blockade of the enraged chieflain. The castle of Doun seems to answer this description of fortification, and has made several gallant defences, in the annals of Scotland. The third kind of fortresses we meet with in Scotland are those situated on the borders of England, or on the coasts of the kingdom, and in the western isles, and very remote places. Many of the old castles in Scotland were situated on an island, in a deep lake, or on a peninsula, which by a broad deep cut was made an island. Of this kind was Lochmaben, in the stewary...
CASTLE, (Edmund). See CASTLE.

CASTLE-Bar, a borough and market-town, capital of the county of Mayo in Ireland, is a well-inhabited place, and carries on a brisk trade: it has a barracks for a troop of horse; and there is here a charter-school capable of receiving fifty children, and endowed with two acres of land, rent-free, by the Right Honourable Lord Lucan, who has also granted a lease of twenty acres more at a pepper-corn yearly.

CASTLE-Cary, a remarkable Roman station about four miles west from Falkirk on the borders of Stirlingshire in Scotland. It comprehends several acres of ground, is of a square form, and is surrounded with a wall of stone and mortar: all the space within the walls has been occupied by buildings, the ruins of which have raised the earth eight or ten feet above its natural surface; so that the fort now seems like an hill-top surrounded with a funk fence. In 1770, some workmen employed in searching for stones for the great canal which passes very near it, discovered several apartments of stone; and in one of them a great number of stones about two feet in length, and standing erect, with marks of fire upon them, as if they had been employed in supporting some vessels under which fire was put. In a hollow of the rock near this place, in 1771, a considerable quantity of wheat quite black with age was found, with some wedges and hammer supposed to be Roman.

CASTLE-Rising, a borough-town of Norfolk in England, which sends two members to parliament. E. Long. 0. 40. 40. N. Lat. 52. 46.

CASTLE-work, service or labour done by inferior tenants for the building and upholding castles of defence, toward which some gave their personal assistance and others paid their contributions. This was one of the three necessary charges to which the Anglo-Saxons were expressly subjected.

CASTLE-TOWN, the capital of the isle of Man, feated on the south-west part of the island. It has a strong castle; but of no great importance, on account of its distance from the rocky and shallow harbour. W. Long. 4. 39. N. Lat. 53. 30.

CASTOR, the BEAVER, in zoology, a genus of quadrupeds belonging to the order of glires. The fore-teeth of the upper jaw are truncated, and hollowed in a tranverse angular direction. The tops of the fore-teeth of the lower jaw lie in a transverse direction; and the tail is depressed. There are three species of cadlor, viz.

1. The fiber or common beaver, with a plain ovated tail, is found on the banks of the rivers in Europe, Asia, and America. It has short ears hid in the fur: a blunt nose; the fore-feet small, the hinder large: its length from nofe to tail about three feet, tail about one foot. It is from the inguinal glands of this animal that the cator is obtained; it is contained in cords or pouches resembling a dog's teeficles. Nothing equals the art with which these animals confruct their dwellings. They choose a level piece of ground, with a small rivulet running through it. This they form into a pond, by making a dam across it by driving into the ground flakes of five or six feet in length, placed in rows, wattling each row with plant twigs, and filling the interlinces with clay, ramming it down close. The side next the water is floped, the other perpendicular;
CaO: or. openings, but their tops and the number of jhore. They are built on piles; are either Each beaver forms its bed of bark and boughs of trees. Th, ofe they lodge under water, and fetch into their apartments as qnires. Lawfon fays, they are fize, fame fall to gnawing with their teeth trees of great length to the water; others dive, and with their feet to the water; works upwards, but never to the vaulted, fa that their work, or on shore feeding on poplar bark. If they hear any noife when at work, they immediately jump into the water, and continue there some time; and when they rise, it is at a distance from the place where they went in. They sometimes are taken with traps: these are nothing but poplar sticks laid in a path near the water; which when the beaver begins to feed upon, they caufe a large log of wood to fall upon their necks, which is put in motion by their moving of the sticks, and confequently requires an ingenious contrivance. The favages generally prefer this way of taking them, because it does not damage their skins. In the winter time they break the ice in two places at a distance from the houfe, the one behind the other. Then they take away the broken ice with a kind of rake, the better to know where to place their flakes. They fatten their nets to these, which have large mehes, and sometimes are eighteen or twenty yards in length. When these are fixed, they proceed to demolish the houfe, and turn a dog therein; which terri­fy­ing the beaver, he immediately leaves it, and takes to the water; after which, he is soon entangled by the net.

2. The mofchatus, with a long, comprefled, lanceolated tail, and palmed feet. It has a long tender nofe like that of a threw-moufe; no external ears, and very small eyes. Length from nofe to tail, seven inches; of the tail, eight. It is the water-rat of Clufins; and inhabits Lapland, Ruflia, the banks of the rivers Wolga and the Yaick. It never wanders far from the fides; is very flow in its pace; makes holes in the cliffs, with the entrance far beneath the lowest full of the water; works upwards, but never to the surface, only high enough to be beyond the highest flow of the river: feeds on fish; is devoured by the pikes and fileri, and gives thofe fish fo strong a flavour of musk as to render them not eatable; has the fame fcent as the former, efpecially about the tail, out of which is expressed a fort of musk very much refeeming the genuine kind. The skins are put into chefts among clothes, to drive away moths. At Orenburgh the skins and tails fell for 15 or 20 copees per hundred. They are fo common near Nizney Novogorod, that the peafants bring 500 a-piece to market, where they are fold for one rube per hundred. The German name for thofe animals is bifeonratze: the Ruflian wychozol.

3. The zibethicus, or musk-rat, with a long, comprefled, lanceolated tail, and the toes of the feet separated from each other. Length from nofe to tail, one foot; of the tail, nine inches. This species inhabits North America, breeds three or four times in a year, and brings from three to fix young ones at a time: during summer the male and female confort together: at the approach of winter they unite in families, and retire into small round edifices covered with a dome, formed of herbs and reeds cemented with.
Clytemnestra, who being begotten having an amour with Leda, the wife of Tylldarus other noble youths of Greece in the expedition to common name of derived was forth two eggs, each containing twins. From-derived was forth two eggs, each containing twins. From

form magazines like the beavers: during winter their habits are covered many feet deep with snow and ice; but they creep out and feed on the roots beneath: they quit their old habitats annually, and form new ones: the fur is soft and much esteemed: the whole animal, during summer, has a most exquisite smell of music, which it loses in winter: perhaps the scent is derived from the calamus aromaticus, a favourite food of this animal. Leckerbot says they are very good to eat.

CASTOR, in astronomy, a moiety of the constellation GEMINI; called also APOLLO. Its latitude northwards, for the year 1700, according to Hevelius, was 10° 4' 23"; and its longitude, of Cancer, 16° 4' 14". It is also called Ralgunze, Apollo, Aphellan, Avellar, and Anelar.

CASTOR and POLLUX, in Pagan mythology, Jupiter having an amour with Leda, the wife of Tyndarus king of Sparta, in the form of a swan, the brought forth two eggs, each containing twins. From that impregnated by Jupiter proceeded Pollux and Helena, who were both immortal; from the other Castror and Clytemnestra, who being begot by Tyndarus were both mortal. They were all, however, called by the common name of Tyndarides. These two brothers entered into an inviolable friendship; they went with the other noble youths of Greece in the expedition to Colchis, and, on several occasions, signalized themselves by their courage; but Castror being at length killed, Pollux obtained leave to share his own immortality with him; so that they are said to live and die alternately every day: for, being translated into the skies, they form the constellation of gemini, one of which stars rises as the other sets.

A martial dance, called the Pyrrhic or Gafforian dance, was invented in honour of those deities whom the Cephelentes placed among the Dii Magni, and offered to them white lambs. The Romans also paid them particular honours on account of the assistance they are said to have given them in an engagement against the Latins; in which, appearing mounted on white hores, they turned the scale of victory in their favour, for which a temple was erected to them in the forum.

CASTOR and POLLUX, a fiery meteor, which at sea appears sometimes sticking to a part of the ship, in form of one, two, or even three or four fire-balls: when one is seen alone, it is more properly called HELENA; two are denominated Castror and Pollux, and sometimes Tyndarides. Castror and Pollux are called by the Spaniards, San Elmo; by the French, St Elme, St Nicholas, St Clare, St Helene; by the Italians, Hermo; by the Dutch, Vree Vuuren.

Castror and Pollux are commonly judged to portend a cessation of the storm, and a future calm; being rarely seen till the tempest is nigh spent. Helena alone portends ill, and witnesses the severest part of the storm yet behind. When the meteor flicks to the masts, yards, &c. they conclude, from the air's not having motion enough to dissipate this flame, that a profound calm is at hand; if it flutter about, it indicates a storm.

CASTOREUM, in the Materia Medica, CASTOR; Castoreum, the inguinal glands of the beaver. The ancients had a notion that it was lodged in the testicles: and that the animals, when hard pressed, would bite them off, and leave them to its pursuers, as if conscious of what they wanted to destroy him for. The best fort of castror is what comes from Ruflia. So much is Russian castror superior to the American, that two guineas per pound is paid in Britain for the former, and only 8s 6d. for the latter. The Russian castror is in large hard round pods, which appear, when cut, full of a brittle, red, liver-coloured substance, intermixed with membranes and fibres exquisitely interwoven. An inferior fort is brought from Danzig, and is generally put and moist. The American castror, which is the worst of all, is in longish thin pods. Ruflia castror has a strong disagreeable smell; and an acrid, bitterish, and nauseous taste. Water extracts the nauseous part, with little of the finer bitter; rectified spirit extracts this last without much of the nauseous; proof-spirit both: water elevates the whole of its flavour in distillation; rectified spirit brings over nothing. Castror is looked upon as one of the capital nerve and antisyphilitic medicines; some celebrated practitioners, nevertheless, have doubted its virtues; and Newman and Stahl declare it insignificant. Experience, however, has shown that the virtues of castror are considerable, tho' less than they have been generally supposed.

CASTRATION, in surgery, the operation of gelding, i.e. of cutting off the testicles, and putting a male animal out of a capacity of generation.

Castration is much in use in Asia, especially among the Turks, who practise it on their slaves, to prevent any commerce with their women. The Turks often make a general amputation.

Castration also obtains in Italy, where it is used with a view to preserve the voice for singing. See Eunuch.

The Persians, and other eastern nations, have divers methods of making eunuchs, different from those which obtain in Europe: we say, of making eunuchs, for it is not always done among them by cutting, or even collision. Centa and other poisonous herbs do the same office, as is shewn by Paulus Aegineta. Those enxious in this manner are called zhibis. Besides which there is another fort named thalam, in whom the genitals are left entire, and only the veins which should feed them are cut; by which means the parts do indeed remain, but so lax and weak, as to be of no use.

Castration was for some time the punishment of adultery. By the laws of the Vitigths, sodomyites underwent the same punishment.

By the civil law, it is made penal in physicians and surgeons to castrate, even with consent of the party, who is himself included in the same penalty, and his effects forfeited. The offence of Mayhem by castration is, according to all old writers, felony; though committed upon the highest provocation. See a record to this purpose of Henry III. transcribed by Sir Edward Coke, 3 Inst. 62. or Blackstone's Com. vol. iv. p. 206.

Castration is sometimes found necessary on medicinal considerations, as in mortifications, and some other diseases of the testicles, especially the sarcoccele and vericelle. Some have also used it in maniac cafes.
Castro, (Pietro de) a celebrated painter, who flourished about the middle of the 17th century. The subjects which this great artist chose to paint, were what are distinguished by the name of still life, vases, shells, musical instruments, gems, vessels of gold, silver, and crystal, books, and rich bracelets; and in these subjects his choice and disposition were elegant, and his execution admirable.

Castro, (Castracani) a celebrated Italian general, was born (nobody knows of whom) at Lucca in Florence in 1284, and left in a vineyard covered with leaves, where he was found by Dianora a widow lady, the sister of Antonio, a canon of St Michael in Lucca, who was descended from the illustrious family of the Castracani. The lady having no children, resolved to bring him up, and educated him as carefully as if he had been their own. They intended him for a priest; but he was fiercely 14 years old when he began to devote himself to military sports, and those violent exercises which suited his great strength of body. The factions named the Guelfs and Ghibelines then shared all Italy between them; divided the popes and the emperors; and engaged in their different interests not only the members of the same town, but even those of the same family. Francesco, a considerable person on the side of the Ghibelines, offering Castruccio's uncommon spirit and great qualities, prevailed with Antonio to let him turn soldier; on which Castruccio soon became acquainted with every thing belonging to that profession, and was made a lieutenant of a company of foot by Francesco Guinigi. In his first campaign he gave such proofs of his courage and conduct as spread his fame all over Lombardy; and Guinigi, dying soon after, committed to him the care of his son and the management of his estate. Still distinguishing himself by his exploits, he filled his commander in chief with fresh jealousy and envy, that he was imprisoned by stratagem in order to be put to death. But the people of Lucca soon released him, and afterwards chose him for their sovereign prince.

The Ghibelines considered him as the chief of their party; and those who had been baffled from their country fled to him for protection, and unanimously promised that if he could restore them to their cities, they would serve him so effectually that the sovereignty of their country should be his reward. Flattered by these promises, he entered into a league with the prince of Milan. He kept his army constantly on foot, employing it as best suited his own designs. For services he had done the pope, he was made senator of Rome with more than ordinary ceremony; but while there, received news which obliged him to hasten back to Lucca. The Florentines entered into a war with him, but Castruccio fought his way through them, and the supreme authority of Tuscany was ready to fall into his hands, when a period was put to his life. In May 1228, he gained a complete victory over his enemies, who amounted to 50,000 foot and 10,000 horse; in which 22,000 of them were slain, with the loss of not quite 16,000 of his own men; but as he was returning from the field of battle, tired with the action, and covered with sweat, he halted a little, in order to thank and care for his soldiers as they passed; when, the north wind blowing upon him, he was immediately seized with an ague, which he at first neglected, but it carried him off in a few days, in the 44th year of his age.

Machiavel, who has written the life of Castruccio, says, that he was not only an extraordinary man in his own age, but would have been fo in any other. He was of a noble aspect, and of the most winning address. He had all the qualities that make a man great; was grateful to his friends, just to his subjects, terrible to his enemies. No man was more forward to encounter dangers; no man more careful to escape them. He had an uncommon presence of mind, and often made repartees with great finartness. Some of them are recorded, which discover a singular turn of humour;
Cafurolcio and, for a specimen, we shall mention three or four of them.—Palling one day through a street where there was a house of bad fame, he surprised a young man, who was just coming out, and who, upon seeing him, was all over blushes and confusion: “Friend, you should not be ashamed when you come out, but when you go in.”—One asking a favour of him with a thousand impertinent and superfluous words: “Hark you, friend; when you would have any thing with me for the future, send another man to ask it.”—Another great talker having tired him with a tedious discourse, excused himself at last, by saying, he was afraid he had been troublesome. “No indeed, (replied he), for I did not mind one word you said.”—He was forced to put a citizen of Lucca to death, who had formerly been a great instrument of his advancement; and being reproached by somebody for it, Causulilo, comporting with all the respect due to his friends intimating that such freedoms might diminish the reverence that denots a catafalco, or a lofty tomb of in honour of fame person of eminence, usually in the church and deacon were to take their charge his duty, and what he may have done for his courtiers, and has different points, from whence the light reflected in the language of their own mariners, from whence it differs chiefly in variable like what similar stones, an inch in diameter, was in the writer’s story, as shows it was left while in the writer’s possession.

Casy, in zoology. See Pelis.

Cat, in sea-affairs, a ship employed in the coal-trade, formed from the Norwegian model. It is distinguished by a narrow stern, projecting quarters, a deep waist, and by having ornamental figures on the prow. These vessels are generally built remarkably strong, and carry from four to six hundred tons, or, in the language of their own mariners, from 20 to 30 keels of coal.

Cat, is also a sort of strong tackle, or combination of pulleys, to hook and draw the anchor perpendicularly up to the cat-head. See Cat-Heads.

Cat’s eye, or Sun-fleame, of the Turks, a kind of gem found chiefly in Siberia. Cat’s eye is by the Latins called oculus cati, and sometimes onyx pallas, as having white zones or rings like the onyx; and its colour variable like opal, from which last it differs chiefly by its superior hardnes. It is very hard, and semi-transparent and has different points, from whence the light is reflected with a kind of yellowish radiation somewhat similar to the eyes of cats, from whence it had its name. The leaf of them are very scarce, and jewelers cut them round to the greatest advantage. One of these stones, an inch in diameter, was in the possession of the duke of Tuscany.

Cat-fish, in ichthyology. See Squids.

Cat-cauls, a denomination given to small strings for fiddles, and other instruments, made of the interlines of sheep or lambs, dried and twisted together, either singly, or several together. These are sometimes coloured red, sometimes blue, but are commonly left whitish or brownish, the natural colour of the gut.
They are also used by watch-makers, cutters, turners, and other artificers. Great quantities are imported into England, and other northern countries, from Lyons and Italy.

Catacomb, a purchase of ropes employed to brace in the shrouds of the lower masts behind their yards, for the double purpose of making the shrouds more tight, and of affording room to draw in the yards more obliquely, to trim the sails for a side-wind, when they are said to be close hauled.

Cat-Heads, two strong short beams of timber, which project almost horizontally over the ship's bows on each side of the bow-sprit; being like two radii which extend from a centre taken in the direction of the bow-sprit. That part of the cat-head which rests upon the forecastle, is securely bolted to the beams; the other part projects like a crane as above described, and carries in its extremity two or three small wheels or sheaves of brass or strong wood, about which a rope called the cat-fall passes, and communicates with the cat-block, which also contains three sheaves. The machine formed by this combination of pulleys is called the Cat, which serves to pull the anchor up to the cat-head, without tearing the ship's sides with its flukes. The cat-head also serves to suspend the anchor clear of the forecastle, is securely bolted to the beams; the

CATACOUSTIC CURVES, in the higher geometry, that species of caustic curves which are formed by reflection. See Fluxions.

CATCHRESIS, in rhetoric, a trope which borrows the name of one thing to express another. Thus Milton, describing Raphael's decent from the empyreal heaven to paradise, says,

"Down thither prone in flight,
"He speeds, and through the vaft etherial sky
"Sails between worlds and worlds."  

CATACOMB, a grotto, or subterraneous place for the burial of the dead. Some derive the word catacomb from the place where ships are laid up, which the modern Latins and Greeks call cumbas. Others say, that cata was used for ad, and catacumbas for adumbas; accordingly, Dadin says, they anciently wrote catacumbas. Others fetch the word Catacomb from the Greek seme, and κυμβος, a hollow, cavity, or the like.

Anciently the word catacomb was only underfoot of the tombs of St Peter and St Paul; and M. Chatelet obverses, that among the more knowing of the people of Rome, the word catacomb is never applied to the subterraneous burying-places hereafter mentioned, but only to a chapel in St Sebastian, one of the seven national churches; where the ancient Roman calendars say the body of St Peter was deposited, under the confuteul of Tufcans and Basilius, in 238.

Catacombs of Italy: a vast assemblage of subterraneous sepulchres about Rome, chiefly at about three miles from that city in the Via Appia; supposed to be the sepulchres of the martyrs; and which are visited accordingly out of devotion, and relics thence taken and dispersed throughout the catholic countries, after having been first baptized by the pope under the name of some saint. These catacombs are said by many to be caves or cells wherein the primitive Christians hid and assembled themselves together, and where they interred such among them as were martyred. Each catacomb is three feet broad, and eight or ten high; running in form of an alley or gallery, and communicating with others: in many places they extend within a league of Rome. There is no masonry or vaulting therein; but each supports itself: the two sides, which we may look on as the pareties or walls, were the places where the dead were deposited; which were laid lengthwise, three or four rows over one another, in the fame catacomb, parallel to the alley. They were commonly closed with large thick tyles, and sometimes pieces of marble, cemented in a manner imitable by the moderns. Sometimes, though very rarely, the name of the deceased is found on the tyle; frequently a palm is seen, painted or engraven, or the cipher XP, which is commonly read pro Christo. The opinion held by many Protestant authors is, that the catacombs are heathen sepulchres, and the same with the putrefy mentioned by Festus Pompeius; maintaining, that whereas it was the praclice of the ancient Romans to burn their dead, the custom was, to avoid expense, to throw the bodies of their slaves to rot in holes of the ground; and that the Roman Christians, observing, at length, the great veneration paid to relics, resolved to have a flock of their own; entering therefore the catacombs, they added what ciphers and inscriptions they pleased; and then shut them up again, to be opened on a favourable occasion. Those in the secret, add they, dying or removing, the contrivance was forgot, till chance opened them at last. But this opinion has even less of probability than the former. Mr Monroe, in the Philosophical Transactions, supposes the catacombs to have been originally the common sepulchres of the first Romans, and dug in consequence of these two opinions, viz. That shades hate the light; and that they love to hover about the places where the bodies are laid.

Though the catacombs of Rome have made the greatest noise of any in the world, there are such belonging to many other cities. Those of Naples, according to bishop Burnet, are much more noble and spacious than the catacombs of Rome. Catacombs have
Catacombs have also been discovered at Syracuse, and Catania in Sicily, and in the island of Malta. The Roman catacombs take particular names from the churches in their neighbourhood, and seem to divide the circumference of the city into the walls between them, extending their galleries every where under, and a vast way from it; so that all the ground under Rome, and for many miles about it, some say 20, is hollow. The largest, and those commonly shown to strangers, are the catacombs of San Sebastianio, those of Saint Agnese, and the others in the fields a little off Saint Agnese. Women are only allowed to go into the catacombs in the church-yard of the Vatican on Whit-Fun-Monday, under pain of excommunication. There are men kept constantly at work in the catacombs. As soon as these labourers discover a grave with any of the flattened marks of a faint upon it, intuition is given to the cardinal Comerlingo, who immediately sends men of Rome. After the labourers have examined a gallery, they stop up the entry that leads to it; so that most of them remain thus closed up; only a few being left open to keep up the trade of showing them to strangers. This they lay is done to prevent people from losing themselves in these subterraneous labyrinths, which indeed has often happened; but more probably to deprive the public of the means of knowing whither and how far the catacombs are carried.

The method of preserving the dead in catacombs seems to have been common to a number of the ancient nations. The catacombs of Egypt are still extant about nine leagues from the city of Grand Cairo, and two miles from the city of Zaccara. They extend from thence to the pyramids of Pharaoh, which are about eight miles distant. They lie in a field covered with a fine running sand, of a yellowish colour. The country is dry and hilly; the entrance of the tomb was the physicians in this country a few feet below the covering of sand. They extend a great way under ground, so as to be under the city of Memphis, and in a manner to undermine its environs. In some of the chambers the walls are adorned with figures and hieroglyphics; in others the mummies are found in tombs, round the apartment catacombs hollowed out in the rock.

The Egyptians seem to have excelled in the art of embalming and preserving their dead bodies; as the mummies found in the Egyptian catacombs are in a better state than the bodies found either in the Italian catacombs, or those of any other part of the world. See EMBALMING and MUMMY.

Laying up the bodies in caves, is certainly the original way of disposing of the dead; and appears to have been propagated by the Phcenicians throughout the countries to which they sent colonies: the interring as we now do in the open air or in temples was first introduced by the Chirilians. When an ancient hero died or was killed in a foreign expedition, as his body was liable to corruption, and for that reason unfit to be transported entire, they fell on the expedient of burning, in order to bring home the ashes, to oblige them to follow; and his country might not be defitute of the benefit of his tattle. It was thus burning seems to have had its original; and by degrees it became common to all who could bear the expences of it, and took place of the ancient burying: thus catacombs became disused among the Romans, after they had borrowed the manner of burning from the Greeks, and then none but slaves were laid in the ground. See BURIAL, &c.

Catalaunia, called also Durocatalaunia, a town of Gallia Belgica: Catalaunia, the people. A name rather of the lower age than of classical antiquity. Now Chelons or Marne, in Campaign. E. Long. 4° 35. N. Lat. 48° 55.

Cata womus, (from κατά and δρόμος, I run), in antiquity, a stretched sloping rope in the theatres, drawn down which the funambuli walked to show their skill. Somewhat have taken the word to signify the hippodrome or decurionorum wherein the Roman knights used to exercize themselves in running and fighting on horseback. But the most natural meaning is that of a rope fastened at one end to the top of the theatre, and at the other to the bottom, to walk or run down, which was the highest glory of the ancient helenobates or funambuli. Elephants were also taught to run down the catadromus. Suetonius speaks of the exploit of a Roman knight, who passed down the catadromus mounted on an elephant's back.

Catachogion, a heathen festival at Ephesus, celebrated on the 22d of January, in which the devotees run about the streets, dressed in divers antic and unseemly manners, with huge cudgels in their hands, and carrying with them the images of their gods; in which guise they ravished the women they met with, abused and often killed the men, and committed many other disorders, to which the religion of the day gave a sanction.

Catagraphia, in antiquity, denote oblique figures or views of mens faces; answering to what the moderns call profiles. Catagraphs are said to be the invention of Simon Clementius, who first taught painters to vary the looks of their figures, and sometimes direct them upwards, sometimes downwards, and sometimes sidewayes or backwards.

Catalepsy, or Catalepsis, in medicine, a kind
CATALOGUE, a list or enumeration of the names of several books, men, or other things, disposed according to a certain order.

Catalogues of books are digested in different manners, some according to the order of the times when the books were printed, as that of Mattaire; others according to their form and size, as the common booksellers-catalogues; others according to the alphabetical order of the authors names, as Hyde's catalogue of the Bodleian library; others according to the alphabetical order of matters or subjects, which are called real or classical catalogues, as those of Lepenius and Draisius; lastly, others are digested in a mixed method, partaking of several of the former, as de Seine's catalogue of cardinal Sfius's library, which is first divided according to the subjects or sciences, and afterwards the books in each are recited alphabetically.

The most applauded of all catalogues is that of Thuanus's library, in which are united the advantages of all the rest. It was first drawn up by the two Puteani in the alphabetical order, then digested according to the sciences and subjects, by Ihm. Bulliardus, and published by F. Quenel at Paris in 1679; and reprinted, though incorrectly, at Hamburg, in 1704. The books are here ranged with justice under their several sciences and subjects, regard being still had to the nation, sect, age, &c. of every writer. Add, that only the best and choicest books in every subject are found here, and the most valuable editions. Yet the catalogue of M. le Telliers archbishop of Rheims's library, made by M. Clement, is not inferior to any published in our age, either on account of the number and choice of the books, or the method of its disposition. One advantage peculiar to this catalogue is, the multitude of anonymous and pseudonymous authors detected in it, scarce to be met with elsewhere. Some even prefer it to Thuanus's catalogue, as containing a greater variety of classed and books on particular subjects.

The conditions required in a catalogue are, that it indicate at the same time the order of the authors and of the matters, the form of the book, the number of volumes, the chronological order of the editions, the language it is written in, and its place in the library; so that all these circumstances may appear at once in the shortest, clearest, and exactest manner possible. In this view, all the catalogues yet made will be found to be defective.

An anonymous French writer has laid down a new plan of a catalogue, which shall unite all the advantages, and avoid all the inconveniences of the rest.

The Jesuits of Antwerp have given us a catalogue of the popes, which makes what they call their Propylaeum.

CATALOGUE of the Stars, is a list of the fixed stars, disposed in their several constellations; with the longitudes, latitudes, &c. of each.

The first who undertook to reduce the fixed stars into a catalogue was Hipparchus Rhodius, about 120 years before Christ; in which he made use of the observations of Timocharis and Arystyllus for about 180 years before him. Ptolemy retained Hipparchus's catalogue, containing 1026 fixed stars; though he himself made abundance of observations, with a view to a new catalogue, A. D. 140. About the year of Christ 880, Albategni, a Syrian, brought down the same to his time. Anno 1437, Ulugh Begh, king of Parthia and India, made a new catalogue of 1022 fixed stars, since translated out of Persian into Latin by Dr Hyde. The third who made a catalogue from his own observations was Tycho Brahe, who determined the places of 777 stars for the year 1600, which Kepler from other observations of Tycho, afterwards increased to the number of 1000 in the Rudolphine Tables; adding those of Ptolemy omitted by Tycho, and of other authors, so that his catalogue amounts to above 1160. At the same time, William Landgrave of Hesse, with his mathematician Christopher Rothmannus and Julius Byrgius, determined the places of 400 fixed stars by his own observations, with their places rectified for the year 1593; which Hevelius prefers to those of Tycho's. Ricciobus, in his Uranonomia Reformata, determined the places of 101 stars for the year 1700, from his own observations: for the rest he followed Tycho's catalogue; altering it where he thought fit. Anno 1667, Dr Halley, in the island of St Helena, observed 350 southern stars not visible in our horizon. The same labour was repeated by F. Noel in 1770, who published a new catalogue of the same stars constructed for the year 1687.

Bayer, in his Uranometria, published a catalogue of 1160 stars, compiled chiefly from Ptolemy and Tycho, in which every star is marked with some letter of the Greek alphabet; the biggest star in any constellation being denoted by the first letter, the next by the second, &c. and if the number exceeds the Greek alphabet, the remaining stars are marked by letters of the Roman alphabet, which letters are preferred by Flamstead, and by Senex on his globes. The celebrated Hevelius composed a catalogue of 1888 stars in 153 of which were observed by himself; and their places were computed for the year 1660.

The last and greatest is the Britannic catalogue, compiled from the observations of the accurate Mr Flamstead: who, for a long series of years devoted himself wholly thereto. As there was nothing wanting either in the observer or apparatus, we may look on this as a perfect work so far as it goes. It is to be regretted the impression had not passed through his own hands; that now extant, was published by authority, but without the author's consent: it contains 2734 stars. There was another published in 1725, pursuant to his testament; containing no less than 3000 stars, with their places rectified for the year 1689: to which is added Mr Sharp's catalogue of the southern stars not visible in our hemisphere, adapted to the year 1726.

CATALONIA, a province of Spain, bounded on the north by the Pyrenean mountains, which divide it from France; by the kingdom of Aragon and Valencia on the west; and by the Mediterranean sea on the fourth and east. It is 155 miles in length, and 100 in breadth. It is watered by a great number of rivers; the principal of which are the Llobregat, the Ter, and the
Catalonia. The air is temperate and healthy; but the land is mountainous, except in a few places. It produces, however, corn, wine, oil, pulse, flax, and hemp, sufficient for the inhabitants. The mountains are covered with large forests of tall trees, such as the oak, the ever-green oak, the beech, the pine, the fir, the chestnut, and many others: with cork-trees, thorns, and medicinal plants. There are several quarries of marble of all colours, crystall, alabaster, amethysts, and lapis lazuli. Gold dust has been found among the sands of one or two of the rivers; and there are mines of tin, iron, lead, alum, vitriol, and salt. They are hardy, courageous, active, vigorous, and good soldiers, but apt to be discontented.

The air is temperate and healthy; but the inhabitants are hardy, courageous, active, vigorous, and good soldiers, but apt to be discontented. The river Lobregat divides Catalonia into two parts, the east and west, according to their situation. This province comprehends 17 vigueries or districts: two of which are in Rouillon, and belong to the French. The rest are subject to the Spaniards. The principal towns are Barcelona the capital, Terragona, Tortosa, Lerida, Soloniana, Cordova Vich, Girona, Sen d'Urgel, Puj Cerda, and Cervera. Catalonia was the last province in Spain which submitted to Philip in the succession-war.

CATAMENIA, in medicine. See MENSES.

CATAMITE, a boy kept for sodomitical practices.

CATANA, or CATANIA, (anc. geog.) a town of Sicily, situated opposite to Etna, to the south-east; one of the five Roman colonies: anciently built by the people of Naxus seven years after the building of Syracuse, 728 years before Christ. It was the country of Charondas, the famous lawgiver. The town is called Catanea. See CATANEA.

CATANANCHE, CANDIA LION-FOOT: A genus of the polygamiæ æquiliæ order, belonging to the syngenesia clav of plants; and in the natural method ranking under the 49th order, Compositæ. The receptacle is paleaceous; the calyx imbricated; the papus furnished with awns by a calicium of five stiff hairs. There are three species, of which the cerulea is the most remarkable. This sends out many long, narrow, hairy leaves, which are jagged on their edges like those of the buckthorn plantain, but broader; the jags are deeper, and at greater distances: these lie flat on the ground, turning their points upwards. Between the leaves come out the flower flacks, which are in number proportionable to the size of the plant; for, from an old thriving root, there are frequently eight or ten, while young plants do not send out above two or three. These flacks rise near two feet high, dividing into many small branches upward, garnished with leaves like those below, but smaller, and without jags on their edges; each of these smaller branches are terminated by single heads of flower, of five stiff hairs. This is a perennial plant, and may be propagated by seeds or slips. The seeds may be sown in the spring on a bed of common earth; and in the autumn following the plants may be removed to the places where they are to remain. The seeds ripen in August. This plant is a pretty ornament in gardens, and is easily kept within bounds.

CATANEA, or CATANIA, a city of Sicily, seated on a gulph of the same name, near the foot of Mount Etna or Gibel. It was founded by the Cialetians soon after the settlement of Syracuse, and enjoyed great tranquillity till Hiero I. expelled the whole body of citizens; and after replenishing the town with a new flock of inhabitants, gave it the name of Etna; immediately after his decease, it regained its ancient name, and its citizens returned to their abodes. Catania fell into the hands of the Romans, among their earliest acquisitions in Sicily, and became the residence of a praetor. To make it worthy of such an honour, it was adorned with sumptuous buildings of all kinds, and every convenience was procured to supply the natural and artificial wants of life. It was destroyed by Pompey's fan, but restored with superior magnificence by Augustus. The reign of Decias is famous in the history of this city for the martyrdom of its patroness St Agatha. On every emergency her intercession is implored. She is piously believed to have preferred Catania from being overwhelmed by torrents of lava, or shaken to pieces by earthquakes; yet its ancient edifices are covered by repeated streams of volcanic matter; and almost every house, even her own church, has been thrown to the ground. In the reign of William the Good, 20,000 Catanians, with their pastor at their head, were destroyed before the sacred veil could be properly placed to check the flames. In the last century the eruptions and earthquakes raged with reprobated violence, and Catania was twice demolished. See ETNA.

The present prince of Biscar has been at infinite pains, and spent a large sum of money, in working down to the ancient town, which on account of the numerous torrents of lava that have flowed out of Mount Etna for these last thousand years, is now to be sought for in dark caverns many feet below the present surface of the earth. Mr Swinburne informs us that he descended into the baths, sepulchres, an amphitheatre, and a theatre, all very much injured by the various catastrophes that have befallen them. They are erected upon old beds of lava, and even built with square portions of the same substance, which in no instance appears to have been fused by the contact of new lavas. The scint or stones of cold lava, have constantly prove& as strong a barrier against the flowing torrent of fire as any other stone could have been, though some authors were of opinion that the hot matter would melt the old mafs and incorporate with it.

This city has been frequently defended from the burning streams by the bold mafs of its own ramparts, and by the air compressed between them and the lava; as appears by the torrent having flpt within a small distance of the walls, and taken another direction. But when the walls were broken or low, the lava collected itself till it rose to a great height, and then poured over in a curve. A similar prodigy befell the Terro del Greco near Naples, where the stream of liquid fire from Vesuvius divided itself into two branches, and left a church untouched in the middle. There is a well at the foot of the old walls of Catania, where the lava, after running along the parapet, and then falling...
The church here is a noble fabric. It is accounted the largest in Sicily, though neither a porch nor cupola has been erected, from a doubt of the solidity of the foundations, which are no other than the bed of lava that ran out of Etna in 1669, and is supposed to be full of cavities. The organ is much esteemed by connoisseurs in musical instruments.

Catania, according to Mr. Swinburne's account, is reviving with great splendor. \textit{"It has already (he says) much more the features of a metropolis and royal residence than Patræmo;} the principal streets are wide, straight, and well paved with lava. An obelisk of red granite, placed on the back of an antique elephant of tontochrome stands in the centre of the great square, which is formed by the town-hall, seminary, and cathedral. The cathedral erected by the abbott Angerus in the year 1094, was endowed by earl Roger with the territories of Catania and Etna, for the small acknowledgement of a glass of wine and a loaf of bread offered once a year. It has suffered so much by earthquakes, that little of the original structure remains, and the modern parts have hardly anything except their materials to recommend them. The other religious edifices of the city are profusely ornamented, but in a bad taste. The spirit of building seems to have feized upon this people, and the prince of Biscari's example adds fresh vigour. It was natural to suppose men would be backward in erecting new habitations, especially with any degree of luxury, on ground so often shaken to its centre, and so often buried under the ashes of a volcano; but such is their attachment to their native soil, and their contempt of dangers they are habituated to, that they rebuild their houses on the warm cinders of Vesuvius, the quaking plains of Calabria, and the black mountains of Sciarra at Catania; it is however surprising to see such embellishments lavished in so dangerous a situation. There is a great deal of activity in the disposition of this people; they know by tradition that their ancestors carried on a flourishing commerce; and that, before the fiery river filled it up, they had a spacious convenient harbour, where they now have a creek for a felucia: they therefore with to restore those advantages to Catania, and have often applied to government for assistance towards forming a mole and port, an undertaking their strength alone is unequal to; but whether the refusal originates in the deficiencies of the public treasury or the jealousy of other cities, all their projects have ended in fruitless applications. The number of inhabitants dwelling in Catania amounts to 30,000; the Catanians make it double: A considerable portion of this number appertains to the university, the only one in the island, and the nurseries of all the lawyers." E. Long. 15. 19. N. Lat. 37. 30.

CATANZARO, a city in the kingdom of Naples, the capital of Calabria Ulterior, with a bishop's see. It is the usual residence of the governor of the province, and is seated on a mountain, in E. Long. 18. 20. N. Lat. 38. 58.

CATAPHONICS, the science which confiders the properties of reflected sounds. See Acoustics.

CATAPHORA, in medicine, the name as Coma.

CATAPHRACTA, (from ἑτά, and φρακτός, I for-
The capital-piece of the machine is a nut or cross-pin of iron, 17, seen at C, and hammered cold into its form. It divides the bore of the capitals exactly in two equal parts, and fixed in grooves about an inch deep. This piece, or nut, ought to be about two inches and one-third thick at the top 18, as represented in the section at B; and rounded off and polished as much as possible, that the cords folded over it may not be hurt or cut by the roughness or edges of the iron. Its height ought to be eight inches, decreasing gradually in thickness to the bottom, where it ought to be only one inch. It must be very exactly inflected in the capitals.

After placing the two capitals in the holes of the two beams in a right line with each other, and fixing the two crofs diametrical nuts or pieces over which the cordage is to wind, one end of the cord is reeved through a hole in one of the capitals in the base, and made fast to a nail within side of the beam. The other side of the cord is then carried through the hole in the opposite beam and capital, and so wound over the crofs pieces of iron in the centre of the two capitals, till they are full, the cordage forming a large skain. The tension or straining of the cordage ought to be equally equal, that is, the several foldings of the cord over the capital-pieces should be equally strained, and so near each other as not to leave the least space between them. As soon as the first folding or skain of cord has filled up one whole space or breadth of the capital pieces, another must be carried over it; and so on, always equally straining the end till no more will pass through the capitals, and the skain of cordage entirely fills them, obliterating it from time to time with soap.

At three or four inches behind the cordage, thus wound over the capital pieces, two very strong upright beams 21 are raised; these roll on 22, 24 inches thick, crofsed over at top by another of the same thickness. The height of the upright beams is 17 diameters; each supported behind with very strong props 25, fixed at bottom in the extremities of the base 2, 3. The crofs beam 24 is supported in the same manner by a prop in the centre.

The arm, or stylus 22, should be of found 8th. Its length is from 15 to 16 diameters of the base of the capitals. The end at the bottom, or that fixed in the middle of the skain, is 10 inches thick, and 14 broad. To strengthen the arm or tree, it should be wrapped round with a cloth dipped in strong glue like the tree of a faddle, and bound very hard with waxed thread of the sixth of an inch in diameter from the large end at bottom, almost to the top, as represented in the figure.

At the top of the arm, just under the iron-hand or receiver 27, a strong card is fastened, with two loops twisted one within another, for the greater strength. Into these two loops the hook of a brafs pulley 28 is put. The cord 29 is then reeved through the pulley, and fastened to the roll 30. The cock or trigger 31, which
CATAPOULTA

which serves as a stay, is then brought to it, and
made fast by its hook to the extremity of the hand
27, in which the body to be discharged is placed.
The pulley at the neck of the arm is then unhooked,
and when the trigger is to let it off, a stroke must be
given upon it with an iron bar or crow of about an
inch in diameter; on which the arm, flies up with a
force almost equal to that of a modern mortar. The
elevation or hemachor 23, placed exactly in the middle
of the cross-beam 24, should be covered with tanned
ox-hide, and stuffed with hair, the arm striking against
it with inconceivable force. It is to be observed, that
the tree or arm 22 describes an angle of 90 degrees,
beginning at the cock, and ending at the hemachor or
elevation.

CATAPULTA for Arrows, Spears, or Darts. Some of
the spears, &c. thrown by these engines are said to
have been 18 feet long, and to have been thrown with
such velocity as to take fire in their course.

A B C D is the frame that holds the darts or
arrows, which may be of different numbers, and placed
in different directions. E F F is a large and strong
iron spring, which is bent by a rope that goes over
three pulleys I, K, L; and is drawn by one or several
men; this rope may be

thrown

up of all difficulties may appear wonderful, and yet
easy, simple, and natural.

It is a very preposterous artifice of some writers to
show the catastrophe in the very title of the play. Mr
Dryden thinks that a catastrophe resulting from a mere
change in the sentiments and resolutions of a person,
without any other machinery, may be so managed as to
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It is a dispute among the critics, whether the cata-
trope should always fall out favourably on the side of
virtue or not. The reasons on the negative side seem
the strongest. Aristotle prefers a shocking catastrophe to
a happy one—The catastrophe is either simple or com-
plicated. The first is that in which there is no change in
the state of the principal persons, nor any discovery
or unravelling, the plot being only a mere passage out
of agitation into quiet repose. In the second, the prin-
cipal persons undergo a change of fortune, in the man-
ner already defined.

CATCH, in poetry, the third part of the
ancient drama; being that wherein the intrigue, or
action, set forth in the epistle, is supported, carried on,
and heightened, till it be ripe for the unravelling
in the catastrophe. Scaliger defines it, the full growth
of the fable, while things are at a stand in that con-
fusion to which the poet has brought them.

CATASTROPE, in dramatic poetry, the fourth
and last part in the ancient drama; or that immediate-
l y succeeding the catastrophe; or, according to others,
the third only; the whole drama being divided into pro-
tasis, epistasis, and catastrophe, or in the terms of
Aristotle, prologue, epilogue, and exode.

The catastrophe clears up every thing, and is noth-
ing else but the discovery or winding up of the plot.
It has its peculiar place: for it ought entirely to be con-
tained, not only in the last act, but in the very conclu-
sion of it; and when the plot is finishe’d, the play should
be so also. The catastrophe ought to turn upon a single
point, or start up on a sudden.

The great art in the catastrophe is, that the clearing
up of all difficulties may appear wonderful, and yet
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cipal persons undergo a change of fortune, in the man-
ner already defined.

CATCH, in the musical sense of the word, a fugue
in the union, wherein, to humour some conceit in the
words, the melody is broken, and the fuge interrupted
in one part, and caught again or supported by another;
as in the catch in Shakespeare’s play of the Twelfth-
night, where there is a catch sung by three persons, in
which the humour is, that each who sings, calls, and is
called knowe in turn: Or, as defined by Mr Jackson, “a
catch is a piece for three or more voices, one of which
leads, and the other follow in the same notes. It
must be so contrived, that after (which are made for that
purpose) in the music of one line be filled up with a word
or two from another line; these form a croz’p purpose, or
catch, from whence the name.”

CATCH-FLY, in botany. See LYTEHIS.

CATCH-Pole, (quasi one that catches by the pole), a
term used, by way of reproach, for the bailiff’s follow-
er or assistant.

CATCH-Word, among printers, that placed at the bot-
tom of each page, being always the first word of the
following page.

CATECHESIS, in a general sense, denotes an in-

struction
Catechetical instruction given any person in the rudiments of an art or science; but more particularly of the Christian religion. In the ancient church, catechets was an instruction given either to children, or adult heathens, preparatory to their receiving of baptism. In this sense, catecheta stands contradiinguished from mystagogiae, which were a higher part of instruction given to those already initiated, and containing the mysteries of faith. Those who give such instructions are called catecheta; and those who receive them, catechumens.

CATECHETIC, or CATECHETICAL, something that relates to oral instruction in the rudiments of Christianity. Catechetical schools were buildings appointed for the office of the catechist, adjoining to the church, and called catechumenon: such was that in which Origen and many other famous men read catechetical lectures at Alexandria. See CATECHUMEN.

CATECHISM, in its primary sense, an instruction, or institution, in the principles of the Christian religion, delivered vivis voce, and so as to require frequent repetitions, from the disciple or hearer, of what has been said. The word is formed from καταστίγμαν, a compound of καταστίγμα, q. d. circumstima, alluding to the noise or din made in this sort of exercise, or to the zeal and earnestness whereby things are to be inculcated over and over on the learners. Anciently the candidates for baptism were only to be instructed in the secrets of their religion by tradition vivis voce, without writing; as also had been the case among the Egyptian priests, and the British and Gaulish druids, who only communicated the mysteries of their theology by word of mouth.

Catechism is more frequently used in modern times for an elementary book, wherein the principal articles of religion are humorously delivered in the way of question and answer.

CATECHIST, καταστίγμα, καταστίγματος, he that catechizes, i. e. he that instructs novices in the principles of religion.

Catechist more particularly denotes a person appointed by the church to instruct those intended for baptism, by word of mouth, in the fundamental articles of the Christian faith. The catechists of churches were ministers usually distinct from the bishops and presbyters, and had their auditories or catechumenon apart. Their business was to instruct the catechumens, and prepare them for the reception of baptism. But the catechists did not constitute any distinct order of the clergy, but were chosen out of any other order. The bishop himself sometimes performed the office; at other times presbyters, or even readers or deacons, were the catechists. Origen seems to have had no higher degree in the church than reader, when he was made catechist at Alexandria, being only 18 years of age, and consequently incapable of the deaconship.

Catechu, in the materia medica, the name of a herbageous plant, of the species of Japan earth and gum arabic, each two ounces, and of sugar of roses fifteen ounces, beat together with a little water. It is recommended as a mild refrigerent, &c.

Catechumen, a candidate for baptism, or one who prepares himself for the receiving thereof.

The catechumens, in church-history, were the lowest order of Christians in the primitive church. They Categorical had some title to the common name of Christian, being a degree above pagans and heretics, though not constituted by baptism. They were admitted to the state of catechumens by the imposition of hands, and the sign of the cross. The children of believing parents were admitted catechumens, as soon as ever they were capable of instruction; but at what age those of heathen parents might be admitted, is not so clear. As to the time of their continuance in this state, there were no general rules fixed about it; but the practice varied according to the difference of times and places, and the readiness and proficiency of the catechumens themselves.

There were four orders or degrees of catechumens; the first were those instructed privately without the church, and kept at a distance for some time from the privilege of entering the church, to make them the more eager and devout of it. The next degree were the audientes, so called from their being admitted to hear sermons, and the scriptures read in the church, but were not allowed to partake of the prayers. The third sort of catechumens were the genu-flectentes, so called because they received imposition of hands kneeling. The fourth order was the competentes et electi, denoting the immediate candidates for baptism, or such as were appointed to be baptized the next approaching festival; before which, strict examination was made into their proficiency under the several stages of catechetical exercises.

After examination, they were exercised for twenty days together, and were obliged to fasting and confession, some days before baptism, they went veiled; and it was customary to touch their ears, saying, Ephes. i. c. Be opened; as also to anoint their eyes with clay; both ceremonies being in imitation of our Saviour's practice, and intended to shadow out to the catechumens their condition both before and after their admission into the Christian church.

CATEGORICAL, in a general sense, is applied to those things ranged under a CATEGORY.

Categorical also imports a thing to be absolute, and not relative: in which sense it stands opposed to hypothetical. We say, a categorical proposition, a categorical syllogism, &c.

A categorical answer denotes an express and pertinent answer made to any question or objection proposed.

CATEGORY, in logic, a series or order of all the predicates or attributes contained, under any genus.

The school-philosophers distribute all the objects of our thoughts and ideas into certain genera or classes, not too much, say they, to learn what they do not know, as to communicate a distinct notion of what they do know; and these classes the Greeks called categories, and the Latins predicaments.

Aristotle made ten categories, viz. quantity, quality, relation, action, passion, time, place, duration, and habit, which are usually expressed by the following technical ditich:

|-------|------|--------|------------------|-------|

CATEK. See BENGAL, n° 15.

CATENARIA, in the higher geometry, the name of a curve-line formed by a rope hanging freely from two
CAT [ 251 ]

CATERPILLAR, in zoology, the name of all winged insects when in their reptile or worm-like state. See ERUCUS.

Method of Destroying CATERPILLARS on Trees.—

Take a chafing-dish with lighted charcoal, and placing it under the branches that are loaded with caterpillars, throw some pinches of brimstone upon the coals. The vapour of the sulphur, which is mortal to these insects, will not only destroy all that are on the tree, but prevent it from being infested with them afterwards. A pound of sulphur will clear as many trees as grow on several acres. This method has been successfully tried in France. In the Journal Occasionalis, the following is said to be infallible against the caterpillars feeding on cabbage, and perhaps may be equally serviceable against those that infest other vegetables. Sow with hemp all the borders of the ground where you mean to plant your cabbage; and, although the neighbourhood is infested with caterpillars, the space inclosed by the hemp will be perfectly free, not one of the vermin will approach it.

CATERPILLAR-Eaters, a name given by some authors to a species of worms bred in the body of the caterpillar, and which eat its flesh; these are owing to a certain kind of fly that lodges her eggs in the body of this animal, and they, after their proper changes, become flies like their parents.

Mr. Reaumur has given us, in his history of insects, some very curious particulars in regard to these little worms. Every one of them, he observes, spins itself a very beautiful case; a cylindrical figure, made of a very strong sort of silk; these are the cases in which this animal spends its state of chrysalids; and they have a mark by which they may be known from all other animal productions of this kind, which is, that they have always a broad stripe or band surrounding their middle, which is black when the rest of the case is white, and white when that is black. Mr. Reaumur has had the pains and patience to find out the reason of this singularity, which is this: the whole sheil is spun of a silk produced out of the creature's body; this at first runs all white, and towards the end of the spinning turns black. The outside of the case must necessarily be formed first, as the creature works from within; consequently this is truly white all over, but it is transparent, and shows the last spun or black silk through it. It might be supposed that the whole inside of the shell should be black; but this is not the case: the whole is fashioned before this black silk comes; and this is employed by the creature, not to line the whole, but to fortify certain parts only; and therefore is all applied either to the middle, or to the two ends omitting the middle; and so gives either a black band in the middle, or a blackness at both ends, leaving the white in the middle to appear. It is not unfrequent to find a fort of small cases, lying about garden walks, which move of themselves; when these are opened, they are found to contain a small living worm. This is one of the species of these caterpillar-eaters; which as soon as it comes out of the body of that animal, spins itself a case for its transformation long before that happens, and lives in it without food till that change comes on; and it becomes a fly like that to which it owed its birth.

CATERVA, in ancient military writers, a term used in speaking of the Gaulish or Celtiberian armies, denoting a body of 6000 armed men. The word catterva, or catterarius, is also frequently used by ancient writers to denote a party or corps of soldiers in disorder or disarray: by which it stands distinguished from cohort or turma, which were in good order.

CATESBRIA, theilly-thorn: A genus of the monogyny order, belonging to the tetrandra class of plants; and in the natural method ranking under the 28th order, Luridae. The corolla is monopetalous, funnel-shaped, very long above the receptacle of the fruit; the stamens are within its throat; the fruit a polypermous berry. There is only one species, viz. the Spinosis, which was discovered in the island of Providence by Mr. Catesby, who gathered the seeds, and brought them to England. It rises to the height of ten or twelve feet, and is covered with a pale ruffle; bark; the branches come out alternately, and are garnished with small leaves resembling those of the box-tree, coming out in clusters all round the branches at certain distances; the flowers hang downward, and come out from the side of the branches: they are tubulous and near six inches long, very narrow at their base, but widening upwards towards the top, where it is divided into four parts which spread open, and are reflexed backward. They are of a dull yellow colour. This plant is propagated by seeds which must be procured from the country where it grows. The seeds must be sown on a hot-bed, and are to be treated in the same manner as other tender exotics.

CATHARINUS, in pharmacy, medicines of a caustic nature, serving to eat off proud fleas.

CATHARINE, Knights of St. Catharine of Mount Sinai, an ancient military order, erected for the assistance and protection of pilgrims going to pay their devotion to the body of St. Catharine, a virgin of Alexandria, distinguished for her learning, and said to have suffered martyrdom under Maximin. The body of the martyr having been discovered on mount Sinai, caused a great concourse of pilgrims; and travelling being very dangerous, by reason of the Arabs, an order of knighthood was erected in 1063, on the model of that of the holy sepulchre, and under the patronage of St. Catharine: the knights of which obliged themselves by oath to guard the body of the saint, keep the roads secure, observe the rules of St. Basil, and obey their grand master. Their habit was white, and on it were represented the instruments of martyrdom whereby the saint had suffered: viz. a halberd armed with spikes, and traverfed with a sword stained with blood.

CATHARINE, Fraternity of St. Catharine at Sienna, a sort of religious society instituted in that city, in honour of St. Catharine, a saint famous for her revelations, and for her marriage with Jesus Christ, whose wedding ring is still preserved as a valuable relic. This fraternity yearly endows a certain number of destitute virgins, and has the privilege of redeeming annually two criminals condemned for murder, and the same number of debtors, by paying their debts.

CATHARTICS, in medicine, remedies which produce
Catherine

CATHEDRAL, in botany. See AEGEAE.

CATHEDRAL, in a general sense, a chair. — The word is more particularly used for a professor's chair, and a preacher's pulpit.

CATHEDRA is also used for the bishop's see, or throne, in a church.

CATHEDRAL, a church wherein is a bishop's see or seat; See CHURCH, and BISHOP. The word comes from the Greek καθεδρα, "chair," of καθεδραν, sedes, "I sit." The denomination cathedra seems to have taken its rise from the manner of sitting in the ancient churches, or assemblies of primitive christians; in these, the council, i. e. the elders and priests, was called Presbyterium; at their head was the bishop, who held the place of chairman, Cathedratis, or Cathedraeius; and the prebys, who sat on either side, were also called by the ancient fathers, Aesofines Episcoporum. The episcopal authority did not reside in the bishop alone; but in all the prebys, whereof the bishop was president. A cathedral, therefore, originally, was different from what it is now; the christians, till the time of Constantine, having no liberty to build any temple: by their churches they only meant their assemblies, and by cathedrals, nothing more than confuburbies.

CATHARINE. See PARR.

CATHARINE. Empress of Russia, a most extraordinary personage, whose history deserves to be given in detail. She was a natural daughter of a country girl; and was born at Ringen, a small village upon the lake Viercherve, near Dorp in Livonia. The year of her birth is uncertain; but, according to her own account, she came into the world on the 5th of April, 1687. Her original name was Martha, which the change for Catherine when the embraced the Greek religion. Count Rofen, a lieutenant-colonel in the Swedif service, who owned the village of Ringen, supported, according to the custom of the country, both the mother and the child: and was, for that reason, fopowed by many persons to have been her father. She left her mother when she was but three years old; and, as count Rofen died about the fame time, she was left in fo deflute a situation, that the parish-clerk of the village received her into his house. Soon afterwards Guile, Lutheran minister of Marienburg, happening, in a journey through those parts, to fee the foundling, took her under his protection, brought her up in his family, and employed her in attending his children. In 1701, and about the 14th year of her age, she espoused a dragon of the Swedif garrifon of Marienburg. Many different accounts are given of this transaction; one author of great credit affirms that the bride and bridegroom remained together eight days after their marriage; another, of no less authority, afferts, on the contrary, that on the morning of their nuptials her husband being bent with a detachment for Riga, the marriage was never consummated. Thus much is certain, that the dragon was absent when Marienburg surrendered to the Rusfians; and Catherine, who was referred for a higher fortune, never saw him more.

General Bauer, upon the taking of Marienburg, saw Catherine among the prisoners; and, being smitten with her youth and beauty, took her to his house, where she superintended his domestic affairs, and was Catharine, fopossed to be his mistress. Soon afterwards she was removed into the family of prince Menzikof, who was no less struck with the attractions of the fair captive. With him she lived until 1704; when, in the 17th year of her age, she became the mistress of Peter the Great, and won so much upon his affections, that he espoused her on the 29th of May 1711. The ceremony was secretly performed at Jaworof in Poland, in the presence of General Bruce; and on the 20th of February, 1712, it was publicly solemnized with great pomp at Peterburgh.

Catherine, by the most unweaied affiduity and unremitted attention, by the softness and complacency of her disposition, but above all by an extraordinary vivacity and gaiety of temper, acquired a wonderful ascendancy over the mind of Peter. The latter was Subject to occasional horrors, which at times rendered him gloomy and fupicious, and raised his passions to such an height as to produce a temporary madness. In these dreadful moments Catherine was the only person who durft venture to approach him; and fuch was the kind of fascination she had acquired over his fenes, that her presence had an instantaneous effect, and the first found of her voice compeled his mind and calmed his agonies. From these circumstances she seemed necessary, not only to his comfort, but even to his very exiftence, the became his ineparable companion on his journeys into foreign countries, and even in all his military expeditions.

The peace of Pruth, by which the Russian army was reftored from certain deftruftion, has been wholly attributed to Catherine, though she was little more than an instrument in procuring the content of Peter. The latter, in his campaign of 1711 against the Turks, having imprudently led his troops into a disadvantageous situation, took the desperate resolution of cutting his way through the Turkif army in the night. With this resolution he retired to his tent in an agony of despair, and gave positive orders that no one should be admitted under pain of death. In this important juncture the principal officers and the vice-chancellor Shaffirof, assembled in the presence of Catherine, and drew up certain preliminaries in order to obtain a truce from the grand vizir. In consequence of this determination, plenipotentiaries were immediately dispatched without the knowledge of Peter, to the grand vizir, and a peace obtained upon more reasonable conditions than could have been expected. With these conditions Catherine, notwithstanding the orders iffued by Peter, entered his tent, and prevailed upon him to sign them. Catherine, by her conduct on this occasion, acquired great popularity; and the emperor particularly approves her conduct to Pruth as one of the reasons which induced him to crown her publicly at Moscow with his own hand. This ceremony was performed in 1724; and although designed by Peter only as a proof of his affection, was the principal cause of her subsequent elevation.

Her influence continued undiminished until a short time before the death of the emperor, when some circumstances happened which occasioned such a coolness between them as would probably have ended in a total rupture, if his death had not fortunately intervened. The
were too well known, and come... her motions. From the page's... discovery, complimentary arbour of the garden with her favourite Mons; while his page, upon the watch without the arbour.

...and Mons was carried to the winter palace, but... of the... days of her husband... and Mons was carried to the winter palace, where no one had admission to him but Peter, who himself brought him his provisions. A report was at the same time circulated, that they were imprisoned for having received bribes, and making their influence over the empress subservient to their own mercenary views. Mons being examined by Peter, in the presence of major-general Ushakov, and threatened with the torture, confessed the corruption which was laid to his charge. He was beheaded; his sister received five strokes of the knout, and was banished into Siberia; two of her sons, who were chamberlains, were also degraded, and sent as common soldiers among the Russian troops in Persia. On the day subsequent to the execution of the sentence, Peter conveyed Catherine in an open carriage under the gallows, to which was nailed the head of Mons. The empress, without changing colour at this dreadful sight, exclaimed, "What a pity it is that there is so much corruption amongst us!"

This event happened in the latter end of the year 1724; and as it was soon followed by Peter's death, and Catherine upon her accession recalled Madame Balke, it has been suspected that the shortened the days of her husband by poison. But notwithstanding the critical situation for Catherine in which he died, and her subsequent elevation, this charge is totally defective of the least shadow of proof: for the circumstances of Peter's disorder were too well known, and the peculiar symptoms of his last illness sufficiently account for his death, without the necessity of recurring to poison.

While Peter was yet lying in the agonies of death, several opposite parties were endeavouring to dispose of the crown. At a considerable meeting of many among the principal nobility, it was secretly determined, on the moment of his disfellowship, to arrest Catherine, and to place Peter Alexievitch upon the throne. Bassevitz, apprized of this resolution, repaired in person to the empress, although it was already night: "My grief and consternation," replied Catherine, "render me incapable of acting myself: do you and prince Menzikof confit together, and I will embrace the measures which you shall approve in my name." Bassevitz, finding Menzikof asleep, awakened and informed him of the pressing danger which threatened the empress and her party. As no time remained for long deliberation, the prince instantly seized the treasure, secured the fortresses, gained the officers of the guards by bribes and promises, also a few of the nobility, and the principal clergy. These partizans being convened in the palace, Catherine made her appearance: she claimed the throne in right of her coronation at Moscow; she expunged the ill effects of a minority; and promised, that "so far from depriving the great-duke of the crown, she would receive it only as a sacred deposit, to be restored to him when the should be united, in another world, to an adored husband, whom she was now upon the point of losing."

The pathetic manner with which she uttered this address, and the tears which accompanied it, added to the previous distribution of large sums of money and jewels, produced the desired effect: at the close of this meeting the remainder of the night was employed in making the necessary preparations to infuse her affection in case of the emperor's death. Peter at length expired in the morning of the 28th of January 1725. This event being made known, the senate, the generals, the principal nobility and clergy, hastened to the palace to proclaim the new sovereign. The adherents of the great duke seemed to care for success, and the friends of Catherine were avoided as persons doomed to destruction. At this juncture Bassevitz whispered one of the opposite party, "The empress is mistress of the treasure and the fortresses; she has gained over the guards and the fynod, and many of the chief nobility; even here she has more followers than you imagine; advise therefore your friends to make no opposition as they value their heads." This information being rapidly circulated, Bassevitz gave the appointed signal, and the two regiments of guards, who had been gained by a large party to declare for Catherine, and had already surrounded the palace, beat to arms. "Who has dared," exclaimed prince Repnin, the commander, "to order out the troops without my knowledge?" "I, returned general Butckerlin, without pretending to dispute your authority, in obedience to the commands of my most gracious mistress." This short reply was followed by a dead silence. In this moment of suspense an anxiety Menzikof entered, preceding Catherine, supported by the duke of Holftein. She at first attempted to speak, but was prevented by sighs and tears from giving utterance to her words: at length, recovering herself, "I come (he said), notwithstanding the grief which now overwhelms me, to assure you, that, submissive to the will of my departed husband, whose memory will be ever dear to me, I am ready to devote my days to the painful occupations of government until Providence shall summon me to follow him." Then, after a short pause, she artfully added, "If the great-duke will profit by my instructions, perhaps I shall have the consolation, during my wretched widowhood, of forming for you an emperor worthy of the blood and the name of him whom you have now irretrievably lost." "As this crisis (replied Menzikof) is a moment of such importance to the good of the empire, and requires the most mature deliberations, your ma...
Catherine, jealously will permit us to confer, without refraining, that this whole affair may be transacted without reproach, as well in the opinion of the present age as in that of posterity.” “Acting as I do (answered Catherine), more for the public good than for my own advantage, I am not afraid to submit all my concerns to the judgment of such an enlightened assembly; you have not only my permission to confer with freedom; but I lay my commands upon you all to deliberate maturely on this important subject, and I promise to adopt whatever may be the result of your decisions.” At the conclusion of these words the assembly retired into another apartment, and the doors were locked.

It was previously settled by Menzikof and his party that Catherine should be empress, and the guards, who surrounded the palace with drums beating and colours flying, effectually vanquished all opposition. The only circumstance, therefore, which remained, was to give a just colour to her title, by perfuming the assembly that Peter intended to have named her his successor. For this purpose Menzikof demanded of that emperor’s secretary, whether his late master had left any written declaration of his intentions! The secretary replied, “That a little before his last journey to Moscow he had destroyed a will; and that he had frequently expressed his design of making another, but had always been prevented by the reflection, that if he thought his people, whom he had raised from a state of barbarism to an high degree of power and glory, could be ungrateful, he would not expose his final intentions to the infiltion of a refusal; and that if they recollected what they owed to his labours, they would regulate their conduct by his intentions, which he had disclosed with more solemnity than could be manifested by any writings.” An altercation now began in the assembly; and some of the nobles having the courage to oppose the accession of Catherine, Theophanes archbishop of Plovdiv called to their recollection the oath which they had all taken in 1722 to acknowledge the successor appointed by Peter; and added, that the sentiments of that emperor delivered by the secretary were in effect an appointment of Catherine. The opposite party, however, denied these sentiments to be so clear as the secretary chose to infinuate; and inferred, that as their late monarch had failed to nominate his heir, the election of the new sovereign should revert to the state. Upon this the archbishop further testified, that the evening before the coronation of the empress at Moscow, Peter had declared in the house of an English merchant, that he should place the crown upon her head with no other view than to leave her mistress of the empire after his decease. This attestation being confirmed by many persons present, Menzikof cried out, “What need have we of any testament! A refusal to conform to the inclination of our great sovereign, thus authenticated, would be both unjust and criminal. Long live the empress Catherine!” These words being instantly repeated by the greatest part of those who were present, Menzikof, isolating Catherine by the title of empress, paid his first obeisance by kissing her hand; and his example was followed by the whole assembly. She next presented herself at the window to the guards, and to the people, who shouted exclamations of “Long live Catherine!” while Menzikof scattered amongst them handfuls of money. Thus Catherine (says a contemporary) was raised to the throne by the guards, in the same manner as the Roman emperors by the praetorians cohorts, without either the appointment of the people or of the legions.

The reign of Catherine may be considered as the reign of Menzikof, that empress having neither inclination or abilities to direct the helm of government; and she placed the most implicit confidence in a man who had been the original author of her good fortune, and the sole instrument of her elevation to the throne.

During her short reign her life was very irregular; she was extremely averse to business; would frequently, when the weather was fine, pass whole nights in the open air; and was particularly intemperate in the use of tokaoy-wine. These irregularities, joined to a cancer and a dropy, hastened her end, and she expired on the 17th of May 1727, a little more than two years after her accession to the throne, and in about the 40th year of her age.

As the deaths of sovereigns in despotic countries are seldom imparted to natural causes, that of Catherine has also been attributed to poison; as if the disorders which preceded her frame were not sufficient to bring her to her grave. Some affirm, that she was poisoned in a glass of spirituous liquor; others, by a pear given her by general Diever. Suspicions also fell upon prince Menzikof, who, a short time before her decease, had a terible misunderstanding with her; and who was accused of hastening her death that he might reign with still more absolute power during the minority of Peter II. But these reports deferve not the least credit, and were merely dictated by the spirit of party or by popular rumour.

Catherine was in her person under the middle-size, and in her youth delicate and well-formed, but inclined to corpulency as she advanced in years. She had a fair complexion, dark eyes, and light hair, which she was always accustomed to dye with a black colour. She could neither read nor write; her daughter Elizabeth usually signed her name for her, and particularly to her last will and testament; and Count Osterman generally put her signature to the public decrees and dispatches. Her abilities have been greatly exaggerated by her panegyrists. Gordon, who had frequently seen her, feems, of all writers, to have represented her character with the greatest justice, when he says, “She was a very pretty look’d woman, of good figure, but not of that sublimity of wit, or rather that quickness of imagination, which some people believe. The great reason why the czar was so fond of her, was her exceeding good temper; she never was seen peevish, or out of humour; obliging and civil to all, and never forgetful of her former condition; withal, mighty grateful.” Catherine maintained the pomp of majesty with an air of ease and grandeur united; and Peter used frequently to express his admiration at the propriety with which she supported her high station, without forgetting that she was not born to that dignity.

The following anecdotes will prove that the bore her elevation meekly; and, as Gordon affirms, was never forgetful of her former condition. When Wurmby, who had been tutor to Gluck’s children at
the time that Catherine was a domestie in that cler­
gaman's family, presented himself before her after her mar­riage with Peter had been publicly solemnized, she re­collected and addressed him with great compla­ency, "What, thou good man, art thou still alive! I will provide for thee." And the accordingly settled upon him a pension. She was no less attentive to the family of her benefactor Gluck, who died a prisoner at Moscow: the petitioned his widow; made him a for­page; portioned the two eldest daughters; and ad­vanced the youngest to be one of her maids of honour. If we may believe Weber, she frequently enquired af­ter her first husband; and, when she was helped with Prince Menziken, used secretly to send him small sums of mon­ey, until, in 1705, he was killed in a skirmish with the enemy.

But the most noble part of her character was her pecu­lar humanity and compassion for the unfortunate. Motrye has paid a handsone tribute to this excelle­ence. "She had, in former, the government of all his (Peter's) passions; and even saved the lives of a great many more persons than Le Fort was able to do; she inspired him with that humanity, which, in the opinion of his subjects, nature seemed to have denied him. A word from her mouth in favour of a wretch, just going to be sacrificed to his anger, would dis­arm him; but if he was fully resolved to satisfy that paffion, he would give orders for the execution when he was absent, for fear she should plead for the victim." In a word, to use the expression of the celebrated Munich, "Elle estoit prompte la mediatisere entre le monarque et ses sujets."

CATHARINE (Order of St) in modern history, belongs to ladies of the first quality in the Russian court. It was instituted in 1714 by Catherine wife of Peter the Great, in memory of his signal eflcape from the Turks in 1711. The emblems of this order are a red cross, supported by a figure of St Catherine; and fastened to a scarlet flaping edged with silver, on which are inscri­bed the name of St Catherine, and the motto, umeris et in pace.

CATHERTON, a town of Ireland, in the coun­ty of Cork, and province of Leinster: seated on the river Barrow: 16 miles N. E. of Kilkenny. W. Long. 7. 1. N. Lat. 52. 45.

CATHCROUCH, a county of Ireland, about 28° miles in length, and eight in breadth; bounded on the east by Wicklow and Wexford, on the west by Queen's county, on the north by Kildare, and on the south and south-west by Wexford. It contains 5600 houses, 42 parishes, five baronies or boroughs, and sends six members to parliament, viz: two for the county, two for Catherlowg, and two for Old Leighlin.

CATHETER, in surgery, a fithetical instrument, uti­sally made of silver, to be introduced into the bladder, in order to searsh for the stone, or discharge the urine when suppressed. See SURGERY.

CATHETERS, in geometry, a line or radius falling perpendicularly on another line or surface; thus the cathe­rii of a right-angled triangle, are the two sides that include the right angle.

Catheters of Incidence, in acoustics, a right line drawn from a point of the object, perpendicular to the reflecting plane.

Catheters of Reflection, or of the Eye, a right line drawn from the eye perpendicular to the reflecting plane.

Cathetus of Obligation, a right line drawn perpen­dicular to the speculum, in the point of incidence or re­flexion.

Cathetus, in architecture, a perpendicular line, supposed to pass through the middle of a cylindrical body, as a balusters, column, &c.

CATHNESS. See Cathness.

CATHOLIC, in a general sense, denotes any thing that is universal or general.

Catholic Church. The rise of heretics induced the primitive Christian church to assume to itself the appel­lation of catholic, being a Characteristic to distingui­sh itself from all sects, who, though they had party names, sometimes sheltered themselves under the name of Christians.

The Romish church distinguishes itself now by the name of catholic, in opposition to all those who have separated from her communion, and whom the con­fessors as heretics and schismatics, and herself only as the true and Christian church. In the strict sense of the word, there is no catholic church in being, that is, no univerfal Christian communion.

Catholic King, is a title which has been long here­ditary to the king of Spain. Mariana pretends, that Reccared first received this title after he had destroy­ed Arianism in his kingdom, and that it is found in the council of Toledo for the year 586. Valse acribes the origin of it to Alphonius in 738. Some allege that it has been used only since the time of Ferdinand and Isabella. Colombiey says, it was given them on occasion of the expulsion of the Moors. The Bollandists pretend it had been borne by their predecessors the Visigoth kings of Spain; and that Alexander VI. only renewed it to Ferdinand and Isabella. Others say, that Philip de Valois first bore the title; which was given him after his death by the ecle­cifics, on account of his favouring their interests.

In some epitaphs of the ancient popes, the title catho­lic is given to the kings of France and of Jerusalem, as well as to several patriarchs and primates.

CATHOLICON, in pharmacy, a kind of soft purgative emetic, so called, as being supposed an univer­sal purger of all humors.

CATILINE, (Lucius) a Roman of a noble family, who having spent his whole fortune in debauchery, formed the design of oppressing his country, destroy­ing the senate, feizing the public treasury, setting Rome on fire, and usurping a sovereign power over his fellow-citizens. In order to succeed in this design, he drew some young noblemen into his plot; whom he prevailed upon, it is said, to drink human blood as a pledge of their union. His conspiracy, however, was dis­covered by the vigilance of Cicero, who was then consul. Upon which retiring from Rome, he put himself at the head of an army, with several of the con­spirators, and fought with incredible valour against Petrius, lieutenant to Anthony, who was colleague with Cicero in the confilidship; but was defeated and killed in battle. See (History of) Rome.—Sallust has given an excellent history of this conspiracy.

CATO, (Marcus Portius) the Senofor, one of the greatest men among the ancients, was born at Tufcul­lum in the year of Rome 539, about the 23rd before Chrif.
Cato.

Chrlft. He began to bear arms at 17; and, on all occasions, showed extraordinary courage. He was a man of great sobriety, and reckoned no bodily exercise unworthy of him. He had but one horse for himself and his baggage, and he looked after and dressed it himself. At his return from his campaigns, he betook himself to plough his ground; not that he was without slaves to do it, but it was his inclination. He dressed also like his slaves, sat down at the same table with them, and partook of the same fare. He did not in the mean while neglect to cultivate his mind, especially in regard to the art of speaking; and he employed his talents, which were very great, in generously pleading causes in the neighbouring cities without fee or reward. Valerius Flaccus, who had a country-feat near Cato, conceiving an esteem for him, persuaded him to come to Rome; where Cato, by his own merit, and the influence of so powerful a patron, was soon taken notice of, and promoted. He was first of all elected tribune of the soldiers for the province of Sicily. He was next made quaestor in Africa under Scipio. Having in this last office reproved him for his profuse expenses to his soldiers, the general answered, that "he did not want to exact a quaestor, but would make war at what expense he pleased; nor was he to give an account to the Roman people of the money he spent, but of his enterprises, and the execution of them." Cato, provoked at this answer, left Sicily, and returned to Rome.

Afterwards Cato was made praetor, when he fulfilled the duties of his office with the strictest justice. He conquered Sardinia, governed with admirable moderation, and was created confuhl. Being tribune in the war of Syria, he gave distinguished proofs of his valor against Antiochus the Great; and at his return flushed candidate for the office of censor. But the nobles, who not only envied him as a new man, but dreaded his influence, set up against him seven powerful competitors. Valerius Flaccus, who had introduced him into public life, and had been his colleague in the consulship, was a ninth candidate, and these two united their interests. On this occasion Cato, far from employing soft words to the people, or giving hopes of gentleness or complaisance in the execution of his office, loudly declared from the rostra, with a threatening look and voice, "That the times required firm and vigorous magistrates to put a stop to that growing luxury which menaced the public with ruin; censors who would cut up the evil by the roots, and restore the rigour of ancient discipline." It is to the honour of the people of Rome, that, notwithstanding these terrible intimations, they preferred him to all his competitors, who courted them by promises of a mild and easy administration: the comitia also appointed his friend Valerius to be his colleague, without whom he had declared that he could not hope to compass the reformation he had in view. Cato's merit, upon the whole, was superior to that of any of the great men who flourished against him. He was temperate, brave, and indefatigable; frugal of the public money, and not to be corrupted. There is scarce any talent requisite for public or private life which he had not received from nature, or acquired by industry. He was a great politician, an able statesman, an eloquent orator, a learned historian, and very knowing in rural affairs. Yet, with all these accomplishments, he had very great faults.

His ambition being poisoned with envy, disturbed both his own peace and that of the whole city as long as he lived. Though he would not take bribes, he was unmerciful and unconceivable in amassing wealth by all such means as the law did not permit.

The first act of Cato in his new office, was naming his colleague to be prince of the senate; after which the censors struck out of the list of the senators the names of seven persons; among whom was Lucius the brother of T. Flaminius. Lucius, when confuls, and commanding in Gaul, had with his own hand murdered a Boan of distinction, a deferter to the Romans; and he had committed this murder purely to gratify the curiosity of his pathic, a young Carthaginian, who longing to see somebody die a violent death, had reproached the general for bringing him away from Rome just when there was going to be a fight of gladiators. Titus Flaminius, full of indignation at the dishonour done to his brother, brought the affair before the people; and inflicted upon Cato's giving the reason of his proceeding. The censor related the story; and when Lucius denied the fact, put him to his oath. The accused, relating to swear, was deemed guilty; and Cato's conduct seemed too cruel to the nobles and their wives as the taxes he laid upon luxury in all its branches; dress, housefod furniture, women toilets, chariots, slaves, and equipage. These articles were all taxed at three per cent. of the real value. The people, however, in general, were pleased with his regulations; insomuch that they ordered a statue to be erected to his honour in the temple of Health, with an inscription that mentioned nothing of his victories or triumph, but imported only that by his wife ordinances in his censorship he had returned the manners of the republic. Plutarch relates, that before this, upon some of Cato's friends expounding their surplus, while many persons without merit or reputation had statues, he had none; he answered, "I had much rather it should be asked why the people have not erected a statue to Cato, than why they have." Cato was the occasion of the third Punic war. Being dispatched to Africa to terminate a difference between the Carthaginians and the king of Numidia, on his return to Rome he reported, that Carthage was grown excessively rich and populous, and he warmly exhorted the senate to destroy a city and republic, during the existence of which, Rome could never be safe. Having brought from Africa some very large fags, he showed them to the confcript fathers in one of the lap-pets of his gown. "The country (says he) where this fine fruit grows, is but three days voyage from Rome." We are told, that from this time he never spoke in the senate upon any subject, without concluding with these words, "I am also of opinion, that Carthage ought to be destroyed." He judged, that, for a people debauched by prosperity, nothing was more to be feared than a rival state, always powerful, and now from its misfortunes grown wise and circumspect. He held it necessary to remove all dangers that could be apprehended from without, when the republic had within so many dissenters threatening her destruction.

From the censor dignified and severe, the reader will
will not perhaps be displeased to turn his view upon Cato sociable and relaxed. For we should have a false notion of him, if we imagined that nothing but a sad austerity prevailed in his speech and behaviour. On the contrary, he was extremely free; and often with his friends he introduced into the conversation with lively discourses and witty sayings. Of these Plutarch has collected a pretty large number; we shall relate but one, and make use of Balzac's paraphrase, and the preface with which he introduces it. "The very centurions, though knaves seemed to be one of the functions of their office, did not altogether lay aside raillery. They were not always bent upon severity; and the first Cato, that troubleome and intolerable honest man, ceased sometimes to be troublesome and intolerable. He had some glimpses of mirth, and some intervals of good humour. He dropped now and then some words that were not unpleasant, and you may judge of the rest by this. He had married a very handsome wife; and history tells us that she was extremely afraid of the thunder, and loved her husband well. These two passions prompted her to the same thing; she always pitched upon her husband as a handy article to grow under; and threw herself into his arms at the first noise she fancied the heard in the sky. Cato, who was then well pleased with the storm, and very willing to be carried, could not conceal his joy. He revealed that domestic secret to his friends; and told them one day, speaking of his wife, "that she had found out a way to make him love bad weather; and that he never was so happy as when Jupiter was angry." It is worth observing, that this was during his censorship; when he degraded the senator Manlius, who would probably have been conful the year after, only for giving a kiss to his wife in the day-time, and in the presence of his daughter.

Cato died in the year of Rome 604, aged 85. He wrote several works. 1. A Roman History. 2. Concerning the art of war. 3. Of rhetoric. 4. A treatise of husbandry. Of these, the last only is extant.

Cato (Marcus Porcius) commonly called Cato Minor, or Cato of Utica, was great grandson of Cato the Censor. It is said, that from his infancy he discovered by his speech, by his conuenience, and even his childish sports and recreations, an infusibleliss of mind; for he would force himself to go through with whatever he had undertaken, though the task was ill suited to his strength. He was rough towards those that flattered him, and quite intractable when threatened; was rarely seen to laugh, or even to smile; was not easily provoked to anger; but if once incensed, hard to pacify. Sylla having had a friendship for the father of Cato, bent often for him and his brother, and talked familiarly with them. Cato, who was then about 14 years of age, seeing the heads of great men brought there, and observing the fighs of those that were present, asked his preceptor, "Why does no body kill this man?" Because, said the other, he is more feared than he is hated. The boy replied, Why then did you not give me a sword when you brought me hither, that I might have stabbed him, and freed my country from this slavery?

He learned the principles of the Stoic philosophy, which so well suited his character, under Antipater of Tyre, and applied himself diligently to the study of it. Eloquence he likewise studied, as a necessary means to defend the cause of justice, and he made a very considerable proficiency in that science. To increase his bodily strength, he indulged himself to suffer the extremes of heat and cold; and used to make journeys on foot, and bare-headed in all seasons. When he was sick, patience and abstinence were his only remedies: he shut himself up, and would see no body till he was well. Though remarkably fohcr in the beginning of his life, making it a rule to drink but once after supper, and then retire, he insensibly contracted a habit of drinking more freely, and of sitting at table till morning. His friends endeavoured to excuse this, by saying that the affairs of the public engaged his attention all the day; and that, being ambitious of knowledge, he passed the night in the conversation of philosophers. Catullus wrote that Cato was once found dead drunk at the corner of a street, early in the morning, by a great number of people who were going to the levee of some great man; and that when, by uncovering his face, they perceived who it was, they blushed for shame: "You would have thought (adds Catullus), that Cato had found them drunk, not they him." Pity observes, that by this reflexion he praises his enemy at the same time that he blames him. And Seneca, his extravagant panegyrist, ventures to assert, that it is easier to prove drunkenness to be a virtue, than Cato to be vicious. He affected singularity, and, in things indifferent, to act directly contrary to the taste and fashions of the age. Magnanimity and constancy are generally ascribed to him; and Seneca would fain make that haughtiness and contempt for others which, in Cato, accompanied those virtues, a matter of praise. Cato, says Seneca, having received a blow in the face, neither took revenge nor was angry; he did not even pardon the affront, but denied that he had received it. His virtue raised him so high, that injury could not reach him. He is reputed to have been chaste in his youth. His first love was Lepida; but when the marriage was upon the point of being concluded, Metellus Scipio, to whom she had been promised, interfered, and the preference was given to him. This affair extremely exasperated our Stoic. He was for going to law with Scipio; and when his friends had diverted him from that design, by showing him the ridicule of it, he revenged himself by making victories upon his rival. When this first flame subsided, he married Attilia the daughter of Serranus, had two children by her, and afterwards divorced her for her very indifferent conduct.

He served as a volunteer under Gallus in the war of Spartaeus; and when military rewards were offered him by the commander, he refused them, because he thought he had no right to them. Some years after, he went a legionary tribune into Macedon under the praetor Rubrius: in which station he appeared, in his dress, and during a march, more like a private soldier than an officer; but the dignity of his manners, the elevation of his sentiments, and the superiority of his views, set him far above those who bore the titles of generals and proconsuls. It is said, that Cato's design in all his behaviour was to engage the soldiers to the love of virtue; whole affections he engaged thereby to himself, without his having that in his intention. "For the sincere love of virtue, (adds Seneca), is the..."
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Cato's passion for the virtuous. Those who praise the worthy without loving them, pay homage to their glory; but are neither admirers nor imitators of their virtues." When the time of his service expired, and he was leaving the army, the soldiers were all in tears; so effectually had he gained their hearts by his conducing manners, and sharing in their labours. After his return home, he was chosen to thequeflorship; and had scarce entered on his charge, when he made a great reformation in the queflor's office, and particularly with regard to the registers. These registers, whose places were for life, and through whose hands passed incessantly all the public accounts, being to act under young magistrates inexperienced in business, afforded an air of importance; and, instead of asking orders from the queflors, pretended to direct and govern as if they themselves were the queflors. Cato reduced them to their proper sphere.

One thing by which Cato extremely pleased the people, was his making the affinns to whom Sylla had given considerable rewards out of the treasury, for murdering the procrifed, difgorge their gains. Plutarch tells us, that Cato was so exact in discharging the duties of a senatir, as to be always the first who came to the house, and the last who left it; and that he never quittefl Rome during those days when the senate was to meet. Nor did he fail to be present at every assembly of the people, that he might awe those who, by an ill-judged facility, bestowed the public money in largesse, and frequently, through mere favour, granted remission of debts due to the state. At first his authority and stiiffness displeased his colleagues; but afterwards they were glad to have his name to oppose to all the unjust solicitations, against which they would have found it difficult to defend themselves. Cato very readily took upon him the task of reforming.

Cato, to keep out a very bad man, put in for the tribunate. He sided with Cicero against Catiline, and opposed Caesar on that occasion. His enemies sent him to recover Cyprus, which Ptolemy had forfeited, thinking to hurt his reputation by so difficult an undertaking; yet none could find fault with his conduct.

Cato laboured to bring about an agreement between Caesar and Pompey; but seeing it in vain, he sided with the latter. When Pompey was slain, he fled to Utica; and being pursued by Caesar, advised his friends to be gone, and throw themselves on Caesar's clemency. His son, however, remained with him; and Statilius, a young man, remarkable for his hatred to Caesar.

The evening before the execution of the purpose he had formed with regard to himself, after bathing, he sipped with his friends and the magistrates of the city. They sat late at table, and the conversation was lively. The discourse falling upon this maxim of the Stoics, that "the wife man alone is free, and that the vicious are slaves;" Demetrius, who was a Peripatetic, undertook to confute it from the maxims of his school. Cato, in answer, treated the matter very ampl; and with so much earnestness and vehemence of voice, that he betrayed himself, and confirmed the suspicions of his friends, that he designed to kill himself. When he had done speaking, a melancholy silence ensued; and Cato perceiving it, turned the discourse to the present situation of affairs, expressing his concern for those who had been obliged to put to sea, as well as for those who had determined to make their escape by land, and had a dry and handy defeat to pass. After supper, the company being dismissd, he walked for some time with a few friends, and gave his orders to the officers of the guard: and going into his chamber, he embraced his son and his friends with more than usual tenderness, which further confirmed the suspicions of the revolution he had taken. Then laying himself down on his bed, he took up Plato's Dialogue on the immortality of the Soul. Having read for some time, he looked up, and missing his sword, which his son had removed while he was at supper, he called a slave, and asked who had taken it away; and receiving no pertinent answer, he resumed his reading. Some time after, he asked again for his sword; and, without showing any impatience, ordered it to be brought to him: but, having read out the book, and finding nobody had brought him his sword, he called for all his servants, fell into a rage, and struck one of them on the mouth with so much violence, that he very much hurt his own hand, crying out in a passioned manner, "What! do my own son and family conspire to betray me, and deliver me up naked and unarmed to the enemy?" Immediately his son and friends rushed into the room; and began to lament, and to beseech him to change his resolution. Cato raising himself, and looking fiercely at them, "How long is it," said he, "since I have left my fences, and my son is become my keeper? Brave and generous son, why do you not bind your father's hands, that when Caesar comes, he may find me unable to defend myself? Do you imagine that without a sword I cannot end my life? Cannot I destroy myself by holding by breath for some moments, or by striking my head against the wall?" His son answered with his tears, and retired. Apollonides and Demetrius remained with him, and to them he addressed himself in the following words: "Is it to watch over me that ye sit silent here? Do you pretend to force a man of my years to live? or can you bring any reason to prove, that it is not safe and unworthy of Cato to beg his safety of an enemy? or why do you not persuade me to learnwhat I have been taught, that, rejecting all the opinions I have hitherto defended, I may now, by Caesar's means, grow wiser, and be yet more obliged to him than for life alone? Not that I have determined any thing concerning myself; but I would have it in my power to perform what I shall think fit to resolve upon: and I shall not fail to ask your counsel, when I have occasion to act up to the principles which your philosophy teaches. Go tell my son, that he should not compel his father to what he cannot persuade him." They withdrew, and the sword was brought by a young slave. Cato drew it, and finding the point to be sharp; "Now," said he, "I am my own master." And, laying it down, he took up his book again; which, it is reported, he read twice over. After this he slept so soundly that he was heard to snore by those who were near him. About midnight he called two of his freedmen, Clearchus his physician, and Eupus whom he chiefly employed in the management of his affairs. The last he sent to the port, to see whether all the Roman
CATOPTRICS.

CATOPTRICS is that part of optics which explains the properties of reflected light, and particularly that which is reflected from mirrors.

As this and the other branches of optics are fully treated under the collective word, we shall, in the present article, 1st, give a summary of the principles of the branch, in a few plain aphorisms, with some preliminary definitions; and, 2dly, infert a set of entertaining experiments founded upon them.

Sect. I. Definitions.

1. Definitions

1. Every polished body that reflects the rays of light is called a mirror, whether its surface be plane, spherical, conical, cylindrical, or of any other form whatever.

2. Of mirrors there are three principally used in optical experiments: The plane mirror $GHI$, (fig. 1.) The spherical convex mirror, $GHI$, (fig. 2.) and the spherical concave mirror $GHI$, (fig. 3.)

3. The point $K$, (fig. 2, 3.) round which the reflecting surface of a spherical mirror is decentered, is called its centre. The line $KH$, drawn from its centre perpendicular to its two surfaces, is the axis of the mirror; and the point $H$, to which that line is drawn, is its vertex.

4. The distance between the lines $AG$ and $BG$, (fig. 1.) is called the angle of incidence, and the distance between $BG$ and $CG$ is the angle of reflection.

Sect. II. Aphorisms.

1. The image $DF$, (fig. 1.) will appear as far behind the mirror, as the object $AC$ is before it.

2. The image will appear of the same size, and in the same position as the object.

3. Every such mirror will reflect the image of an object of twice its own length and breadth.

4. If the object be an opaque body, and its rays fall on the mirror nearly in direct lines, there will be only one image visible, which will be reflected by the inner surface of the glass. But,

5. If the object be a luminous body, and its rays fall very obliquely on the mirror, there will appear, to an eye placed in a proper position, several images; the first of which, reflected from the outer surface of the glass, will not be so bright as the second, reflected from the inner surface. The following images, that are produced by the repeated reflections of the rays between the two surfaces of the glass, will be in proportion less vivid, to the eighth or tenth, which will be scarcely visible.

1. The image $DF$, (fig. 2.) will always appear II. in a spherical convex mirror.

2. The image will be in the same position as the object. 3. It will be less than the object.

4. It will be curved, but not, as the mirror, spherical.

5. Parallel rays falling on this mirror will have the focus or image at half the distance of the centre $K$, from the mirror.

6. In converging rays, the distance of the object must be equal to half the distance of the centre, to make the image appear behind the mirror.

7. Diverging rays will have their image at less than half the distance of the centre. If the object be placed in the centre of the mirror, its image will appear at one-eighth of that distance behind it.

8. That point where the image appears of the same size, in a dimensions as the object, is the centre of that mirror.

2. Parallel rays will have their focus at one-half the distance of the centre.

3. Converging rays will form an image before the mirror.

4. In diverging rays, if the object be at less than one half the distance of the centre, the image will be behind the mirror, erect, curved, and magnified, as $Kk2DEF$. 

Romans were gone; to the physician he gave his hand to be dressed, which was swelled by the blow he had given his slave. This being an intimation that he intended to live, gave great joy to his family. Butas soon returned, and brought word that they were all gone except Cratus, who had stayed upon some business, but was just ready to depart. He added, that the wind was high, and the sea rough. Thesewords drew a sigh from Cato. He sent Butas again to the port, to know whether there might not be some one, who, in the hurry of embarkation, had forgot some necessary provisions, and had been obliged to put back. If the ship was not cut, but was just ready to depart. He added, that all was gone except one.

The spherical concave mirror $GHI$, (fig. 3.)

In the spherical convex mirror, $GHI$, (fig. 2.)

The point $K$, (fig. 2, 3.) round which the reflecting surface of a spherical mirror is decentered, is called its centre. The line $KH$, drawn from its centre perpendicular to its two surfaces, is the axis of the mirror; and the point $H$, to which that line is drawn, is its vertex.

The distance between the lines $AG$ and $BG$, (fig. 1.) is called the angle of incidence, and the distance between $BG$ and $CG$ is the angle of reflection.
CATOPTRICS.

DEF, (fig. 3.) but if the distance of the object be greater, the image will be before the mirror, Inverted and diminished, as DEF, (fig. 4.)

5. The sun's rays falling on a concave mirror, and being parallel, will be collected in a focus at half the distance of its centre, where their heat will be augmented in proportion of the surface of the mirror to that of the focal spot.

6. If a luminous body be placed in the focus of a concave mirror, its rays being reflected in parallel lines will strongly enlighten a space of the same dimension with the mirror, at a great distance. If the luminous object be placed nearer than the focus, its rays will diverge, and consequently enlighten a larger space. It is on this principle that reverberators are constructed.

IV. In all plane and spherical mirrors the angle of incidence is equal to the angle of reflection.

SECT. III. Entertaining Experiments.

1. Of all our senses the sight is certainly subject to the greatest illusion. The various writers on optics have described a great number of instances in which it deceives us, and have constantly endeavoured to investigate the causes, to explain their effects, and to reconcile appearance with reality. We every day discover new phenomena, and doubtless many more are to be found, that a discovery which at first seemed of little consequence, has led to matters of the highest importance.

Take a glass bottle A (fig. 14,) and fill it with water to the point B; leave the upper part BC empty, and cork it in the common manner. Place this bottle opposite a concave mirror, and beyond its focus, that you may appear rendered in its image.

Now it is remarkable in this apparent bottle, that the water, which, according to all the laws of catoptrics, and all the experiments made on other objects, should appear at ab, appears on the contrary at bc, and consequently the part ab appears empty.

If the bottle is inverted and placed before the mirror (as in fig. 15,) its image will appear in its natural erect position; and the water, which is in reality at BC, will appear at ab.

If while the bottle is inverted it be uncorked, and the water run gently out, it will appear, that while the part BC is empty, that of ab in the image is filling; and what is likewise very remarkable, as soon as the bottle is empty the illusion ceases, the image also appearing entirely empty. If the bottle likewise be quite full there is no illusion.

While the bottle is held inverted, and partly empty, some drops of water fall from the bottom A towards BC; it seems in the image as if there were formed at the bottom of the part ab, bubbles of air that rise from a to b; which is the part that seems full of water. All these phenomena constantly appear.

The remarkable circumstances in this experiment, are, first, not only to see an object where it is not; but secondly, that of two objects which are really in the same place, as the surface of the bottle and the water it contains, the one is seen at one place, and the other at another; and to see the bottle in the place of its image, and the water where neither it nor its image are.

II. Construct a box A B, of about a foot long, eight inches wide, and six high; or what other dimension you shall think fit, provided it does not greatly vary from these proportions.

On the inside of this box, and against each of its opposite ends A and B, place a mirror of the same size. Take off the quicksilver from the mirror that you place at B, for about an inch and a half, at the part C, where you are to make a hole in the box of the same size, by which you may easily view its inside. Cover the top of the box with a frame, in which must be placed a transparent glass, covered with a gauze, on the side next the inner part of the box. Let there be two grooves at the parts E and F to receive the two painted scenes hereafter mentioned. On two pieces of cut pasteboard let there be skilfully painted on both sides (see fig. 6. and 7.) any subject you think proper; as woods, gardens, bowers, colonades, &c. and on two other pasteboards, the same subjects on one side only; observing that there ought to be on one of them some object relative to the subject placed at A, that the mirror placed at D may not reflect the hole at C on the opposite side.

Place the two boards painted on both sides in the grooves E and F; and those that are painted on one side only, against the opposite mirrors C and D; and then cover the box with its transparent top. This box should be placed in a strong light to have a good effect.

When the eye is placed at C, and views the objects on the inside of the box, of which some, as we have said, are painted on both sides, they are successively reflected from one mirror to the other; and if, for example, the painting consists of trees, they will appear like a very long vista, of which the eye cannot discern the end; for each of the mirrors reflecting the objects, continually more faintly, contribute greatly to augment the illusion.

III. Take a square box ABCD, of about six inches long, and twelve high; cover the inside of it with four four plane mirrors, which must be placed perpendicularly to the bottom of the box CBFD.

Place certain objects in relief on the bottom of this box; suppose, for example, a piece of fortification, (as fig. 9.) with tents, soldiers, &c. or any other subject that you judge will produce an agreeable effect by its disposition when repeatedly reflected by the mirrors.

On the top of this box place a frame of glass, in form of the bottom part of a pyramid, whose base AGEB is equal to the size of the box; its top I LN must form a square of six inches, and should not be more than four or five inches higher than the box. Cover the four sides of this frame with a gauze, that the inside may not be visible but at the top, I LN, which should be covered with a transparent glass.

When you look into this box through the glass I LN, the mirrors that are diametrically opposite each other, mutually reflecting the figures included, the eye beholds a boundless extent, completely covered with
these objects; and if they are properly disposed, the illusion will occasion no small surprize, and afford great entertainment.

Note. The nearer the opening ILN is to the top of the box, the greater will be the apparent extent of the subject. The same will happen if the four mirrors placed on the sides of the box be more elevated. The objects, by either of these dispositions, will appear to be repeated nine, twenty-five, forty-nine times, &c. by taking always the square of the odd numbers of the arithmetical progression 3, 5, 7, 9, &c. as is very easy to conceive, if we remember that the hexagon, (that subject.) between the mirrors, place little figures of pasteboard, support the box, the greater will be the square of the odd numbers of the arithmetical progression 3, 5, 7, 9, &c. as is very easy to conceive, if we remember that the hexagon, (that subject.)

All these different dispositions, properly directed, as well with regard to the choice as position of the objects, will constantly produce very remarkable and pleasing illusions.

If instead of placing the mirrors perpendicular, they were to incline equally, so as to form part of a reversed pyramid, the subject placed in the box would then have the appearance of a very extensive globular or many-sided figure.

IV. On the hexagonal or six-sided plane ABCDEF draw six semi-diameters GA, GB, GC, GD, GE, GF; and on each of these place perpendicularly two plane mirrors, which must join exactly at the centre G, and which placed back to back must be as thin as possible. Decorate the exterior boundary of this piece (which is at the extremity of the angles of the hexagon) with six columns, with the same time serve to support the mirrors, by grooves formed on their inner sides. (See the profile H.) Add to these columns their entablatures, and cover the edifice in such manner as you shall think proper.

In each one of these six triangular spaces, contained between the mirrors, place little figures of pasteboard, in relief, representing such objects as when seen in an hexagonal form will produce an agreeable effect. To these add small figures of enamel; and take particular care to conceal, by some object that has relation to the subject, the place where the mirrors join, which, as we have said before, all meet in the common centre G.

When you look into any one of the six openings of this palace, the objects there contained being repeated six times, will seem entirely to fill up the whole of the building. This illusion will appear very remarkable; especially if the objects made choice of are properly adapted to the effect that is to be produced by the mirrors.

Note, if you place between two of these mirrors part of a fortification, as a curtain and two demi-batlions, you will see an entire citadel, with its six battlements. Or if you place part of a ball-room, ornamented with chandeliers and figures in enamel, all those objects being here multiplied, will afford a very pleasing prospect.

V. Within the case ABCD, place four mirrors, O, P, Q, R, so disposed that they may each of them make an angle of forty-five degrees, that is, that they may be half way inclined from the perpendicular, as transparent in the figure. In each of the two extremities AB, fig. 11, make a circular overture, in one of which fix the tube GL, in the other the tube MF, and observe that in each of these is to be inserted another tube, as H and I (a).

Furnish the first of these tubes with an object-glass at G, and a concave eye-glass at F. You are to observe that in regulating the focus of these glasses, with regard to the length of the tube, you are to suppose it equal to the line G, or visual pointed ray, which entering at the overture G, is reflected by the four mirrors, and goes out at the other overture F, where the ocular glass is placed. Put any glas you will into the two ends of the moveable tubes H and I; and lastly place the machine on a fland E, moveable at the point S, that it may be elevated or depressed on pleasure.

When the eye is placed at F, and you look through the tube, the rays of light that proceed from the object T, passing through the glasses G, are successively reflected by the mirrors, O, P, Q, and R, to the eye at F, and there paint the object T, in its proper situation, and these rays appear to proceed directly from that object.

The two moveable tubes H and I, at the extremities of each of which a glass is placed, serve only the more to diffuse the illusion, for they have no communication with the interior part of the machine. This instrument being moveable on the stand E, may be directed to any object; and if furnished with proper glasses will answer the purpose of a common perspective.

The two moveable tubes H and I being brought together, the machine is directed toward any object, and defiring a person to look in at the end F, you ask him if he can distinctly that object. You then separate the two moveable tubes, and leaving a space between them sufficient to place your hand, or any other solid body, you tell him that the machine has the power of making objects visible through the most opaque body; and as a proof you desire him then to look at the same object, when, to his great surprize, he will see it as distinct as when there was no solid body placed between the tubes.

Note. This experiment is the more extraordinary, as it is very difficult to conceive how the effect is produced. The two arms of the case appearing to be made to support the perspectival glasses; and to whatever object it is directed, the effect is still the same.

(a) These four tubes must terminate in the substance of the case, and not enter the inside, that they may not hinder the effect of the mirrors. The fourfold reflection of the rays of light from the mirrors, darkens in some degree the brightness of the object; some light is also lost by the magnifying power of the perspective: If, therefore, instead of the object-glass at G, and concave eye-glass at F, plane glasses were substituted; the magnifying power of the perspective will be taken away, and the object will appear brighter.
CATOPTRICS.

VI. In the partition AB, make two openings, CD, and EF, of a fourth high, and ten inches wide, and about a foot distant from each other. Let them be at the common height of a man's head; and in each of them place a transparent glass, surrounded with a frame like a common mirror.

Behind this partition place two mirrors H and I, inclined to it in an angle of forty-five degrees: that is half-way between a line drawn perpendicular to the ground and its surface; let them be both 18 inches square: let all the space between them be inclosed by boards or pasteboard painted black, and well closed, that no light may enter; let there be also two curtains to cover them, which may be drawn aside at pleasure.

When a person looks into one of these supposed mirrors, instead of seeing his own face, he will perceive the object that is in front of the other; so that if the two persons present themselves at the same time before these mirrors, instead of each one seeing himself, they will reciprocally see each other.

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This experiment may be considerably improved by placing the two glasses in the partition in adjoining rooms, and a number of persons being previously placed in one room, when a stranger enters the other, you may tell him his face is dirty; and direct him to see in it once more, he will then, to his further satisfaction, make an aperture at G, near the top of the side E, and if the rays shine thereon, he will be convinced that the glass was not so clean as it appeared to be.

Note, When a man looks in a mirror that is placed perpendicular to another, his face will appear entirely deformed. If the mirror be a little inclined, so as to make an angle of 80 degrees (that is, one-ninth part from the perpendicular), he will then see all the parts of his face, except the nose and forehead. If it be inclined to 60 degrees (that is, one-third part), he will appear with three noses and six eyes: in short, the apparent deformity will vary at each degree of inclination; and when the glass comes to 45 degrees (that is, half-way down), the face will vanish. If, instead of placing the two mirrors in this situation, they are so disposed that their junction may be vertical, their different inclinations will produce other effects; as the situation of the object relative to these mirrors is quite different. The effects of these mirrors, though remarkable enough, occasions but little surprize; as there is no method of concealing the cause by which they are produced.

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Note, A glass mirror should be always here used, as those of metal do not represent the objects with equal vivacity, and are beside subject to tarnish. It is also necessary that the box be sufficiently large, that you may not be obliged to use a mirror whose focus is too short; for in that case, the right lines near the border of the picture will appear bent in the mirror, which will have a disagreeable effect, and cannot be avoided.

IX. The rays of a luminous body placed in the focus of a concave mirror being reflected in parallel lines, fire to a second mirror be placed diametrically opposite the first, it will, by recollecting those rays in its focus, set fire to a combustible body.

Place two concave mirrors, A and B, at about 12 or 15 feet distance from each other, and let the axis of each of them be in the same line. In the focus C of one of them, place a live coal, and in the focus D of the other, some gun-powder. With
CATOPTRICS.

a pair of double bellows, which make a continual blast, keep constantly blowing the coal, and notwithstanding the distance between them, the powder will presently take fire.

It is not necessary that these mirrors be of metal or brass, those made of wood or plateboard, gilded, will produce the explosion, which has sometimes taken effect at the distance of 50 feet, when mirrors of eighteen inches, or two feet diameter, have been used.

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The phenomena that may be produced by means of concave mirrors are highly curious and astonishing. By their aid, spectres of various kinds may be exhibited. Suppose, for example, a person with a drawn sword places himself before a large concave mirror, but farther from it than its focus; he will then see an inverted image of himself in the air, between him and the mirror, of a less size than himself. If he steadily present the sword towards the centre of the mirror, an image of the sword will come out therefrom towards the sword in his hand, point to point, as it were to fence with him; and by his pushing the sword nearer the image will appear to come nearer him, and almost to touch his breast, having a striking effect upon him.

If the mirror be turned 45 degrees, or one-eighth round, the reflected image will go out perpendicular to the direction of the sword presented, and apparently come to another person placed in the direction of the motion of the image. If that person is unsatisfied with the experiment, and does not see the original sword, he will be much surprised and alarmed. This experiment may be another way diversified, by telling any person, that at such an hour, and in such a place, he should see the apparition of an absent or deceased friend (of whose portrait you are in possession). In order to produce this phantom, instead of the hole in the partition AB in the last figure, there must be a door which opens into an apartment to which there is a considerable defect. Under that door you are to place the portrait, which must be inverted and strongly illuminated, that it may be lively reflected by the mirror, which must be large and well polished. Then having introduced the incredulous spectator at another door, and placed him in the proper point of view, you suddenly throw open the door at AB; when, to his great astonishment, he will immediately see the apparition of his friend.

It will be objected, perhaps, that this is not a perfect apparition, because it is only visible at one point of view, and by one person. But it should be remembered, that it was an established maxim in the last centuries, that a spectre might be visible to one person and not to others. So Shakespeare makes both Hamlet and Macbeth see apparitions that were not visible to others, present at the same time. It is not unlikely, moreover, that this maxim took its rise from certain apparitions of this kind that were railed by the monks, to serve some purposes they called religious; as they alone were in possession of what little learning there then was in the world.

Opticians sometimes grind a glass mirror concave in one direction only, as it is laid longitudinally; it is in fact a concave portion of a cylinder, the breadth of which may be considered that of the mirror. A person looking at his face in this mirror, in the direction of its concavity, will see it curiously distorted in a very lengthened appearance; and by turning the cylindrical mirror a quarter round, its profile will appear distorted another way, by an apparent increase in width only. Another curious and singular property attends this sort of mirrors: If in a very near situation before it, you put your finger on the right hand side of your nose, it will appear the same in the mirror; but if in a distant situation, somewhat beyond the centre of concavity, you again look at your face in the mirror, your finger will appear to be removed to the other or left-hand side of your nose. This, though something extraordinary, will in its caufe appear very evident from a small consideration of the properties of spherical concave mirrors.
CATROU, (Francis) a famous Jesuit, born at Paris in 1659. He was engaged for twelve years in the Journal de Trevoux, and applied himself at the same time to other works, which distinguished him among the learned. He wrote a general History of the Mogul empire, and a Roman history, in which he was assisted by father Rouille, a brother Jesuit. Catrou died in 1737; and this last history was continued by Rouille, who died in 1740.

CATTERTHUN, a remarkable Caledonian poft, a few miles north of the town of Brechin in the county of Angus in Scotland. Mr. Pennant describes it as of uncommon strength. "It is (says he) of an oval form made of a stupendous pile of loose white stones, whose convexity, from the base within to that without, is 122 feet. On the outside a hollow, made by the disposition of the stones, surrounds the whole. Round the base is a deep ditch, and below that about 100 yards, are vestiges of another, that went round the hill. The area within the stone mound is 32 acres; the axis, or length of the oval, is 456 feet, the transverse diameter 200. Near the east side is the foundation of a rectangular building; and on most parts are the foundations of others small and circular: all which had once their superstructures, the shelter of the poileffors of the poft: there is also a hollow, now being used as a well of the place." There is another fortification, but of inferior strength, in the neighbourhood. It is called the Brown Catterthun, from the colour of the ramparts which are composed of earth. It is of a circular form, and consists of various concentric dikes. On one side of this rife a small rill, which, running down the hill, has formed a deep gulley. From the side of the fortres is another rampart, which extends parallel to the rill, and then reverts, forming an additional poft or retreat. The meaning of the word Catter-thun is Camp-town; and Mr. Pennant thinks these might probably be the pofts occupied by the Caledonians before their engagement at the foot of the Grampian Mountains with the celebrated Agricola. See (History of) Scotland.

CATTI, a people of Germany, very widely spread, on the east reaching to the river Sala, on the north to Wedphalia; occupying, besides Hesse, the Wetteran, and part of the tract on the Rhine, and on the banks of the river Lohne. The Hercynian forest began and ended in their country.

CATTIVELLAUNI, anciently a people of Britain, seated in the country which is now divided into the counties of Hertford, Bedford, and Bucks. The name of this ancient British people is written in several different ways by Greek and Roman authors being sometimes called Catti, Caffii, Catticelani, Cattinidani, Cattieludani, &c. That they were of Belgic origin cannot be doubted, and it is not improbable, that they derive their name of Catti from the Belgic word Catrin, which signifies illustrious or noble, and that the addition of Vellauni, which means on the banks of rivers, might be given them after their arrival in Britain, as descriptive of the situation of their country. However this may be, the Cattivellani formed one of the most brave and warlike of the ancient British nations when Cæsar invaded Britain, and long after. Cattivellanus, their prince, was made commander in chief of the confederated Britons, not only on account of his own personal qualities, but also because he was at the head of one of their bravest and most powerful tribes. In the interval between the departure of Cæsar and the next invasion under Claudius, the Cattivellani had reduced several of the neighbouring states under their obedience; and they again took the lead in the opposition to the Romans at their second invasion, under their brave but unfortunate prince Caracalla. The country of the Cattivellani was much frequented and improved by the Romans, after it came under their obedience. Verulamium, their capital, which stood near where St Albans now stands, became a place of great consideration, was honoured with the name and privileges of a municipium or free city, and had magistrates after the model of the city of Rome. This place was taken and almost destroyed by the insurgents under Boudicca; but it was afterwards rebuilt, restored to its former splendor, and surrounded with a strong wall, some vestiges of which are still remaining. Duracorbive and Magavintonum, in the second siter of Antoninus, were probably Donfable and Fenny-Stratford, at which places there appear to have been Roman stations. The Salena of Ptolemy, a town in the country of the Cattivellani, was perhaps situated at Saludy, in Bedfordshire, where several Roman antiquities have been found. There were, besides these, several other Roman forts, stations, and towns in the country, which it would be tedious to enumerate. The territories of the Cattivellani made a part of the Roman province called Britannia Prima.

CATTLE, a collective word, which signifies the four-footed animals, which serve either for tilling the ground, or for food to men. They are diffignified into large, or black cattle; and into small cattle: of the former are horses, bulls, oxen, cows, and even calves and heifers; amongst the latter are rams, ewes, sheep, lambs, goats, kids, &c. Cattle are the chief stock of a farm: they who deal in cattle are styled graziers.

CATULLUS, (Caesar Valerianus) a Latin poet, born at Verona, in the year of Rome 666. The harmony of his numbers acquired him the esteem and friendship of Cicero, and other great men of his time. Many of his poems, however, abound with gross obscenities. He wrote satirical verses against Cæsar, under the name of Marmoro. He spent his whole life in a state of poverty; and died in the flower of his age, and the height of his reputation. Joseph Scaliger, Paffer, Muret, and Isaac Volfius, have written learned notes on this poet.
Cats ---v---

Jonary of Holland and fiadholder of the fiefs, but in¬
conveniences that fiemmed attached to the duties of the
portuned him to go on an
erequeries or officers
fore the whole
delicate
厅ion of horfemen, equipages, &c. by way of parade, or
like.

He retired to his fine country feat at Sorgvliet, where
his advanced age deman¬
red. As the
penfionary had been fatal to his
enjoyed it, from the beginning of the republic till that
time, Catz delivered up his charge on his knees,
that office. But though he was re¬
solved to fpend the
rest of his days in repofe, the love of his country
reawaked in him to comply with the de¬
ires of the fiate, who
reawaked in him to comply with the de¬
ires of the fiate, who

Cavalcante, (Guido) a nobleman of Florence
in the 13th century, who having followed the party of the
Guelfes, experienced the changeablenes of fortune.
He fhowed great strength of mind in his mis¬
fortunes, and never neglected to improve his talents.
He wrote a treatife in Italian concerning fyle, and
some verses which are esteemed. His poem on the love
of this world, has been commented on by feveral
learned men.

Cavalier, a horfeman, or perfon mounted on
horfback; especially if he be armed withal, and have
a military appearance.

Anciently, the word was restrained to a knight, or
miles. The French still use Chevalier in the fame
fence.

Cavalier, considered as a faction. See Britain,
n° 109.

Cavalerie, in fortification, an elevation of earth of
different fapes, fitted ordinarily in the gorge of a
battalion, bordered with a parapet, and cut into more
or lefs embrafures, according to the capacity of the
cavalier. Cavaliers are a double defence for the faces
of the opposite battalion: they defend the ditch, break
the besiegers galleries, command the traverses in dry
moats, flour the falient angle of the counterfeap,
where the besiegers have their counter-batteries,
and enflafe the enemies trenches, or oblige them to mul¬
tiply their parallels; they are likewise very service¬
able in defending the breach and the reen¬
crements of the besieged, and can very much in¬
commodate the en¬
crements which the enemy make, being lodged in the
battalion.

Cavalier, in the menege, one that understands
horfes, and is prafified in the art of riding them.

CAVALIERI, (Bonaventure) an eminent mathe¬
matician in the 17th century, a native of Milan, and
a friar of the order of the Jefuati of St. Jerome, was
professor of mathematics at Bologna, where he pub¬
lished feveral mathematical books, particularly the
Method of Indivifibles. He was a scholar of Galileo.
His Direftorium generale Uranometricum contains great
variety of moft useful practices in trigonometry and
afronomy. His trigonometrical tables in that work
are excellent.

Cavalry, a body of foldiers that charge on
horfback. The word comes from the French, ca¬
valerie, and that from the corrupt Latin, caballus, a
horfe.

The Roman cavalry confifted wholly of tho¬
esta called equites, or knights, who were a dif¬
tinct order in the dis¬
tribution of citizens. —The Grecian cavalry were
divided into cataphraca and non cataphraca, i. e. into
heavy and light armed. —Of all the Greeks, the Thes¬
salians excelled molt in cavalry. The Lacedemonians,
inhabiting a mountainous country, were but meanly
furnished with cavalry, till, carrying their arms into
other countries, they found great occasion for horfes
to support and cover their foot. The Athenian ca¬
vality, for a confiderable time, confifted only of 96 hor¬
femen: after expelling the Periabans out of Greece, they
increased the number to 300: and afterwards to 1200,
which was the highest pitch of the Athenian cavalry.
The Turkish cavalry confifts partly of Spanis, and part¬
ly of horfemen raised and maintained by the Zaimis
and Timariots.

The chief use of the cavalry is to make frequent
excursions to disturb the enemy, intercept his con¬
voys, and defoy the country: in battle to fupport
and cover the foot, and to break through and disor¬
der the enemy; also to fccure the retreat of the foot.
Formerly, the manner of the fighting of the cavalry
was
C A V

1. wiss, after firing their pithola or carabinas, to wheel off, and to give opportunity for loading again. Gustavus Adolphus is said to have first taught the cavalry to charge through, to march straight up to the enemy, with the sword drawn in the bridlehand, and each man having fired his piece, at the proper distance, to betake himself to his sword, and charge the enemy as was found most advantageous.

CAVAN, a town of Ireland, and capital of a county of the same name, in the province of Ulster, situated in W. Long. 7° 32'. N. Lat. 53° 40'.

CAVAN, a county of Ireland, 47 miles in length, and 23 in breadth; is bounded on the east by Monaghan, and on the south by Longford, West-Meath, and East-Meath. It has but two towns of any note, viz. Cavan and Kilmore. It winds five members to parliament; two for the county, two for Cavan, and one for Kilmore. It contains upwards of 8000 houses, 37 parishes, seven baronies, and two boroughs.

CAUCASUS, the name of a very high mountain of Asia, being one of that great ridge which runs between the Black and Caspian seas. Sir John Chardini describes this as the highest mountain, and the most difficult of paths, of any he had seen. It has frightful precipices, and in many places the roads are cut out of the solid rock. At the time he passed it, the mountain was entirely covered with snow; so that, in many places, his guides behoved to clear the way with hoes. The mountain is 36 leagues over, and the summit of it eight leagues in breadth. The top is perpetually covered with snow: and our traveller relates, that the two days he seemed to be in the clouds, and was not able to see 20 paces before him. Excepting the very top, however, all the parts of Mount Caucasus are extremely fruitful; abounding in honey, corn, fruits, hogs, and large cattle. The vines twine about the trees, and rife so high, that the inhabitants cannot gather the fruit from the uppermost branches. There are many streams of excellent water, and a vast number of villages. The inhabitants are for the most part Christians of the Georgian Church. They have fine cloisters, and the women are very beautiful.—In the winter they wear snow-shoes in the form of rackets, which prevent their sinking in the snow, and enable them to run upon it with great facility.

CAUDEC, a rich, populous, and trading town in Normandy, and capital of the territory of Caux. It is situated at the foot of a mountain near the river Seine, in E. Long. 46° 46'. N. Lat. 40° 30'.

CAUDEX, by Malphigi and other botanists, is used to signify the stem or trunk of a tree: by Linnaeus, the stock or body of the root, part of which ascends, part descends. The ascending part raises itself gradually above ground, serving frequently for a trunk, and corresponds in some measure to the caudex of former writers: the descending part strikes gradually downward into the ground, and puts forth radicles or small fibres, which are the principal and essential part of every root. The descending caudex therefore corresponds to the radix of other botanists. Agreeably to this idea, Linnaeus considers trees and shrubs as roots above ground: an opinion which is confirmed by a well-known fact, that trees, when inverted, put forth leaves from the descending caudex, and radicles or roots from the ascending. For the varieties in the descending caudex, see the article RADEX.

CAUDIUM, (anc. geog.) a town of Samnium, on the Via Appia, between Caelia and Beneventum: Caudinus, the epithet. The Caudine Forks, or Turcules, were memorable by the disgrace of the Romans; being spears disposed in the form of a gallows under which prisoners of war were made to pass, and gave name to a defile or narrow pass near Caudium, Livy: where the Samnites obliged the Roman army and the two confuls to lay down their arms and pass under the gallows, or yoke, as a token of submission.

CAVE, any large subterraneous hollow. These were undoubtedly the primitive habitations, before men began to build edifices above ground. The primitive method of burial was also to dispose the bodies in caves, which seems to have been the origin of catacombs. They long continued the proper habitations of shepherds. Among the Romans, caves (antar) used to be consecrated to nymphs, who were worshipped in caves, as other gods were in temples. The Persians also worshipped their god Mithras in a natural cave, consecrated for the purpose by Zoroaster. The cave of the nymph Egeria is still shown at Rome. Kircher, after Gaffarelus, enumerates divers species of caves; as divine, natural, &c.—Of natural caves some are possessed of a medicinal virtue, as the Grotto de Serpente; others are poisonous or medicinal; some are replete with metallic exhalations, and others with waters. Divine caves were those said to affect the human mind and passions in various ways, and ever to inspire with a knowledge of future events. Such were the sacred caverns at Delphi which inspired the Pythia; the Sibyl's cave at Cumae, still shown near the lake Avernus; the cave of Trophonius, &c.

CAVE, (Dr William), a learned English divine born in 1637, educated in St John's college Cambridge; and successively minister of Hasley in Oxfordshire, all-hallows the Great in London, and of Hinton. He became chaplain to Charles II. and in 1669 was installed a canon of Windsor. He compiled The Lives of the Primitive Fathers in the three first centuries of the church, which is esteemed a very useful work; and Hibernia Literaria, &c. in which he gives an exact account of all who had written for or against Christianity, from the time of Chrift to the 14th century: which works produced a warm controversy between Dr Cave and M. Le Clerc, who was then writing his Bibilothques Universelles in Holland, and who charged the doctor with partiality. Dr Cave died in 1713.

CAVE, (Edward) printer, celebrated as the projector of the Gentleman's Magazine,—the first publication of the species, and linece

The fruitful mother of a thousand more, who was born in 1691. His father being disappointed of some small family expectations, was reduced to follow the trade of a shoemaker at Rugby in Warwickshire. The free school of this place, in which his son had, by the rules of its foundation, a right to be instructed, was then in high reputation, under the Rev. Mr Holyock, to whose care most of the neighbouring families, even of the highest rank, entrusted their sons. He had judgment.
to discover, and for some time generously to encourage the genius of young Cave; and was so well pleased with his quick progress in the school, that he declared his intention to breed him for the university, and recommend him as a servant to some of his scholars of high rank. But prosperity which depends upon the caprice of others, is of short duration. Cave’s superiority in literature excited him to an invidious familiarity with boys whom he knew were far above him in rank and expectations; and, as in unequal associations it always happens, whatever unlucky prank was played was imputed to Cave. When any mischief, great or small, was done, though perhaps others boasted of the stratagem when it was successful, yet upon detection or miscarriage, the fault was sure to fall upon poor Cave. The harsh treatment he experienced from this source, and which he bore for a while, made him at last leave the school, and the hope of a literary education, to seek some other means of gaining a livelihood.

He was first placed with a collector of the excise; but the insolence of his mistresses, who employed him in servile drudgery, quickly disgusted him, and he went up to London in quest of a more suitable employment. He was recommended to a timber-merchant at the Bankside: and while he was there on looking, is said to have given hopes of great mercantile abilities: but the place he soon left, and was bound apprentice to Mr Collins, a printer of some reputation, and deputy alderman. This was a trade for which men were formerly qualified by a literary education, and which was pleasing to Cave, because it furnished some employment for his scholastic attainments. Here, therefore, he resolved to settle, though his master and mistresses lived in perpetual discord, and their house was therefore no comfortable habitation. From the inconvenience of these domestic tumults he was soon released, having in only two years attained so much skill in his art, and gained so much the confidence of his master, that he was sent without any superintendent to conduct a printing-house at Norwich, and publish a weekly paper. In this undertaking he met with some opposition, which produced a public controversy, and procured young Cave the reputation of a writer.

His master died before his apprenticeship was expired, and he was not able to bear the perverseness of his mistresses. He therefore quit his house upon stipulated allowance, and married a young widow with whom he lived at Bow. When his apprenticeship was over, he worked as a journeyman at the printing-house of Mr Barber, a man much distinguished and employed by the Tories, whose principles had at that time so much prevalence with Cave, that he was for some years a writer in Mill’s Journal. He afterwards obtained by his wife’s interest a small place in the post-office; but still continued, at his intervals of attendance, to exercise his trade, or to employ himself with some typographical business. He corrected the Gradius ad Parnassum: and was liberally rewarded by the company of flanioners. He wrote an Account of the Criminals, which had for some time a considerable sale; and published many little pamphlets that accident brought into his hands, of which it would be very difficult to recover the memory. By the correspondence which his place in the post-office facilitated, he procured a country newspaper, and fold their intelligence to a journal in London for a guinea a week. He was afterwards raised to the office of clerk of the franks, in which he acted with great spirit and firmness; and often stopped franks which were given by members of parliament to their friends, because he thought such extension of a peculiar right illegal. This raised many complaints; and the influence that was exerted against him procured his ejection from office. He had now, however, collected a sum sufficient for the purchase of a small printing-office, and began the Gentleman’s Magazine; an undertaking to which he owed the influence in which he passed the last 20 years of his life, and the large fortune which he left behind him.

When he formed the project, he was far from expecting the success which he found; and others had fo little prospect of its consequence, that though he had for several years talked of his plan among printers and booksellers, none of them thought it worth the trial. That they were not (says Dr Johnson) restrained by their virtue from the execution of another man’s design, was sufficiently apparent as soon as that design began to be gainful; for in a few years a multitude of magazines arose, and perished: only the London Magazine, supported by a powerful association of booksellers, and circulated with all the art and all the cunning of trade, exempted itself from the general fate of Cave’s invasers, and obtained though not an equal yet a considerable sale.

Cave now began to aspire to popularity; and being a greater lover of poetry than any other art, he sometimes offered subjects for poems, and proposed prizes for the best performers. The first prize was 50l. for which, being newly acquainted with wealth, and thinking the influence of 50l. extremely great, he expected the first authors of the kingdom to appear as competitors; and offered the allotment of the prize to the universities. But when the time came, no name was seen among the writers that had been ever seen before; the universities and several private men rejected the province of affigning the prize. The determination was then left to Dr Cromwell Mortimer and Dr Birch; and by the latter the award was made, which may be seen in Gent. Mag. Vol. VI. p. 39.

Mr Cave continued to improve his Magazine, and had the satisfaction of seeing its success proportionate to his diligence, till in 1753 his wife died of an asthma. He seemed not at first much affected by her death, but in a few days lost his sleep and appetite, which he never recovered. After having lingered about two years, with many vicissitudes of amendment and relapse, he fell by drinking acid liquor into a diar- rhoea, and afterwards into a kind of lethargic insensibility; and died Jan. 10, 1754, having just concluded the 23d annual collection.

CAVEARE. See CAVEATING.

CAVEAT, in law, a kind of process in the spiritual courts, to stop the proving of a will, the granting of administration, &c. to the prejudice of another. It is also used to stop the institution of a clerk to a benefice.

CAVEATING, in fencing, is the shifting the sword from one side of that of your adversary to the other.
CAVENDISH, (Sir William) descended of an ancient and honourable family, was born about the year 1505, the second son of Thomas Cavendish, of Caven­dish in Suffolk, clerk of the pipe in the reign of Henry VIII. Having had a liberal education, he was taken in to the family of the great cardinal Wolsey, whom he served in the capacity of gentleman-usher of the chamber, and afterwards conferred his into his service. He died, and delayed going to court till he had been in high favour at court than a camp: that when the civil war broke out, his circumstances were now so bad, that himself and wife were reduced to the necessity of pawning their clothes for a dinner. He afterwards removed to Antwerp, that he might be nearer his own country; and there, though under great difficulties, retired for several years: but, notwithstanding his distresses, he was treated, during an exile of eighteen years, with extraordinary marks of distinction. On his return to England at the restoration, he was advanced to the dignity of earl of Ogle and duke of Newcastle. He spent his time in a country retirement, and was the patron of men of merit. His grace died in 1679, aged 84. He wrote a treatise on horsemanship, which is esteemed; and some comedies, which are not.

Mr Granger observes, that he was master of many accomplishments, and was much better qualified for a court than a camp: that he understood horsemanship, music, and poetry; but was a better horsemann than musician, and a better musician than poet.

CAVENDISH, (Margaret) duchess of Newcastle, famous for her voluminous productions, was born about the latter end of the reign of James I. and was the youngest sister of Lord Lucas of Coleheffer. She married the duke of Newcastle abroad in 1645; and on his return after the restoration, spent the remainder of her life in writing plays, poems, with the help of her husband, to the amount of about a dozen of folios. "What gives the best idea of her unbounded passion for scribbling (sa.s Mr Walpole), was her finding revising the copies of her works, left, as she said, it should disturb her following conceptions." She died in 1673.

CAVENDISH, (William) the first duke of Devonshire, and one of the most distinguished patriots in the British annals, was born in 1640. In 1677, being then member for Derby, he vigorously opposed the venal measures of the court; and, the following year, was one of the committee appointed to draw up articles of impeachment against the lord treasurer Danby. In 1679, being re-elected to serve for Derby in a new parliament, Charles II. thought fit to make him a privy councilor; but he soon withdrew from the board, with his friend lord Ruffel, when he found that popish interest prevailed. He carried up the articles of impeachment to the house of lords, against lord chief justice Scroggs, for his arbitrary and illegal proceed-
CAVENDISH. In the court of the king’s bench; and when the king declared his resolution not to sign the bill for excluding the Duke of York (afterwards James II.), he moved the house of commons, that a bill might be brought in for the association of all his majesty’s protestant subjects. He also openly named the king’s evil counsellors, and voted for an address to remove them from his presence and councils for ever. He nobly appeared at lord Russel’s trial, in defence of that great man, at a time when it was feared more criminal to be an accomplice than a witness for him. The same fortitude, activity, and love of his country, animated this illustrious patriot to oppose the arbitrary proceedings of James II.; and when he saw there was no other method of saving the nation from impending slavery, he was the foremost in the association for invading over the prince of Orange, and the first nobleman who appeared in arms to receive him at his landing. He was created Duke of Devonshire in 1694, by William and Mary. His last public service was in the union with Scotland, for concluding of which he was appointed a commissioner by queen Anne. He died in 1707, and ordered the following inscription to be put on his monument.

Williamus Dux Devon,

Bonorum Principum Fidelis Subditus,

Iulius et Infius Tyrannus.

William Duke of Devonshire,

Of good Princes the faithful Subject,

The Enemy and Aversion of Tyrants.

Besides being thus estimable for public virtues, his grace was distinguished by his literary accomplishments. He had a poetical genius, which showed itself particularly in two pieces, written with equal spirit, dignity, and delicacy: these are, an ode on the death of queen Mary; and an allusion to the archbishop of Cambrai’s supplement to Homer. He had great knowledge in the languages, was a true judge in history, and a critic to any person of the circle, to be only a fragment of his time; it being an opinion, particularly a sort of mullet, with a species of the spawn of fiurgeon. A kind of caviare brought from Muscovy is prepared from the bellugs, a fish eight or ten feet long, caught in the Caspian sea, which is much preferable to that made of the spawn of fiurgeon. A kind of caviare, or rather sanguinaria, is also made from the spawn of some other fishes; particularly a sort of mullet caught in the Mediterranean. See MUGIL and BOTARIO.

Infeel CAVIARE. See AXAYACATL.

CAVIDOS. See CAVIDOS.

CAVIL, (cavillatio) is defined by some a fallacious kind of reason, carrying some resemblance of truth, caviare from Archangel, but commonly buy it at second hand of the English and Dutch. —According to Savary, the best caviare brought from Muscovy is prepared from the bellugs, a fish eight or ten feet long, caught in the Caspian sea, which is much preferable to that made of the spawn of fiurgeon. A kind of caviare, or rather sanguinaria, is also made from the spawn of some other fishes; particularly a sort of mullet caught in the Mediterranean. See MUGIL and BOTARIO.

CAUKING, or CAULKING, of a ship, is driving a quantity of oakum, or old ropes unwitted and drawn aunder, into the seams of the planks, or into the intervals where the planks are joined together in the ship’s decks or sides, in order to prevent the entrance of water. After the oakum is driven very hard into these seams, it is covered with hot and melted pitch or rosin, to keep the water from running out. Among the ancients, the first who made use of pitch in caulking were the inhabitants of Phœcea, afterwards called Corsica. Wax and rosin appear to have been commonly used previous to that period; and the Poles at this time use a sort of animal clay for the same purpose, on their navigable rivers.

CAULKING-Irons, are iron chisels for that purpose. Some of these irons are broad, some round, and others grooved. After the seams are filled with oakum, it is done over with a mixture of tallow, pitch, and tar, as low as the ship draws water.

CAUL, in anatomy, a membrane in the abdomen, covering the greatest part of the guts called, from its structure, Reticulum, but most frequently Omentum. See ANATOMY, n° 90.

CAUL is likewise a little membrane, found on some children, encompassing the head when born.

Drelincourt takes the caul to be only a fragment of the membranes of the foetus; which ordinarily break at the birth of the child. Lampridius tells us, that the midwives fold this caul at a good price to the advocates and pleaders of his time; it being an opinion, that while they had this about them, they should carry with them a force of persuasion which no judge could withstand: the canons forbid the use of it; because some witches and forcers, it seems, had abused it.

CAULIFLOWERS, in gardening, a much esteemed species of cabbage. See Brasia.

CAURIS, in natural history, is a name given by some to the genus of shells called, by the generality of writers, corallana, and concha venere. It is from a false pronunciation of this word cauris, which we call these shells porcellana. See CORSELAN-Shell.

CAURSINES, (Courins) were Italians that came into England about the year 1235, terming themselves the
the Pope's merchants, but driving no other trade than
letting out money; and having great banks in Eng-
land, they differed little from Jews, save (as history
fays) they were rather more mercifulls to their debtors.
Some will have them called Courisini, quasi Caufa Ur-
fini, bearich and cruel in their caufes; others Coarfini
or Corifini, as coming from the ille of Corfica; but
Cowel fays, they have their name from Courfiani, Caufiri,
a town in Lombardy, where they first practifed their
arts of ufury and extortion; from whence, spreading
themselves, they carried their infamous trade through
most parts of Europe, and were a common plague to
every nation where they came. The then bishop of
London excommunicated them; and king Henry III.
banifhed them from his kingdom in the year 1240.
But, being the pope's folicitors and money-changers,
they were permitted to return in the year 1250; tho'
in a very short time they were again driven out of the
kingdom on account of their intolerable exactions.

CAUSA MATRIMONII PRELOCUTI, in common
law, a writ that lies where a woman gives land to a man
in fee to the intent he shall marry her, and he refufes
in a very subtile matter, which passes from the magnet to the
needle, and forces it from its place. He can even
show you, in a figure, where there magnetic effluvia
issue from the magnet, what round they take, and
what way they return home again. And thus he thinks
he comprehends perfectly how, and by what caufe,
the motion of the needle is produced.

A Carteefian philofopher enters deeper into the caufe
of this phenomenon. He observes, that the magnet
does not touch the needle, and therefore can give it
no impulfes. He pities the ignorance of the failor. The
effect is produced, fays he, by magnetic effluvia, or
fubtile matter, which paffes from the magnet to the
needle, and forces it from its place. He can even
show you, in a figure, where these magnetic effluvia
issue from the magnet, what round they take, and
what way they return home again. And thus he thinks
he comprehends perfectly how, and by what caufe,
the motion of the needle is produced.

A Newtonian philofopher inquires what proof can
be offered for the exiftence of magnetic effluvia, and
can find none. He therefore holds it as a fiction, a
hypothesi; and he has learned that hypofhes ought
to have no place in the philofophy of nature. He
confesses his ignorance of the real caufe of this motion,
and thinks that his buifeifs as a philofopher is only to
find from experiment the laws by which it is regulated
in all cafes.

These three perffons differ much in their fentiments
with regard to the real caufe of this phenomenon; and
the man who knows moft is he who is fenfible that he
knows nothing of the matter Yet all the three fpeak
the fame language, and acknowledge that the caufe
of this motion is the attractive or repulsive power of
the magnet.

What has been faid of this, may be applied to every
phenomenon that falls within the compafs of natural
philofophy. We deceive ourselves, if we conceive
that we can point out the real efficient caufe of any
one of them.

The grandeft discovery ever made in natural philo-
...
discover the laws of nature; and then to apply those laws to the solution of the phenomena of nature. This was all that this great philosopher attempted, and all that he thought attainable. And this indeed he attained in a great measure, with regard to the motions of our planetary system, and with regard to the rays of light.

But supposing that all the phenomena which fall within the reach of our senses were accounted for from general laws of nature justly deduced from experience; that is, supposing natural philosophy brought to its utmost perfection; it does not discover the efficient cause of any one phenomenon in nature.

The laws of nature are the rules according to which the effects are produced; but there must be a cause which operates according to these rules. The rules of navigation never navigated a ship. The rules of architecture never built a house.

Natural philosophers, by great attention to the course of nature, have discovered many of her laws, and have very happily applied them to account for many phenomena; but they have never discovered the efficient cause of any one phenomenon; nor do those who have different notions of the principles of the science make any such pretense.

Upon the theatre of nature we see innumerable effects, which require an agent endowed with active power; but the agent is behind the scene. Whether it be the Supreme Cause alone, or a subordinate cause, or causes; and if subordinate causes be employed by the Almighty, what their nature, their number, and their different offices may be; are things hid, for wise reasons, without doubt, from the human eye.

 أيضًا، خلال كتبه، وصف العديد من الأدوية، بما في ذلك السلفارمين وأكسيوكريميتا، حيث أن هذه النباتات تحتوي على سموم تدميرية تصل إلى الدماغ، مما يمكن أن يؤدي إلى سوء الفطام. بفضل علماء الأدوية الجدد، بدأوا في استخدام هذه الأدوية بشكل أسرع وأكثر كفاءة.

The cause of a disease is defined by Galen to be that during the presence of which we are ill, and which being removed the disorder immediately ceases. The doctrine of the causes of diseases is called ETIOLOGY.

Physicians divide causes into procaurlic, antecedent, and continent.

PROCAURIC CAUSE, or a cause which brings about an effect, is either an occasion which of its own nature does not beget a disease, but happening on a body inclined to diseases, breeds a fever, gout, &c. (such as are watching, fasting and the like); or an evident and manifest cause, which immediately produces the disease, as being sufficient thereto, such as is a sword in respect of a wound.

ANTecedENT CAUSE, or a cause which predisposes the body, from whence some disease may arise; such as a plethora in respect of a fever, a cacocehumia in respect of a fever.

Continent, Conjoint, or Proximate Cause, that principle in the body which immediately adheres to the disease, and which being present, the disease is also present; or, which being removed, the disease is taken away: such is the stone in a nephritic patient.

CAUSEWAY, or CAUSEY, a massive construction of stone, flates, and facelines; or an elevation of fat, viscous earth, well beaten; serving either as a road in wet marshy places or as a mole to retain the waters of a pond or prevent the river from overflowing the lower ground. See ROAD.—The word comes from the French Chauy, or Chauysse; and Causeway, from the Latin Coacuta, or Coacata; according to Somner and Spelman, a calacando. Bergier rather takes the word to have had its rise à petitum caelestis, quibus territur. Some derive it from the Latin colo, or French chaux, as supposing it primarily to denote a way paved with chalk-flones.

CAUSEWAY, calectum, or calea, more usually denotes a common hard raised way, maintained and repaired with stones and rubbles.

DESPER'S CAUSED, a famous work of this kind, which ranges through the county of Northumberland in England, commonly supposed to be Roman, though Mr Horley suspects it to be of later times.

GIANT'S CAUSEWAY, is a denomination given to a huge pile of stone columns in the district of Coleraine in Ireland. See GIANT'S CAUSEWAY.

CAUSSIN, (Nicholas) parnised the just, a French Jesuit, was born at Troyes in Champagne, in the year 1580; and entered into the Jesuits order when he was 26 years of age. He taught rhetoric in several of their colleges, and afterwards began to preach by which he gained very great reputation. He increased this reputation by publishing books, and in time was preferred to be confessor to the king. But he did not discharge this office to the satisfaction of Cardinal Richelieu, though he discharged it into the satisfaction of every honest man; and therefore, it is not to be wondered at that he came at length to be removed. He died in the Jesuits convent at Paris in 1651. None of his works did him more honour than that which he entitled LA COURCE SAINTE. It has been printed a great many times; and translated into Latin, Italian, Spanish, Portuguese, German, and English. He published several other books both in Latin and French.

CAUSTICITY, a quality belonging to several substances, by the acrimony of which the parts of living animals may be corroded and destroyed. Bodies which have this quality, when taken internally, are true poisons. The causticity of some of these, as of arsenic, is so deadly, that even their external use is prohibited by prudent physicians. Several others as nitrous acid, lapis infernalis or lunar caustic, common caustic, butter of antimony, are daily and successfully used to consume fungous flesh, to open ulcers, &c. They succeed very well when properly employed and skillfully managed.

The causticity of bodies depends entirely on the state of the saline, and chiefly of the acid, matters they contain. When these acids happen to be at the same time much concentrated, and slightly attached to the matters with which they are combined, they are then capable of acting, and are corrosive or caustic. Thus fixed and volatile alkalies, although they are themselves caustic, become much more so by being treated with quicklime; because this substance deprives them of much of their inflammable matter, and all their fixed air, which binds and restrains the action of their saline principle. By this treatment, then the saline principle is more disengaged, and rendered more capable of action. Also all combinations of metallic matters with acids form salts more or less corrosive, because these acids are deprived of all their superabundant water, and are besides but imperfectly saturated with the metallic matters. Nevertheless, some other circumstances is necessary to constitute the causticity of these saline metals.
Cauritic. metallic matters. For the same quantity of marine acid, which, when pure and diluted with a certain quantity of water, would be productive of no harm, shall, however, produce all the effects of a corrosive poison, when it is united with mercury in corrosive sublimate, although the sublimate shall be dissolved in so much water that its causticity cannot be attributed to the concentration of its acid. This effect is, by some chemists, attributed to the great weight of the metallic matters with which the acid is univited; and this opinion is very probable, seeing its causticity is nothing in this way. Some are reckoned more acrid than the acids in a separate state; but its dissolving power, or its disposition to combine with other bodies, and this disposition is nothing else than attraction.

On this subject Dr Black observes, that the compounds produced by the union of the metals with acids are in general corrosive. Many of them applied to the skin destroy it almost as fast as the mineral acids; and some of the most powerful potential cauteries are made in this way. Some are reckoned more acid than the pure acids themselves; and they have more powerful effects when taken internally, or at least seem to have. Thus we can take 10 or 12 drops of a fustic acid, diluted with water, without being disturbed by it; but the same quantity of acid previously combined with silver, quicksilver, copper, or regal of antimony, will throw the body into violent disorders, or even prove a poison, if taken all at once.

This increased activity was, by the mechanical philosophers, supposed to arise from the weight of the metallic particles. They imagined that the acid was composed of minute particles of the shape of needles or wedges; by which means they were capable of entering the pores of other bodies, separating their atoms from each other, and thus dissolving them. To these acid spiculae the metallic particles gave more force; and the momentum of each particular needle or wedge was increased in proportion to its increase of gravity by the additional weight of the metallic particle. But this theory is entirely fanciful, and does not correspond with facts. The activity of the compound is not in proportion to the weight of the metal; nor are the compounds always poifomed of any great degree of acrimony; neither is it true that any of them have a greater power of destroying animal substances than the pure acids have.

There is a material difference between the powers called stimulis and corrosives. Let a person apply to any part of the skin a small quantity of metallic caustic, and likewise a drop of strong nitrous acid, and he will find that the acid acts with more violence than the caustic; and the disorders that are occasioned by the compounds of metals and acids do not proceed from a causticity in them, but from the metal affecting and proving a stimulus to the nerves; and that this is the case, appears from their affecting some particular nerves of the body. Thus the compounds of regal of antimony and mercury with the vegetable acids, do not shew the smallest degree of acrimony; but taken internally, they produce violent convulsive motions over the whole body, which are occasioned by the metallic matter having a power of producing this effect; and the acid is only the means of bringing it into a dissolved state, and making it capable of acting on the nervous system. In general, however, the compounds of metallic substances with acids may be considered as milder than the acids in a separate state; but the acid is not so much neutralized as in other compounds, for it is less powerfully attracted by the metal; so that alkaline salts, absorbent earths, or even heat alone, will decompose them; and some of the inflammable substances, as spirit of wine, aromatic oils, &c. will attract the acid, and precipitate the metal in its metallic form; and the metals can be employed to precipitate one another in their metallic form; so that the cohesion of these compounds is much weaker than those formed of the same acids with alkaline salts or caustic.

Cautics, in physics, an appellation given to medicines of so hot and fiery a nature, that, being applied, confume, and as it were burn, the texture of the parts; like hot iron.

Cautics are generally divided into four sorts; the common strong caustic, the common milder caustic, the antimonial caustic, and the lunar caustic. See PHARMACY and CHEMISTRY.

Cautic Curves, in the higher geometry, a curve formed by the concourse or coincidence of the rays of light reflected from some other curve.

Causus, or Burning Fever, a species of continual fever, accompanied with a remarkable inflammation of the blood.

Cauterosis, the act of burning or fear of some morbid part, by the application of fire either actual or potential. In some places they cauterize with burning tow, in others with cotton or moxa, in others with live coals; some use Spanish wax, others pyramidal pieces of linen, others gold or silver: but Severinus recommends flame blown through a pipe; but what is usually preferred among us is a hot iron.

Cauterizing irons are of various figures; some flat, others round, some curved, &c. of all which we find draughts in Albucasis, Scultetus, and Ferrara, and others. Sometimes a cauterity is applied through a capsule, to prevent any terror from the sight of it. This method was invented by Placentinus, and is described by Scultetus. In the use of all cauteries, care is to be taken to defend the neighbouring parts, either by a lamina, defensive platter, or lint moistened in oxideyater. Sometimes the hot iron is transmitted through a copper cannula, for the greater safety of the adjoining parts. The degrees and manners of cauterizing are varied according to the nature of the disease and the part affected.

Cautery, in surgery, a medicine for burning, eating, or corroding any solid part of the body. Cauteries are diffinguished into two classes; actual and potential; by actual cauteries are understood red hot instruments, unifiable of iron, and by potential cauteries are understood certain kinds of corroding medicines. See PHARMACY.

Cautus, in the civil and Scots law, denotes much the same with what, in the law of England, is called Bail.

Cauturer, in Scots law, that person, who becomes bound for another to the performance of any deed or obligation. As to the different kinds and effects of Cautusry, see Law, Part III. No 1 clxxv. 19.

Caxa, a little coin made of lead mixed with some feeris.
CAYENNE, a rich town and island in South-America, and capital of the French settlements there, is bounded on the north by the Dutch colonies of Surinam, and situated in W. LONG. 53° 10'. N. LAT. 5° 0'.

This settlement was begun in 1635. A report had prevailed for some time before, that, in the interior parts of Guiana, there was a country known by the name of del Dorado, which contained immense riches in gold and precious stones; more than ever Cortez and Pizarro had found in Mexico and Peru; and this false had fired the imagination of every nation in Europe. It is supposed that this was the country in quest of which Walter Raleigh went on his last voyage; and, as the French were not behind their neighbours in their endeavours to find out so desirable a country, some attempts, for this purpose, were likewise made by that nation much about the same time; which at last coming to nothing, the adventurers took up their residence on the island of Cayenne. In 1643, some merchants of Rouen united their flock, with a design to support the new colony; but, committing their affairs to one Poncet de Breteigny, a man of a ferocious disposition, he declared war both against the colonists and savages, in conformance of which he was soon maf- facrved. This catastrophe entirely extinguished the ar- mour of these associates; and in 1651 a new company was establisht. This promised to be much more con- siderable than the former; and they set out with such a capital as enabled them to collect 700 or 800 colonis- ts in the city of Paris itself. These embarked on the Seine, in order to fall down to Havre de Grace; but unfortunately the Abbe de Marivault, a man of great virtue, and the principal promoter of the under- taking, was drowned as he was stepping into his boat. Another gentleman, who was to have acted as general, was affaihnated on his passage; and 12 of the principal adventurers, who had promised to put the colony into a flourishing situation, not only were the principal perpetrators of this fact, but uniformly behaved in the same atrocious manner. As at last they hanged one of their own number; two died; three were banished to a desert island; and the rest abandoned themselves to every kind of excess. The commandant of the citadel deserted to the Dutch with part of his garrison. The savages, roused by numberless provocations, fell upon the remainder; so that the few who were left thought themselves happy in escaping to the Leeward Islands in a boat and two canoes, abandoning the fort, am- munition, arms, and merchandise, fifteen months after they had landed on the island.

In 1663, a new company was formed, whose capital amounted only to L. 8750. By the assistance of the ministry they expelled the Dutch, who had taken pos-
Caylus.

In his natural temper he was gay and priggishly, had a taste for pleasure, a strong passion for independence, and an invincible aversion to the servitude of a court. Such were the instructors of the count de Caylus. He was only twelve years of age when his father died at Brussels in 1704. After finishing his exercises, he entered into the corps of the Monjueforset; and in his first campaign in the year 1709, he distinguished himself by his valor in such a manner, that Louis XIV. commended him before all the court, and rewarded him with an ensigncy in the Gendarmerie. In 1711 he commanded a regiment of dragoons, which was called by his own name; and he signalized himself at the head of it in Catalonia. In 1715, he was at the siege of Fribourg, where he was exposed to imminent danger in the bloody attack of the covered way. The peace of Rastade having left him in a state of inactivity ill-suited to his natural temper, his vivacity soon carried him to travel into Italy; and his curiosity was greatly excited by the wonders of that country, where antiquity is still fruitful, and produces so many objects to improve taste and to excite admiration. The eyes of the count were not yet learned; but he was struck with the fight of so many beauties, and soon became acquainted with them. After a year's absence, he returned to Paris with so strong a passion for travelling, and for antiquities, as induced him to quit the army.

He had no sooner quitted the service of Louis, than he sought for an opportunity to get out for the Levant. When he arrived at Smyrna, he visited the ruins of Ephesus. From the Levant he was recalled in February 1717 by the tenderness of his mother. From that time he left not France, but to make two excursions to London. The academy of painting and sculpture adopted him an honorary member in the year 1731; and the count, who loved to realize titles, spared neither his labour, nor his credit, nor his fortune, to instruct, afflct, and animate the artists. He wrote the lives of the most celebrated painters and engravers that have done honour to this illustrious academy; and by extending the limits of the art, which seemed to him to move in too narrow a circle, he collected, in three different works, new subjects for the painter, which he had met with in the works of the ancients.

Such was his passion for antiquity, that he wished to have had it in his power to bring the whole of it to life again. He saw with regret, that the works of the ancient painters, which have been discovered in our times, are effaced and destroyed almost as soon as they are drawn from the subterraneous mansions where they were buried. A fortunate accident furnished him with the means of saving the composition and the colouring of the pictures of ancient Rome. The coloured drawings which the famous Pietro Sante Bartoli had taken there from antique pictures, fell into his hands. He had them engraved; and, before he enriched the king of France's cabinet with them, he gave an edition of them at his own expense. It is perhaps the most extraordinary book of antiquities that ever will appear. The whole is painted with a purity and a precision that are mimimable; we see the liveliness and the freshness of the colouring that charmed the Caylars. There were only 30 copies published; and there is no reason to expect that there will hereafter be any more.

Count de Caylus was engaged at the same time in an enterprise still more favourable to Roman grandeur, and more interesting to the French nation. Colbert had framed the design of engraving the Roman antiquities that are still to be seen in the southern provinces of France. By his orders Mignard the architect had made drawings of them, which count de Caylus had the good fortune to recover. He resolved to finish the work begun by Colbert, and to dedicate it to that great minister; and so much had he this enterprise at heart, that he was employed in it during his last illness, and warmly recommended it to M. Mariette.

In 1742, Count Caylus was admitted honorary member of the academy of belles lettres; and then it was that he seemed to have found the place for which nature designed him. The study of literature now became his ruling passion; he consecrated to it his time and his fortune; he even renounced his pleasures to give himself wholly up to that of making some discovery in the field of antiquity. But amidst the fruits of his research and invention, nothing seemed more flattering to him than his discovery of encaustic painting. A description of Pliny's, but too concise a one to give him a clear view of the matter, suggested the idea of it. He availed himself of the friendship and skill of M. Magault, a physician in Paris, and an excellent chemist; and by repeated experiments found out the secret of incorporating wax with divers tints and colours, and of making it obedient to the pencil. Pliny has made mention of two kinds of encaustic painting practiced by the ancients; one of which was performed with wax, and the other upon ivory, with hot punctures of iron. It was the former that Count Caylus had the merit of reviving; and M. Muntz afterwards made many experiments to carry it to perfection.

In the hands of Count Caylus, literature and the arts lent each other a mutual aid. But it would be endless to give an account of all his works. He published above 40 dissertations in the Memoirs of the Academy of Belles Lettres. The artist was particularly attentive to; and to prevent their falling into mistakes from an ignorance of costume, which the ablest of them have sometimes done, he founded a prize of 500 livres, the object of which is to explain, by means of authors and monuments, the usages of ancient nations. In order that he might enjoy with the whole world the treasures he had collected, he caused them to be engraved, and gave a learned description of them in a work which he embellished with 800 copperplates.

The strength of his constitution seemed to give him hopes of a long life; but a humour settling in one of his legs, which entirely destroyed his health, he expired on the 5th of September 1765, and by his death his family is extinct. The tomb erected to the honours of count Caylus is to be seen in the chapel of St Germain-l'Auxerrois, and deserves to be remarked. It is perfectly the tomb of an antiquary. This monument was an ancient sepulchral antique, of the most beautiful porphyry, with ornaments in the Egyptian taste. From the moment he procured it, he had
Ceanothus. garden where he used to look upon it with a tranquil but thoughtful eye, and pointed it out to the inspection of his friends.

The character of Count Caylus is to be traced in the different occupations which divided his cares and his life. In society he had all the frankness of a foal-dier, and a politeness which had nothing in it of deceit or circumvention. Born independent, he applied to studies which suited his taste. His heart was yet better than his abilities. In his walks he used frequently to try the honesty of the poor by feeding them with a piece of money to get change for him. In these cases he enjoyed their confusion at not finding him; and then presenting himself, used to commend their honesty, and give them double the sum. He said frequently to his friends, "I have this day loot a crown; but I was sorry that I had not an opportunity of giving a second. The beggar ought not to want integrity."

Cayster, or Caystrus, (anc. geog.) a river of Ionia, whose mouth was in great numbers. Its source was in the Montes Cilbiani, (Pliny). Caystrus Campus was a part of the territory of Ephesus. Campi Caystriani of Lydia, were the plains lying in the middle between the inland parts and Mount Tmolus.

Cazerom, or Cazeron, a city of Asia in Peria, situated in E. Long. 70. N. Lat. 39. 15.

Cazic, or Cazique, a title given to the petty kings, princes, and chiefs, of the several countries of America, excepting those of Peru, which are called Caziques. The French call them caziques, a denomination which they always give to the Tartarian lords.—The cazics, in some places, are of a light green color, grow irregularly on the branches, and not opposite by pairs, as has been asserted. They are late in the spring before they shoot. The flowers grow at the ends of the twigs in clusters: They are of a white colour, and when in bloom give the shrub a most beautiful appearance. Indeed it seems to be almost covered with them, as there is usually a cluster at the end of nearly every twig; and the leaves which appear among them serve as ornaments only, like myrtle in a distant nosegay; nature however has denied them smell. This tree will be in bloom in July; and the flowers are succeeded by small brownish fruit, in which the seeds will sometimes ripen in England.

This plant is propagated by layering; or from seeds sown in pots of compost, consisting of two parts virgin earth well tempered and one part sand, about a quarter of an inch deep; being equally careful to defend the young seedlings from an extremity of cold in winter, as from the parching drought of the summer months. The best time of layering them is in the summer, just before they begin to flower: At that time lay the tender twigs of the spring shoots in the earth, and nip off the end which would produce the flowers. By the autumn twelvemonth some of them will be rooted. At the floods, however, the plants should remain until the spring, when they should be taken off, and the best rooted of the strongest may be planted in the nursery-way, or in a dry soil and well sheltered place, where they are to remain; while the bad-rooted ones and the weakest should be planted in pots; and if these are plunged into a moderate warmth of dung, it will promote their growth, and make them good plants before autumn. In the winter they should be guarded against the frosts; and in the spring they may be planted out where they are to remain.

Cebes, of Theso, a Socratic philosopher, author of the admired Table of Cebes; or "Dialogues on the birth, life, and death of Mankind." He flourished about 405 years before Christ. The above piece is mentioned by some of the ancient writers, by Lucian, D. Laertius, Tertullian, and Suidas: but of Cebes himself we have no account, save that he is once mentioned by Plato, and once by Xenophon. The former says of him, in his "Phaedo," that he was a sagacious inquisitor of truth, and never averted without the most convincing reasons: the latter, in his "Memorabilia," ranks him among the few intimates of Socrates, who excelled the rest in the innocence of their lives. Cebes's Table is usually printed with Epictetus's Manual.

Cecil, (William) lord Burleigh, treasurer of England in the reign of queen Elizabeth, was the son of Richard Cecil, Esq; master of the robes to king Henry VIII. He was born in the house of his grandfather, David Cecil, Esq; at Bourn in Lincolnshire, in the year 1520; and received the rudiments of his education in the grammar-school at Grantham. From thence
had brought with him two Irish chaplains, enthusiastic in their profession, and was so pleased with his offer, which was the more extraordinary, as being at a time when the Greek language was by no means universally understood. In 1541 he went to London, and became a member of the society of Gray's-Inn, with an intention to study the law; but he had not been long in that situation, before an accident introduced him to King Henry, and gave a new bias to his pursuits. O'Neil, a famous Irish chief, coming to court, had brought with him two Irish chaplains, violent bigots to the Romish faith; with these Mr Cecil, visiting his father, happened to have a warm dispute in Latin, in which he displayed uncommon abilities. The king being informed of it, ordered the young man into his presence, and was so pleased with his offer, that he became a member of the society.

The king being informed of it, ordered the young man into his presence, and was so pleased with his offer, that he became a member of the society. At the age of 16 he read a lecture, in which he displayed uncommon abilities. The sight and judgment of his friend must have been subdued, for he was made secretary of state for 40 years, and guided the helm of government during the most glorious period of English history. From this period we find him the primum mobile of every material transaction during the glorious reign of Queen Elizabeth. Notwithstanding the temporary influence of other favourites, Lord Burleigh was, in fact, her prime minister, and the person in whom the chief confidence in matters of real importance. Having filled the highest and most important offices of the state for 40 years, and guided the helm of government during the most glorious period of English history, he departed this life on the 4th of August 1598, in the 78th year of his age. His body was removed to Stamford, and there deposited in the family vault, where a magnificent tomb was erected to his memory. Notwithstanding his long enjoyments of such lucrative employments, he left only an estate of L.4000 per annum, L.11,000 in cash, and 40,000 in money, and effects worth about L.30,000. He lived, indeed, in a manner suitable to his high rank and importance. He had four places of residence, viz., his lodgings at court, his house in the Strand, his seat at Burleigh-Park near Stamford, and his seat at Tedworth. The laft of these was his favourite place of retirement, where he frequently entertained the queen at a vast expense.

Cecilia. 


Cecilia, (St) the patroness of music, has been honoured as a martyr ever since the fifth century. Her story as delivered by the notaries of the Roman church, and from them transcribed into the Golden Legend and other books of the like kind, says, that she was a Roman lady born of noble parents, about the year 225. That, notwithstanding she would destroy him, Valerianus, somewhat heresy, the book, as the calamon, says the book, was given to understand by his spouse, that she was nightly visited by an angel, and that he must forbear to approach her, otherwise the angel would destroy him. Valerianus, somewhat troubled at these words, desired that he might see his rival the angel; but his spouse told him that was impossible, unless he would consent to be baptised and become a Christian. This he consented to; after which, returning to his wife, he found her in her closet at prayer, and by her side, in the shape of a beautiful young man, the angel clothed with brightness, after some conversation with the angel, Valerianus told him that he had a brother named Tiburtius, whom he greatly wished to see a paraker of the grace which he himself had received. The angel told him that his desire was granted, and that they should be both crowned with martyrdom in a short time. Upon this the angel vanished, and was not long in showing himself as good as his word; Tiburtius was converted, and both he and his brother Valerianus were beheaded. Cecilia was offered her life upon condition that she should be visited in a dry bath, i.e. an inclosure, from whence the air was excluded, having a slow fire underneath it; which kind of death was sometimes inflicted by the Romans upon women of quality who were criminals. Upon the spot where her house stood, is a church said to have been built by pope Urban I. who administered baptism to her husband and his brother: it is the church of St Cecilia at Trastevere: within is a most curious painting of the saint, as also a flately monument with a cumbent statue of her with her face downwards. There is a tradition of St Cecilia, that she excelled in music; and that the angel who was thus enamoured of her, was drawn from the celestial regions by the charms of her melody; this has been deemed authoratative for making her the patroness of music and musicians. The legend of St Cecilia has given frequent occasion to painters and sculptors to exercise their genius in representations of her, playing on the organ, and sometimes on the harp. Raphael has painted her singing with a refulent in her hands; and Domenichino and Mignard, Cecropia singing and playing on the harp.

Cecropia, the founder and first king of Athens, about the time of Moses the lawgiver of the Hebrews. He was the first who established civil government, religious rites, and marriage among the Greeks; and died after a reign of 50 years. See ATTICA, n° 4.

Cedrus, in botany. See Juniperus and Pinus. The species of cedar famous for its duration, is that popularly called by us the cedar of Lebanon (Pinus cedrus), by the ancients cedrus magnus, or the great cedar; also cedrato, Kadara. See the article Pinus.

Cedrenus, (George) a Greek monk, lived in the 7th age, and wrote "Annals, or an abridged History, from the Beginning of the World to the Reign of Isaac Comnenus emperor of Constantinople, who succeeded Michael IV. in 1057." This work is no more than an extract from several historians. There is an edition of it, printed at Paris in 1647, with the Latin version of Xylander, and the notes of father Goar a Dominican.

Cedrus, the cedar-tree, mahogany, &c. See Juniperus, Pinus, and Sweeten. Ceiling, in architecture, the top or roof of a lower room; or a covering of plaster, over laths nailed on the bottom of the joists that bear the floor of the upper room; or where there is no upper room, on joists for the purpose; hence called ceiling joists. The word ceiling answers prettily to the Latin laeunus, "every thing over head." Plastered ceilings, are much used in Britain, more than in any other country: nor are they without their advantages, as they make the room lightsome; are good in case of fire; stop the passage of the dust; lessen the noise over head; and, in summer, make the air cooler.

Ceiling, in sea-language, denotes the inside planks of a ship.

Cemelia, from καιμης, "to be laid up," in antiquity, denotes choice or precious pieces of furniture or ornaments, reserved or laid up for extraordinary occasions and uses; in which fene, sacred garments, vessels, and the like, are reputed the cemelia of a church. Medals, antique stones, figures, manuscripts, records, &c. are the cemelia of men of letters.

Cemeliarchium, the repository or place where cemelia are preferred.

Cemellyphylax, (from καιμηλια and φυλακος, I keep), the keeper or curator of a collection of cemelia; sometimes also denominated cemeliarcha. The cemeliarcha, or cemellyphylax, was an officer in the ancient churches or monasteries, answering to what was otherwise denominated chartophylax, and cistus archeverum. Celaene, (anc. geog.) the capital of Phrygia Magna, situated on a cognominous mountain, at the common sources of the Maeander and Marisias. The king of Peria had a strong palace beneath the citadel, by the springs of the Marnias, which rose in the market-place, not less in size than the Maceander, and flowed through the city. Cyrus the younger had also a palace there, but by the springs of the Maceander, which river passed likewise through the city. He leg.
Celandine, or Celasnus, which lake bad, moreover, an extensive paradise or park, full of wild beasts, which he hunted on horseback for exercise or amusement; and watered by the Maederland, which ran through the middle. Xerxes was said to have built these palaces and the Citadel after his return from his expedition into Greece.

Aniochus Soter removed the inhabitants of Celâna into a city, which he named from his mother, Apamea; and which became afterwards a mart inferior only to Ephesus. See Apamea.

Celandine, in botany. See Chelidonium.

Celano, a town of Italy, in the kingdom of Naples, in Farther Abruzzo. It is seated a mile from the lake Celano, anciently called Fusinus. E. Long. 13° 39'. N. Lat. 41° 36'.

Celarent, in logic: a mode of syllogism, wherein the major and conclusion are universal negative propositions, and the minor an universal affirmative.

E. g. cf. E. None whose understanding is limited can be omniscient.

\(\therefore\) Every man's understanding is limited.

\(\therefore\) Eni Therefore no man is omniscient.

Celastrus, in botany: a genus of the monogynia order, belonging the pentandria class of plants; and in the natural method ranked under the 43d order, Daunaya. The corolla is pentapetalous and perfect; the capsule quinquelocular and trilocular; the seeds veiled. There are 11 species; two of which are introduced to Britain.

1. The bullatus, an uncertain deciduous shrub, is a native of Virginia. It is about four feet in growth, rising from the ground with several flasks, which divide into many branches, and are covered with a brownish bark. The leaves are of a fine green colour, and grow alternately on the branches. They are of an oval figure, and have their edges undivided. The flowers are produced in July, at the ends of the branches, in loose spikes. They are of a white colour, and in their native countries are succeeded by very ornamental scarlet fruit; but in Britain this seldom happens. It is easily propagated from seeds sown, about an inch deep, in beds of good freth mould made fine. They seldom come up until the second, and sometimes not before the third spring. It is also propagated by layers; which work must be performed on the young wood, in the autumn, by a slit at the joint. These layers may be expected to strike root by the autumn following; when they may be taken up and planted in the nursery-ground. This shrub must have a well-sheltered situation, otherwise the leaves are apt to fall off at the approach of frosty weather. And Millar says, that, growing naturally in moist places, it will not thrive well in a dry soil.

2. The scandens, or biffard eunomus, with woody twining flasks, rising by the help of neighbouring trees or bushes to the height of 12 feet. The leaves are oblong, terraced, of a pleasant green colour, pale, and waved underneath, and grow alternately on the branches. The flowers are produced in small bunches, from the sides of the branches, near the ends. They are of a greenish colour, appear in June; and are succeeded by roundish, red, three-cornered capsules, containing ripe seeds, in the autumn. This species is exceedingly hardy, and makes a beautiful appearance among other trees in the autumn, by their beautiful red berries, which much resemble those of the Spindle-tree, and which will be produced in vast profusion on the tops of other trees, to the height of which these plants by their twining property climb. They should not be planted near weak or tender trees, to climb on; for they embrace the stalks so closely as to bring on death to any but the hardiest trees and shrubs. It is propagated, 1. By laying down the young shoots in the spring. By the autumn they will have struck root, and may then be taken off and set in the places where they are designed to remain. 2. By seeds; which should be sown soon after they are ripe, otherwise they will be two and sometimes three years before they come up. When they make their appearance, nothing more need be done than keeping them clear from weeds all summer and the winter following; and in the spring the strongest plants may be drawn out, and set in the nursery for a year, and then removed to the places where they are designed to remain; whilst the weakest, being left in the seed-bed one year more, may undergo the same discipline.

In Senegal the negroes use the powder of the root as a specific against gonorrhoeas, which is said to cure in eight or sometimes in three days. An infusion of the bark of a species of loftrtree, which grows in the Ile of France, is said to pollute the same virtues.

. Celebes, an island in the Indian sea, seated under the equator, and called by some Magafler. The length and breadth has not been accurately computed; but the circumference, at a medium, is about 3oo miles. It had formerly six kingdoms, which are reduced to one. The air is hot and moist; and subject to great rains during the north-west winds, which blow from November to March, at which time the country is overflowed, and for this reason they build their houses on piles of wood 10 feet high. The most healthful time is during the northern monsoons, which seldom fail blowing regularly in one part of the year. The chief vegetables are rice and cocoa; but they have ebony, sanders, &c. Their fruits and flowers are much the same as in the neighbouring parts of the Indies. They have pepper, sugar, and oil, and the finest cotton, and opium. The natives have olive complexions, and the women have shining black hair. They are thought to be very handsome by the Dutch and Chinese, who often purchase them for bedfellows. The men are industrious, robust, and make excellent soldiers. Their arms are sabres, and trunks, from whence they blow poisoned darts, which are pointed with the tooth of a sea-fish. Some likewise use poisoned daggers. They were the last of the Indian nations that were enslaved by the Dutch, which could not be effectually till after a long war. They teach their children to read and write, and their characters have some resemblance of the Arabic. Their religion being Mahometan, the men indulge themselves in many wives and concubines. The employment of the women is spinning, cookery, and making their own and their husbands clothes. The men wear jewels in their ears, and the women gold chains about their necks. The inhabitants in general go half naked, without any thing on their head, legs, or feet, and some have nothing but a cloth about their middle. The streets of
Celeres, the town Macasus are spacious, and planted with trees on every side. It stands by the side of the only large river they have in the island. The Dutch have a fort here, mounted with 40 guns, and garrisoned with 700 men. There is only one other town of note, called Jampandam, where they also have a fort. The island is not near so populous as when the Dutch conquered it; the men being hired for soldiers in most of the neighbouring countries.

The religion of these islands was formerly idolatry. They worshiped the sun and moon. They sacrificed to them in the public squares, having no materials which they thought valuable enough to be employed in raising temples. About two centuries ago, some Christians and Mahometans having brought their opinions to Celeres, the principal king of the country took a dislike to the national worship. Having convened a general assembly, he ascended an eminence, when, spreading out his hands towards heaven, he told the Deity, that he would acknowledge for truth that doctrine whole minimizers should first arrive in his dominions, and as the winds and waves were at his command. Almighty would have himself to blame if he embraced a falsehood. The assembly broke up, determined to wait the orders of heaven, and to obey the first missionaries that should arrive. The mahometans were the most active, and their religion accordingly prevailed.

CELERES, in Roman antiquity, a regiment of body-guards belonging to the Roman kings, established by Romulus, and composed of 300 young men, chosen out of the most illustrious Roman families, and approved by the suffrages of the curios of the people, each of which furnished ten. The name comes from celer, "quick, ready;" and was given them because of their promptness to obey the king.

The celeres always attended near the king's person, to guard him, to be ready to carry his orders, and to execute them. In war, they made the van-guard in the engagement, which they always began first; in retreats, they made the rear-guard.

Though the celeres were a body of horse, yet they usually dismounted, and fought on foot; their commander was called tribune, or prefect of the celeres. They were divided into three troops, of 100 each, commanded by a captain called centurio; their tribune was the second person in the kingdom.

Plutarch says, Numa broke the celeres; if this be true, they were soon re-established; for we find them under most of the succeeding kings: witness the great Brutus, who expelled the Tarquins, and who was the tribune of the celeres.

CELERI, in botany, the English name of a variety of the Apium Graveolens.

The seed of celeri should be sown at two or three different times, the better to continue it for use thro' the whole season without running up to feed. The first sowing should be in the beginning of March, upon a gentle hot-bed; the second may be at the end of the same month, which ought to be in an open spot of light earth, where it may enjoy the benefit of the sun; the third time of sowing should be in the latter end of April, or beginning of May, on a light soil; and if exposed to the morning sun only, it will be so much the better, but it should not be under the drip of trees. The middle of May, some of the plants of the first sowing will be fit to transplant for blanching.

The manner of transplanting it is as follows: after having cleared the ground of weeds, you must dig a trench by a line about 10 inches wide, and 8 or 9 inches deep, loosing the earth in the bottom, and laying it level: and the earth that comes out of the trench should be equally laid on each side the trench, to be ready to draw in again to earth the celeri as it advances in height. These trenches should be made at three feet distance from each other: then plant your plants in the middle of the trench, at about four or five inches distance, in one straight row, having before trimmed the plants, and cut off the tops of the long leaves: and as they are planted, you must observe to cover the earth well to their roots with your foot, and to water them plentifully until they have taken new root. As these plants advance in height, you must observe to draw the earth on each side close to them, being careful not to bury their hearts, nor ever to do it but in dry weather; otherwise the plants will rot. When your plants have advanced a considerable height above the trenches, and all the earth, which was laid on the sides thereof, has been brought in earthing them up, you must then make use of a spade to dig up the earth between the trenches, which must also be made use of for the same purpose continuing from time to time to earth it up until it is fit for use. The last crop should be planted in a drier soil, to prevent its being rotted with too much wet in the winter. You will do well to cover your ridges of celeri with some peat-baulm, or some such light covering, when the frost is very hard, which will admit the air to the plants; for if they are covered too close, they will be very subject to rot: by this means you will preserve your celeri till spring; but you must remember to take off the covering when you expect the weather will permit, otherwise it will be apt to cause the celeri to pipe, and run to seed. The celeri, when fully blanched, will not continue good above three weeks or a month before it will rot or pipe; therefore, in order to continue it good, you should have, at least, six or seven different seasons of planting, proportioned to the consumption.

The other sort of celeri, which is commonly called celeriac, is to be managed in the same manner; excepting that this should be planted on the level ground, or in very shallow drills: for this plant seldom grows above eight or ten inches high, so requires but little earthing up; the great excellence of this being in the size of the root, which is often as large as ordinary turnips.

The best method to save the seed of celeri, is to make choice of some long good roots of the upright celeri, which have not been too much blanched, and plant them out, at about a foot asunder, in a moist soil, early in the spring; and when they run up to feed, keep them supported with stakes, to prevent their being broken down with the wind: and in July, when the feed begins to be formed, if the season should prove very dry, it will be proper to give some water to the plant, which will greatly help its producing good feeds. In August these seeds will be ripe, at which time it should be cut up, in a dry time, and...
CELESTINS, a religious order so called from their founder Peter de Meuron, afterwards raised to the pontificate under the name of Celestin V. This Peter, who was born at Isernia, a little town in the kingdom of Naples, in the year 1215, of lowly parents, retired, while very young, to a solitary mountain, in order to dedicate himself wholly to prayer and mortification. The fame of his piety brought several, out of curiosity, to see him; some of whom, charmed with his virtues, renounced the world to accompany him in his solitude. With these he formed a kind of community, the first of its kind in the year 1254, which was approved by Pope Urban IV. in 1254, and erected into a distinct order, called the hermits of St. Damien. Peter de Meuron governed this order till 1286, when his love for solitude and retirement induced him to quit the charge. In July 1294, the great reputation of his sanctity raised him, though much against his will, to the pontificate. He then took the name of Celestin V. and his order that of Celestins from him. By his bull he approved their constitutions, and confirmed all their monasteries to the number of 20. But he sat too short time in the chair of St. Peter to do many great things for his order; for having governed the church five months and a few days, and considering the great burden he had taken upon him, to which he thought himself unequal, he solemnly renounced the pontificate in a conistory held at Naples.

After his death, which happened in 1296, his order made great progress not only in Italy, but in France likewise; whether the then general Peter of Tivoli, elected 12 religious, at the request of king Philip the Fair, who gave them two monasteries; one in the forest of Orleans, and the other in the forest of Compiègne at mount Chartres. This order likewise passed into several provinces of Germany. They have about 96 convents in Italy, and 21 in France, under the title of priories.

The Celestins live two hours after midnight, to say matins. They can no street at any time, except when they are sick. They fast every Wednesday and Friday, from Easter to the feast of the exaltation of the holy cross; and, from that feast to Easter, every day. As to their food, it consists of a white gown, a capuche, and a black capulary. In the choir, and when they go out of the monastery, they wear a black cowl with the capuche: their shirts are of serge.

CELESTES, or CELEST, (from κέλετος, a race-horse,) in antiquity, denote sarge or saddle-horses; by way of contradistinction from those yoked or harnessed together, called bigarii, quadrigeri, &c. The same denomination is also given to the cavaliers or riders on Celusma horsecab; and hence some deduce celeres, the name of Romulus's guard.

CELEUSMA, or CELEUMA, in antiquity, the shout or cry of the seamen, whereby they animated each other in their work of rowing. The word is formed from κιλέω, to call, to give the signal.

CELEUSMA was also a kind of song or formula, rehearsed or played by the master, or others, to direct the strokes and movements of the mariners, as well as to encourage them to labour. See CELUSTES.

CELEUSTES, in ancient navigation, the boat-swan or officer appointed to give the rowers the signal when they were to pull, and when to stop. He was also denominated epopes, and by the Romans porticus, sometimes simply bortator.

CELIBACY, the state of unmarried persons. Scaliger derives the word from the Greek κρῖνμα, "bed," and κρίνω λίγυς, "I leave" others say it is formed from cali beatitudo; q. d. the blissfulness of heaven.

The ancient Romans used all means imaginable to discourage celibacy. Nothing was more usual than for the confuls to impose a fine on bachelors. Dionysius Halicarnassensis mentions an ancient constitution whereby all persons of full age were obliged to marry. But the first law of that kind, of which we have any certainty, is that under Augustus, called lex Julia de martiandis ordinibus. It was afterwards denominated Papia Poppea, and more usually Julia Papia, in regard of some new sanction, and amendments made to it under the consuls Papus and Poppeus. By this law divers prerogatives were given to persons who had many children; penalties imposed on those who lived a single life, as that they should be incapable of receiving legacies, and not exceeding a certain proportion.

CELIBATE, the name with celibacy; but it is chiefly used in speaking of the single life of the Popish clergy, or the obligation they are under to abstain from marriage. In this sense we say the law of celibate. Monks and religious take a vow of celibate; and what is more, of chastity.

The church of Rome imposes an universal celibacy on all its clergy, from the pope to the lowest deacon and subdeacon. The advocates for this usage pretend, that a vow of perpetual celibacy was required in the ancient church as a condition of ordination, even from the earliest apostolic ages. But the contrary is evident from numerous examples of bishops and archbishops, who lived in a state of matrimony, without any prejudice to their ordination or their function. It is generally agreed that most of the apostles were married. Some say all of them, except St. Paul and St. John. Others say St. Paul himself was married, because he writes to his yoke-fellow, whom they interpret his wife. Be this as it will, in the next ages after the apostles, we have accounts of divers married bishops, presbyters, and deacons, without any reproof or mark of dishonour set on them; e.g. Valent, presbyter of Philipp, mentioned by Polycarp; and Chrestemon, bishop of Nikus. Novatus was a married presbyter of Carthage, as we learn from Cyprian; who himself was also a married man, as Pagi confesses; and so was Cæcilius the presbyter who converted him; and Numidius another presbyter of Carthage. The reply
reply which the Romanists give to this is, that all married persons, when they came to be ordained, promised to live separately from their wives by consent, which answered the vow of celibacy in other persons. But this is not only said without proof, but against it. For Novatus, bishop of Carthage, was certainly allowed to cohabit with his wife after ordination; as appears from the charge that Cyprian brings against him, that he had struck and abused his wife, and thereby caused her to miscarry. There seems indeed to have been, in some cases, a tendency towards the introduction of such a law, by one or two zealots; but the motion was no sooner made, than it was quashed by the authority of wiser men. Thus Eusebius observes, that Pinythus, bishop of Gnossis in Crete, was for laying the law of celibacy upon his brethren; but Dionysius bishop of Corinth wrote to him, that he should consider the weakness of men, and not impose that heavy burden on them. In the council of Nice, anno 325, the motion was renewed for a law to oblige the clergy to abstain from all conjugal society with their wives, whom they had married before their ordination; but Paphnutius, a famous Egyptian bishop, and one who himself never was married, vigorously declined against it, upon which it was unanimously rejected. So Socrates and Sozomen tell the story; to which all that Eusebius, after Bellarmin, has to say, is, that he suspects the truth of it. The council in Trullo, held in 692, made a difference in this respect between bishops and presbyters; allowing presbyters, deacons, and all the inferior orders, to cohabit with their wives after ordination; and giving the Roman church a smart rebuke for the contrary prohibition, but at the same time laying an injunction upon bishops to live separate from their wives, and appointing the wives to beseech themselves to a monastic life, or become deaconesses in the church. And thus was a total celibate established in the Greek church, as to bishops, but not any others. In the Latin church, the like establishment was also made, but by slow steps in many places. For in Africa, even bishops themselves cohabited with their wives at the time of the council of Trullo. The celibacy of the clergy, however, appears of an ancient standing, if not of command and necessity, yet as of counsel and choice. But as it is clearly neither of divine nor apostolical institution, it is, at first, hard to conceive from what motive the court of Rome perished to very obligingly to impose this institution on the clergy. But we are to observe that this was a leading step to the execution of the project formed of making the clergy independent of princes, and rendering them a separate body to be governed by their own laws. In effect, while priests had children, it was very difficult to prevent their dependence on princes, whose favours have such an influence on private men; but having no family, they were more at liberty to adhere to the Pope.

CELIODOGRAPHIA, the description of the spots which appear on the surfaces of the sun and planets. See Astronomy, No 58, &c.

CELL, or CELLA, in ancient writers, denotes a place or apartment usually under ground, and vaulted, in which were floored up some sort of necessaries, as wine, honey, and the like; and according to which it was called Cella Vinaria, Gloriæ, Melaria, &c. The word is formed from the Latin cella, to conceal.

CELLA was also used for the lodge or habitation of a common prostitute, as being anciently under ground, hence also denominated fornix.


On which place an ancient scholiast remarks, that the names of the whores were written on the doors of their several cells; by which we learn the meaning of inscripta cella in Martialis, lib. xi. ep. 46.

CELLA was also applied to the bed-chambers of domestics and servants; probably as being low and narrow.—Cicero, inveighing against the luxury of Antony, says, the beds in the very cells of his servants were spread with pompos purple coverlets.

CELL is also applied to the members or apartments of baths. Of these there were three principal called frigidaria, tepidaria, and caldaria; to which may be added a fourth, called cella affa, and sometimes fictatoria.

CELLA likewise signifies the adjut, or inmost and most retired parts of temples, wherein the images of the gods to whom the edifices were consecrated were preferred. In this sense we meet with cella Jacob, cella Concordia, &c.

CELL is also used for a lesser or subordinate sort of minifier dependent on a great one, by which it was erected, and continues still to be governed. The great abbey of England had most of them cells in places distant from the mother abbey, to which they were accountable, and from which they received their superiors. The alien priories in England were cells to abbey in Normandy, France, Italy, &c. The name cell was also given to rich and considerable monasteries not dependent on any other.

CELL signifies also a little apartment or chamber, such as those wherein the ancient monks, solitaries, and hermits, lived in retirement. Some derive the word from the Hebrew שמא, i. e., "a prison, or place where any thing is shut up."

The same name is still retained in divers monasteries. The dormitory is frequently divided into so many cells or lodges. The Carthusians have each a separate house, which serves them as a cell. The hall wherein the Roman concave is held, is divided, by partitions, into divers cells, for the several cardinals to lodge in.

CELL is also a name given to the little divisions in honey-combs, which are always regular hexagons. See Bees.

CELL, in botany, is applied to the hollow places between the partitions in the pods, holts, and other food-vessels of plants; according as there is one, two, three, or of these cells, the vessel is said to be unilocular, bilocular, trilocular, &c.

CELLS, in anatomy, little bags, or bladders, where fluids or other matters are lodged; called loculi, cellulae, &c. Thus the cellula adiposa are the little cells where the fat is contained; cellulae in the colon, are spaces wherein the excrements are detained till voided, &c.

CELLAR, or Cellarium in ancient writers, denotes the fame with cella, viz. a conservatory of estables, or drinkable.
Cellar. Cellars, in modern building, are the lowest rooms in a house, the ceilings of which usually lie level with the surface of the ground on which the house is built; or they are situated under the pavement before the house, especially in streets and squares.

Cellars, or cellerers, (Cellerarius or Cellarius), an officer in monasteries, to whom belong the care and procurement of provisions for the convent. The denomination is said to be borrowed from the Roman law, where cellarius denotes an examiner of accounts and expenses. Ulpian defines it thus: 'Cellarius, id eft, idaeo praepositus ut rationes fualve fint.'

The cellarius was one of the four obedientiaris, or great officers of monasteries; under his ordering was the piftrimum or bakehouse, and the braicum, or brew-house. In the richer houses there were particular lands set apart for the maintenance of his office, called condì della cafe.

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fe would be often unintelligible, often misunderstood by us. He shows us also, how the ancients cared dif-
temperies by friction, bathing, &c. His eight books
de Medicina have been several times printed. The El-
zivir edition, in the year 1650, by Vander Linden, is
the best, as being entirely corrected from his manu-
scripts.

CELSUS, an Epicurean philosopher, in the second
century. He wrote a work against the Christians, en-
titled, The true Discourse; to which Origens, at the de-
sire of Ambrose his friend, wrote a learned answer. To
this philosopher Lucian dedicated his Pseudanumiaci.

CELTES, or CELTES, an ancient nation, by which
most of the countries of Europe are thought to have
been peopled. The compilers of the Universal Histo-
ry are of opinion, that they are descended from Gomer
the eldest son of Japhet, the son of Noah. They think
that Gomer settled in the province of Phrygia in Asia;
Aithkenaz his eldest son, or Toparzah his youngest, or
both, in Armenia, and Riphath the second son in
Capadocia. When they spread themselves wider, they
seem to have moved regularly in columns without in-
terfering with or disturbing their neighbours. The
defendants of Gomer, or the Celtes, took the left hand,
infenibly spreading themselves westward towards Po-
land, Hungary, Germany, France, and Spain; while
the descendants of Magog, Gomer's brother, moving
eastward, peopled Tartary.

In this large European tract, the Celtes began to ap-
pear a powerful nation under a regular monarchy, or
rather under several considerable kingdoms. Mention
is made of them indeed in so many parts of Europe, by
ancient geographers and historians, that Oertelius took
Celtica to be a general name for the continent of Eu-
rope, and made a map of it bearing this title. In those
parts of Asia, which they possessed, as well as in the dif-
ter parts of Europe, the Celtes went by various names.
In Leper Asia they were known by the names of
Titans, and Sacks; in the northern parts of Eu-
rope, by those of Cymmerians, Cymbrics, &c.; and in
the southern parts they were called Celts, Gauls, or
Catalans.

With respect to the government of the Celtes we
are entirely in the dark. All we know is, that the
curettes, and afterwards druids and bards, were the
interpreters of their laws; judged all causes whether
criminal or civil; and their sentence was reckoned so
facred, that whoever refused to abide by it was by
them excluded from attending at their sacred rites;
after which no man dared converse with him; so that
this punishment was reckoned the most severe of all,
even severer than death itself.

They neither reared temples nor statues to the deity,
but destroyed them wherever they could find them,
planting in their stead large spacious groves; which
being open on the top and sides, were, in their opin-
ion, more acceptable to the divine Being, who is ab-
solutely unconfined. In this their religion seems to
have resembled that of the Perfees and disciples of
Zoroaster. The Celtes only differed from them in
making the oak instead of the fire the emblem of the
deity; in choosing that tree above all others to plant
their groves with, and attributing several supernatural
virtues both to its wood, leaves, fruit, and misfletce;
alike which were made use of in their sacrifices and
other parts of their worship. But after they had adopt-
ed the idolatrous superstition of the Romans and other
nations, and the apotheosis of their heroes and prin-
ces, they came to worship them much in the same
manner: as Jupiter under the name of Tarum, which
in the Celtic signifies thunder: Mercury, whom some
authors call Heus or Hepas, probably from the Celtic
hand, which signifies a dog, and might be the Anubis
lustrans of the Egyptians. But Mars was held in
the greatest veneration by the warlike, and Mercury by
the trading part of the nation. The care of religion
was immediately under their curettes, since known by
the name of druids and bards. These were, as Ca-
far tells us, the performers of sacrifices and all reli-
gious rites, and expounders of religion to the people.

They also instructed youth in all kinds of learning,
such as philosophy, astronomy, astrology, &c. Their
doctrines were taught only by word of mouth, effec-
ting them too sacred to be committed to writing.

Other more common subjects, such as their hymns to
their gods, the exploits of princes and generals in time
of war, and especially before a battle, were conched
in elegant verse; and recited, or rather sung, on all
proper occasions; though even these were also kept
from vulgar eyes, and either committed to memory, or
if to writing, the whole was a secret to all the laity.
The latter indeed seems the most probable, for
what Caesar hints is true; namely, that these poetic
records were increased in his time to such a bulk, that
it took up a young bard near 20 years to learn them
by heart. Diodorus tells us farther, that these poets
used to accompany their songs with instrumental music,
such as that of organs, harps, and the like; and that
they were held in such veneration, that if, in the time
of an engagement between two armies, one of these
bards appeared, both sides immediately ceased fighting.

The reason of this was, that they were universally
believed to be prophets as well as poets; so that it was
thought dangerous as well as injurious to disobey what
they profphes came from their gods. These prophetic
philosophers kept academies, which were resorted to
not only by a great number of their own youth, but also
of those from other countries, insomuch that Aristotle
says their philosophy passed from thence into Greece,
and not from Greece thither. Diodorus likewise
quotes a passage from Hecateus, which is greatly in
their praise; vizi. that the druids had some kind of in-
struments by which they could draw distant objects
nearer, and make them appear larger and plainer;
and by which they could discover even seas, mountains,
and valleys, in the moon. But whatever might be their
learning, it is certain, that in proceeds of time, they
adopted several very barbarous cultums, such as facri-
ficing human victims to their gods as more acceptable
to them than those of any other animals. And Diodorus
tells us of another inhuman cultum they used in their
divinations, especially in great matters, which was
done by killing some of their slaves, or some prisoners
of war, if any they had, with a scimitar, to draw their
agony from the running of his blood from his mangled
limbs.

For the history, &c. of the different Celtic nations
see the article GAUL, &c.

CELTES, certain ancient instruments of a wedge-
like form, of which several have been discovered in
NAA different
Celtiberia is botany: A genus of the monocot order, belonging to the polygama class of plants; and in the natural method ranking under the 53d order, Scapridiae. It is a hermaphroditic plant: The female calyx is quinquistrate; there is no corolla; there are five flamina, and two hyales. The fruit is a monoporous plum. In the male, there is no calyx: the corolla is hexapetalous; there are six flamina, and an embryo of a pitilium. There are three species, all of the same genus: 1. The Australis or Southern Celtis, a deciduous tree, native of Africa and the South of Europe. 2. The Occidentalis or Western Celtis, a native of Virginia. And 3. The Orientalis or Eastern Celtis, a native of Armenia. The two first species grow with large, fair, straight stems; their branches are numerous and diffuse; their bark is of a darkish grey colour; their leaves are of a pheasant green; three or four inches long, deeply serrated, end in a narrow point, nearly resembling the leaves of the common fling-nettle, and continue on the trees till late in the autumn: So that one may easily conceive what an agreeable variety these trees would make. Add to this, the pleasant shade they afford. The leaves are late in the spring before they show themselves; but they make amends for this, by retaining their verdure till near the close of autumn, and then do not resemble most deciduous trees, whose leaves show their approaching fall by the change of their colour; but continue to exhibit themselves of a pleasant green even to the last. Hanbury speaks highly of the celtis as a timber-tree: he says, "The wood of the Loc-tree is extremely durable. In Italy they make their flutes, pipes, and other wind-instruments of it. With us the coach-makers use it for the frames of their vehicles." Millar mentions also the wood of the Occidentalis being used by the coach-makers. The third species will grow to about twelve feet; and the branches are numerous, smooth, and of a greenish colour. The leaves are smaller than those of the other sorts, though they are of a thicker texture, and of a lighter green. The flowers come out from the wings of the leaves, on slender foot-stalks: They are yellowish, appear early in the spring, and are succeeded by large yellow fruit.

Propagation, &c. All the species are propagated from seeds, which ripen in England, if they have a favourable autumn; but the foreign seeds are the most certain of producing a crop. These seeds should be sown, soon after they are ripe, either in boxes, or in a fine warm border of rich earth, a quarter of an inch deep; and in the following spring many of the young plants will appear; though a great part often lie till the second spring before they show their heads. If the seeds in the bedsshoot early in the spring, they should be hooped, and protected by mats from the frosts, which would nip them in the bud. When all danger from frosts is over, the mats should be laid aside till the parching beams of the sun got powerful; when, in the day time, they may be laid over the hoops again, to screen the plants from injury. The mats should be constantly taken off every night, and the young plants should never be covered either in rainy or cloudy weather. During the whole summer, these seedlings should be frequently watered in dry weather, and the beds kept clean of weeds, &c. In the autumn, they must be protected from the frosts, which often come early in that season, and would not fail to destroy their tops. The like care should be continued all winter to defend them from the severe enemies. In this ferniary they may remain, being kept clean of weeds and watered in dry weather, till the end of June, when they should be taken out of their beds, and planted in others at six inches distance. And here let no one (continues Hanbury) be startled at my recommending the month of March, for this is the month that has found by repeated experience, that the plants will be then almost certain of growing, and will continue their shoots till the autumn; whereas I have ever perceived, that many of those planted in March, have frequently perished, and that those which did grow made hardly any shoot that year, and showed the early figure of a flinted tree. In June, therefore, let the ground be well dug, and prepared for this work; and let the mould be rich and good; But the operation of removing must be deferred till rain comes; and if the season should be dry, this work may be postponed till the middle of July. After a shower, therefore, or a night's rain, let the plants be taken out of their beds, and pricked out at six inches distance from each other. After this, the beds in which they are planted should be hooped, and covered with mats when the sun shines; but these must always be taken away at night, as well as in rainy or cloudy weather. With this management, they will have shot to a good height by the autumn, and have acquired so much hardiness and strength as to need no farther care than to be kept clear of weeds.
Cement

Cement is the general name for any gluttonous substance capable of uniting and keeping things together in chole collection. In this sense the word cement comprehends mortar, folder, glue, &c. but has been generally restricted to the compositions used for holding together broken glazes, china, and earthen ware. For this purpose the juice of garlic is recommended as exceedingly proper, being both very strong, and, if the operation is performed with care, leaving little or no mark. Quicklime and the white of an egg mixed together, and expeditiously used, are also very proper for this purpose. Mr Lewis recommends a mixture of quicklime and cheefe, in the following manner: "Sweet cheese folded thin and stirred with boiling hot water, changes into a tenacious slime which does not mingle with the water. Worked with fresh parcels of hot water, and then mixed upon a hot stone with a proper quantity of unskated lime, into the consistence of a paste, it proves a strong and durable cement for wood, stone, earthen-ware, and glass. When thoroughly dry, which will be in two or three days, it is not in the least acted upon by water. Cheese barely beat with quicklime, as directed by some of the chemists for letting cracked glasses, is not near so efficacious." A composition of the drying oil of linseed and white-lead is also used for the same purposes, but is greatly inferior.

Cement in building is used to denote any kind of mortar of a stronger kind than ordinary. The cement commonly used is of two kinds; hot, and cold. The hot cement is made of rosin, beeswax, brick-dust, and chalk, boiled together. The bricks to be cemented are heated, and rubbed one upon another, with cement between them. The cold cement is that above described for cementing china, &c. which is sometimes, though rarely, employed in building.

The ruins of the ancient Roman buildings are found to cohere so strongly, that most people have imagined the ancients were acquainted with some kind of mortar, which, in comparison of ours, might justly be called cement; and that to our want of knowledge of the materials they used, is owing the great inferiority of modern buildings in their durability. In 1770, one M. Loriot, a Frenchman, pretended to have discovered the secret of the ancient cement, which, according to him, was no more than a mixture of powdered quicklime with lime which had been long skated and kept under water. The skated lime was first to be made up with sand, earth, brick-dust, &c. into mortar after the common method, and then about a third part of quicklime in powder was added to the mixture. This produced an almost instantaneous petrification, something like what is called the setting of alabaster, but in a much stronger degree; and was possessed of many wonderful qualities needless here to relate, seeing it has never been known to succeed with any other person who tried it. Mr Anderson, in his essays on agriculture, has discussed this subject at considerable length, and seemingly with great judgment. He is the only person we know, who has given any rational theory of the uses of lime in building, and why it comes to be the proper basis of all cements. His account is in substance as follows:

Lime which has been skated and mixed with sand, becomes hard and confidcnt when dry, by a process similar to that which produces the natural Halite, in caverns. These are always formed by water dropping from the roof. By some unknown and inexplicable process of nature, this water has dissolved in it a small portion of calcareous matter in a calcic slate. As long as the water continues covered from the air, it keeps the earth dissolved in it; it being the natural property of calcareous earths, when deprived of their fixed air, to dissolve in water. But when the small drop of water comes to be exposed to the air, the calcareous matter contained in it begins to attract the fixable part of the atmosphere. In proportion as it does so, it also begins to separate from the water, and to realign its native form of limestone or marble. This process Mr Anderson calls a crystallization; and when the calcareous matter is perfectly crystallized in this manner, he affirms that it is to all intents and purposes limetone or marble of the same consistence as before: and "in this manner (says he), within the memory of man, have huge rocks of marble been formed near Matlock in Derbsire." If lime in a calcic slate is mixed with water, part of the lime will be dissolved, and will also begin to crystallize. The water which parted with the crystallized lime, will then begin to act upon the remainder, which it could not dissolve before; and thus the process will continue, either till the lime be all reduced to an effete, or (as he calls it) crystalline slate, or something hinders the action of the water upon it. It is this crystallization which is observed by the workmen when a heap of lime is mixed with water, and left for some time to macerate. A hard crust is formed upon the surface, which is ignorantly called freezing, though it takes place in summer as well as in winter. If therefore the hardness of the lime, or its becoming a cement, depends entirely on the formation of its crystals, it is evident, that the perfection of the cement must depend on the perfection of the crystals, and the hardness of the matters which are entangled among them. The additional substances used in making of mortar, such as sand, brick-dust, or the like, according to Mr Anderson, serve only for a purpose similar to what is answered by flicks put into a vessel full of any saline solution, namely, to afford the crystals an opportunity of fastening themselves upon it. If therefore the matter interpolated between the crystals of the lime is of a friable, brittle nature, such as brick dust or chalk, the mortar will be of a weak and imperfect kind; but when the particles are hard, angular, and very difficult to be broken, such as those of river or pit-fand, the mortar turns out exceedingly good and strong. Sea-fand is found to be an improper material for mortar, which Mr Anderson ascribes to its being less angular than the other kinds. That the crystallization may be the more perfect, he also recommends a large quantity of water, that the ingredients.
Cement. be perfectly mixed together, and that the drying be as slow as possible. An attention to these circumstances, he thinks, would make the buildings of the moderns equally durable with those of the ancients; and from what remains of the ancient Roman works, he thinks a very strong proof of his hypothesis might be adduced. The great thickness of their walls necessarily required a vast length of time to dry. The middle of them was composed of pebbles thrown in at random, and which have evidently had mortar so thin as to be poured in among them. By this means, a great quantity of the lime would be dissolved, and the crystallization performed in the most perfect manner; and the indefatigable pains and perseverance for which the Romans were so remarkable in all their undertakings, leave no room to doubt that they would take care to have the ingredients mixed together as well as possible. The consequence of all this is, that the buildings formed in this manner are all as firm as if cut out of a solid rock; the mortar being equally hard, if not more so, than the stones themselves.

Notwithstanding the bad success of those who have attempted to repeat M. Lorio's experiments, however, Dr Black informs us, that a cement of this kind is certainly practicable. It is done, he says, by powdering the lime while hot from the kiln, and throwing it into a thin paste of sand and water; which, not flaking immediately, absorbs the water from the mortar by degrees, and forms a very hard mass. "It is plain (he adds) that the strength of this mortar depends on using the lime hot or fresh from the kiln."

By mixing together gypsum and quick-lime, and then adding water, we may form a cement of tolerable hardnes, and which apparently might be used to advantage in making troughs for holding water, or lining small canals for it to run in. Mr Wiegley says, that a good mortar or cement, which will not crack, may be obtained by mixing three parts of a thin magma of flaked lime with one of powdered gypsum; but adds, that it is used only in a dry situation. A mixture of tars with flaked lime acquires in time a honey hardnes, and may be used for preventing water from entering a barn, and similar buildings.

Cement, among engravers, jewellers, &c. is the same with the hot cement used in building; and is used for keeping the metals to be engraved firm to the block, and also for filling up what is to be chiseled. Cement, in chemistry, is used to signify all those powders and pastes with which any body is surrounded in pots or crucibles, and which are capable by the help of fire of producing changes upon that body. They are made of various materials, and are used for different purposes, as for parting gold from silver, converting iron into steel, copper into brass; and by cementation more considerable changes can be effected upon bodies, than by applying to them liquids of any kind; because the active matters are then in a state of vapour, and suffused by a very considerable degree of heat.

Cement which quickly hardens in Water. This is described in the pothumous works of Mr Hooke, and is recommended for gilding live craw-fish, carps, &c. without injuring the fish. The cement for this purpose is prepared, by putting some Burgundy pitch into a new earthen pot, and warming the vessel till it receives so much of the pitch as will flick round it; then shewing some finely powdered amber over the pitch when growing cold, adding a mixture of three kinds of linseed oil, and one of oil turpentine, covering the vessel and boiling them for an hour over a gentle fire, and grinding the mixture as it is wanted with as much punchy-stone in fine powder as will reduce it to the consistence of paint. The fish being wiped dry, the mixture is spread upon it; and the gold leaf being then laid on, the fish may be immediately put into water again, without any danger of the gold coming off, for the matter quickly grows hard in the water.

Cement-Pot, are those earthen pots used in the cementation of metals.

Cementation, the act of corroding or otherwise changing a metal by means of a cement.

Cemetery (κηρυρησις, from κηρυσσω to "speak") a place set apart or consecrated for the burial of the dead.

Anciently none were buried in churches or churchyards: it was even unlawful to inter in cities, and the cemeteries were without the walls. Among the primitive Christians these were held in great veneration. It even appears from Eusebius and Tertullian, that, in the early ages, they assembled for divine worship in the cemeteries. Valerian seems to have consecrated the cemeteries and other places of divine worship, but they were restored again by Gallienus. As the martyrs were buried in these places, the Christians chose them for building churches on, when Constantine established their religion; and hence some derive the rule which still obtains in the church of Rome, never to consecrate an altar without putting under it the relics of some saint. The practice of consecrating cemeteries is of some antiquity. The bishop walked round it in procession, with the crozier or pastoral staff in his hand, the holy water-pot being carried before, out of which the aspersions were made.

Cenchrus, in botany: A genus of the monocot order, belonging to the poaceae class of plants; and in the natural method ranking under the 4th order, Gramina. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female. The involucrum is laciniated, and the calyx is a biserous glume, with one floret-male, and three floret-female.
The Jewish censo was a small fort of casting-dish, covered with a dome, and suspended by a chain. Josephus tells us, that Solomon made twenty thousand gold centers for the temple of Jerusalem, to offer perfumes in, and fifty thousand others to carry fire in.

CENSIO, in antiquity, the act or office of the censo. See CENSUS.

Censo included both the rating or valuing a man's estate, and the imposing multas and penalties.

Censo, habitation, a punishment inflicted on a Roman soldier for some offence, as laziness or luxury, whereby his habita, or hear, was taken from him, and consequently his wages and hopes of preferment stopped.

CENSITUS, a person censoed, or entered in the censoial table. See CENSUS.

In an ancient monument found at Ancyra, containing the actions of the emperor Otho, we read, Quo lausto citium Romanorum, Censita jussa capit capra quadragies. Centum millia & sexaginta tria.

CENSITUS is also used in the civil law for a servile fort of tenants, who pays capitation to his lord for the land he holds of him, and is entered as such in the lord's rent-roll. In which sense, the word amounts to the same with capite censo, or capite censo. See CAPE CENT.

CENSOR, (from censere to 'see' or 'perceive'), one of the prime magistrates in ancient Rome. Their business was to register the effects of the Roman citizens, to impose taxes in proportion to what each man possessed, and to take cognizance or inspection of the manners of the citizens. In consequence of this last part of their office, they had a power to censo vice or immorality by inflicting some public mark of ignominy on the offender. They had even a power to create be an esuit, exfematus, and expel from the senate such as they deemed unworthy of that office. This power they sometimes exercised without sufficient grounds; and therefore a law was at length passed that no senator should be degraded or disgraced in any manner, until he had been formally accused and found guilty by both the censo. It was also a part of the censoian jurisdiction, to fill up the vacancies in the senate, upon any remarkable deficiency in their number; to let out to farm all the lands, revenues, and customs, of the republic; and to contract with artificers for the charge of building and repairing all the public works and edifices both in Rome and the colonies of Italy. In all parts of their office, however, they were subject to the jurisdiction of the people; and an appeal always lay from the sentence of the censo to that of an assembly of the people.

The first two censo were created in the year of Rome 311, upon the senate's observing that the censo were so much taken up with war, as not to have time to look into other matters. The office continued to the time of the emperors, who assumed the censo power, calling themselves morum prefects; though Vespasian, and his sons took the title of censo. Decius attempted to restore the dignity to a particular magistrate. After this we hear no more of it, till Constantine's time, who made his brother censo, and he seems to have been the last that enjoyed the office.

The office of censo was so considerable, that for a long time none aspired to it till they had passed for the centum. At first the censo enjoyed their dignity for five years, but in 420 the Lictor Mamertinus made a law restraining it to a year and an half, which was afterwards observed very strictly. At first one of the censo was elected out of a patrician, and the other out of a plebeian family; and upon the death of either, the other was discharged from his office, and two new ones elected, but not till the next lulsum. In the year of Rome 622, both censo were chosen from among the plebeians; and after that time the office was shared between the senate and people.

—After their election in the Comitia Centuriata, the censo proceeded to the capitol, where they took an oath not to manage either by favour or disaffection, but to act equitably and impartially throughout the whole course of their administration.

The republic of Venice still has a censo of the manners of their people, whose office lasts six months.

CENSORS OF BOOKS, are a body of doctors or others established in divers countries, to examine all books before they go to the press, and to see they contain nothing contrary to faith and good manners.

At Paris the faculty of theology claim this privilege, as granted to them by the pope; but, in 1624, new commissions of four doctors were created, by letters-patent, the sole censo of all books, and answerable for everything contained therein.

In England, they had formerly an officer of this kind, under the title of licenser of the press; but, since the revolution the press has been laid under no such restraint.

Censorinus, a celebrated writer in the third century, well known by his treatise De Die Natalis. This treatise, which was written about the year 228, Gerard Vossius calls a little book of gold; and declares it to be a most learned work of the highest use and importance to chronologers, since it connects and determines with great exactness, some of the principal events in pagan history. It was printed at Cambridge, with the notes of Lidenbrokius, in 1695.

Censure, a judgment which condemns some book, person, or action; or, more particularly, a reprimand from a superior. Ecclesiastical censo are penalties by which, for some remarkable misbehaviour, Christians are deprived of the communion of the church, or prohibited to execute their clerical office.

Census, in Roman antiquity, an authentic declaration made before the censo, by the several subjects of the empire, of their respective names and places of abode. This declaration was registered by the censo; and contained an enumeration, in writing, of all the estates, lands, and inheritances they possessed; their quantity, quality, place, wives, children, domestics, tenants, slaves. In the provinces the censo served not only to discover the substance of each person, but where, and in what manner and proportion, taxes might be best imposed. The censo at Rome is commonly...
CENTAURIA, in botany: A genus of the polygama fruticans order, belonging to the synangia class of plants; and in the natural method ranking under the 49th order, Compositae. The receptacle is bristly; the pappus simple; the corolla of the radius funnel-shaped, longer than those of the disk, and irregular.

CENTAUR, in astronomy, a part or moiety of a southern constellation, in form half-man half-horse; usually joined with the wolf. The word comes from κενταύρος, formed of κέντας, pungo; χαλλός, bull; q. d. bull pricker. The stars of this constellation, in Ptolemy's Catalogue are 37; in Tycho's 4; and in the Britannic Catalogue, with Sharp's Appendix, 39.

CENTAURS, in mythology a kind of fabulous monsters, half men, and half horses. The poets pretend that the centaurs were the sons of Ixion and a cloud; the reason of which fancy is, that they retired to a castle called ἰεσώτος, which signifies a "cloud." This fable is differently interpreted; some will have the centaurs to have been a body of shepherds and herdsmen, rich in cattle, who inhabited the mountains of Arcadia, and to whom is attributed the invention of bucolic poetry. Palæphæus, in his book of incredibles, relates, that under the reign of Ixion, king of Thessaly, a herd of bulls on mount Thessaly run mad, and ravaged the whole country, rendering the mountains inaccessible; that some young men who had found the art of taming and mounting horses undertook to clear the mountains of these animals, which they purified on horseback, and thence obtained the appellation of Centaurs. Thissuccess rendering them insolent, they insulted the Lapithæ, a people of Thessaly; and because when attacked they fled with great rapidity, it was supposed they were half horses and half men. - The Centaurs in reality were a tribe of Lapithæ, who inhabited the city Pelaerinion adjoining to mount Pelion, and first invented the art of breaking horses, as is intimated by Virgil.

CENTAUREA, GREATER CENTAURY: A genus of the polygama fruticans order, belonging to the synangia class of plants; and in the natural method ranking under the 49th order, Compositae. The receptacle is bristly, the pappus simple, the corolla of the radius funnel-shaped, longer than those of the disk, and irregular. There are 61 species. The root of one of them called glaftifolia, is an article in the materia medica. It has a rough, somewhat acrid taste, and abounds with a red viscous juice. Its rough taste has gained it some esteem as an astringent; its acrimony as an aperient; and its glutinous quality as a vulnerary; but the present practice takes very little notice of it in any intention. Another of the species in the cyamus or blue bottle, which grows commonly among corn. The expressed juice of this flower stains linen of a beautiful blue colour, but is not permanent. Mr Boyle says that the juice of the inner petals, with a little alum, makes a beautiful permanent colour, equal to ultramarine.

Leffer Centaur. See Gentiana. CENTEE, in botany: A genus of the tetrandra order, belonging to the monoeica class of plants; and in the natural method ranking under the 11th order, Sermentae. The male involucrum is tetraphylous and quinquenflowerous, with four petals; the female
involucrum is diphylloid and uniferous; the petals four; the germ inferior; two styles; and a bilocular ovary.

CENTENARIUS, or CENTENARIO, in the middle age, an officer who had the government or command, with the administration of justice, in a village. The centenarii as well as vicarii were under the jurisdiction and command of the count. We find them among the Franks, Germans, Lombards, Goths, &c.

CENTENARIUS was also used for an officer who had the command of 100 men; most frequently called a CENTURION.

CENTENARIUS, in monasteries, was an officer who had the command of 100 monks.

CENTENINUM ovum, among naturalists, denotes a sort of hen's egg much smaller than ordinary, vulgarly called a cock's egg; from which it has been fabulously held that the cockatrice has produced. The name is taken from an opinion, that these had thrown the woman, in whose frontal while all the other parts of a body move about it, the particulars of her

which all the lazies, membra'nts, &c. in common with others. In Lincolnshire, England; the place of the yolk is

whence centeninium, q. d. the hundredth egg.—These eggs have no yolks, but in other reprefents differ not from common ones; having the albumen, chalazas, membranes, &c. in common with others. In the place of the yolk is found a little body like a serpentine coiled up, which doubtless gave rise to the fable of the basilisk's origin from thence. Their origin is with probability ascribed by Hervey to this, that the yolks in the vitellary of the hen are exhausted before the albumen.

CENTER, or CENTRE, in a general sense, signifies a point equally distant from the extremities of a line, figure, or body. The word is formed from the Greek ἱσθή, a point.

CENTER of Gravity, in mechanics, that point about which all the parts of a body do in any situation exactly balance each other.

Center of Motion, that point which remains at rest, while all the other parts of a body move about it.

Center of a Sphere, a point in the middle, from which all lines drawn to the surface are equal.

Hermes Trismegistus defines God an intellectual sphere, whose center is everywhere, and circumference nowhere.

CENTESIMA USURA, that wherein the interest in an hundred months became equal to the principal; i.e. when the money is laid out at one per cent. per month; answering to what in our style would be called 12 per cent. for the Romans reckoned their interest not by the year, but by the month.

CENTESIMATION, a milder kind of military punishment, in cases of desertion, mutiny, and the like, where only every hundredth man is executed.

CENTILOQUIUM, denotes a collection of 100 sentences, opinions, or sayings.

The centiolumen of Hermes, contains 100 aphorisms, or astrological sentences, supposed to have been written by some Arab, falsely ascribed to Hermes Trismegistus. It is only extant in Latin, in which it has several times been printed. —The centiolumen of Ptolemy is a famous astrological piece, frequently confounded with the former, consisting likewise of 100 sentences or doctrines, divided into short aphorisms, intitled also in Greek Σεντίλιος, as being the fruit or re-

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fult of the former writings of that celebrated astro-

mer, viz. his quadrupartium and alias ejus; errant, by reason that herein is shown the use of astrological calculations.

CENTIPES, in zoology. See SCIOLOPENDRA.

CENTIPED WORM, a term used for such worms as have a great many feet, though the number does not amount to 100, as the term seems to import.—M. Mallet relates the history of a man, who, for three years, had a violent pain in the lower part of the forehead near the root of the nose: as length he felt an itching, and afterwards something moving within his nostril, which he brought away with his finger; it was a worm of the centiped kind, an inch and a half long, which run swiftly. It lived five or six days among tobacco. The patient was free of his pain ever after. Mr Littre mentioned a like case in 1708, of a larger centiped voided at the nose, after it had thrown the woman, in whose frontal it was, into convulsions, and had almost deprived her of her reason.

CENTILIVRE, (Safauna) a celebrated comic writer, was the daughter of Mr Freeman of Holbeach, in Lincolnshire, England; and had such an early turn for poetry, that it is said she wrote a song before she was seven years old. Before she was twelve years of age, she could not only read Moliere in French, but enter into the spirit of all the characters. Her father dying, left her to the care of a step-mother; whose treatment not being agreeable to her, she determined, though almost delirious of money and every other necessity, to go up to London to seek a better fortune than what she had hitherto experienced. As she was proceeding on her journey foot, she was met by a young gentleman from the university of Cambridge, the afterwards well-known Anthony Hammond, Esq; who was so extremely struck with her youth and beauty, that he fell instantly in love with her; and inquiring into the particulars of her story, soon prevailed upon her unexperienced innocence to seize on the protection he offered her, and go with him to Cambridge. After some months cohabitation, he persuaded her to come to London; where, in a short time she was married to a nephew of Sir Stephen Fox. But that gentleman not living with her above a twelvemonth, her wit and beauty soon procured her a second husband, whose name was Carrol and who was an officer in the army; but he having the misfortune to be killed in a duel about a year and an half after their marriage, she became a second time a widow. For the sake of support she now applied to her pen, and became a votary of the muse; and it is under this name of Carrol that some of her earlier pieces were published. Her first attempt was in tragedy, in a play called the Ferjeuver Husband; yet her natural vivacity leading her afterwards to comedy, we find but one more attempt in the bulkin among 18 dramatic pieces which she afterwards wrote.

In 1706, she wounded the heart of one Mr Joseph Centlivre, yeoman of the month, or in other words principal cook to her Majesty, who married her; and, after passing several years happily together, she died at his house in Spring-Garden, Charing-Cross, in December 1723.
This lady for many years enjoyed the intimacy and esteem of the most eminent wits of the times, viz. Sir Richard Steele, Mr. Rowe, Budgell, Farquhar, Dr. Sewell, &c. and very few authors received more tokens of esteem and patronage from the great. With regard to her merit as a writer, it must be allowed that her plays do not abound with wit, and that the language of them is sometimes even poor, cursive, incorrect, puerile; but then her plots are busy and well conducted, and her characters in general natural and well marked.

CENTNER, or Docimastic Hundred, in metallurgy and assaying, is a weight divisible, first into an hundred, and thence into a greater number of other smaller parts; but though the word is the same both with the assayers and metallurgists, yet it is to be understood as expressing a very different quantity in their different acceptation of it. The weights of the metallurgists are easily understood, as being of the common proportion, but those of the assayers are a thousand times smaller than these, as the portions of metals or ores examined by the assayers are usually very small.

The assayers, who extract metals out of their ores, use a weight divided into an hundred equal parts, each part a pound, the whole they call a centner or hundred weight; the pound is divided into thirty-two parts, or half ounces, and the half ounce into two drams.

These divisions and denominations of the metallurgists are easily understood, but the same words, tho' they are equally used by assayers, with them express very different quantities; for as the centner of the metallurgists contains an hundred pounds, the centner of the assayers is really no more than one dram, to which the other parts are proportioned.

As the assayers' weights are divided into such an extreme degree of minuteness, and are so very different from all the common weights, the assayers usually make them themselves in the following manner, out of small silver, or fine gold-plates, of such a size, that the mark of their weight, according to the division of the dram, which is the docimastic or assaying centner, may be put upon them. They first take for a basis one weight, being about two-thirds of a common dram: this they mark (64 lb.) Then having at hand some granulated lead, washed clean, well dried, and sifted very fine, they put as much of it into one of the small dishes of a fine balance as will equipollute the (64 lb.) as it is called, just mentioned: then dividing this granulated lead into very nice halves, in the two scales, after taking out the first silver weight, they obtain a perfect equilibrium between the two scales; they then pour the granulated lead out of one dish of the scales, and instead of it put in another silver weight, which they make exactly equiponderant with the lead in the other scale, and mark it (32 lb.) If this second weight, when first put into the scale, exceed by much the weight of the lead, they take a little from it by a very fine file; but when it comes very near, they use only a whetstone to wear off an extremely small portion at a time. When it is brought to be perfectly even and equal to the lead, they change the scales to see that no error has been committed, and then go on in the same manner till they have made all the divisions, and all the small weights. Then to have an entire centner or hundred weight, they add to the (64 lb.) as they call it, a 32 lb. and a 4 lb. and weighing against them one small weight, they make it equal to them, and mark it (100) This is the docimastical, or assaying centner, and is really one dram.

CENTO, in poetry, a work wholly composed of verses or passages promiscuously taken from other authors, only disposed in a new form and order.—Proba Falconia has written the life of Jesus Christ in centos taken from Virgil. Alexander Rofs has done the like in his Chriiftrost, and Stephen de Pleure the fame.

CENTONARIO, in antiquity, certain of the Roman army, who provided different sorts of stuff called centones, made use of to quench the fire which the enemies engines threw into the camp. These centonarii kept with the carpenters and other officers of artillery.

CENTRAL FORCES, the powers which cause a moving body to tend towards, or recede from, the center of motion. See MECHANICS.

CENTRAL RULE, a rule discovered by Mr. Thomas Baker, whereby to find the centre of a circle designed to cut the parabola in as many points as an equation to be constructed hath real roots. Its principal use is in the construction of equations, and he hath applied it with good success as far as biquadratics.

The central rule is chiefly founded on this property of the parabola, that, if a line be inscribed in that curve perpendicular to any diameter, a rectangle formed of the segments of the inscribed is equal to the rectangle of the intercepted diameter and parameter of the axis.

The central rule has the advantage over Cartes and De Laure's methods of constructing equations, in that both these are subject to the trouble of preparing the equation by taking away the second term.

CENTRIFUGAL FORCE, that force by which all bodies that move round any other body in a curve tend towards, or recede from, the center of their motion in a tangent to the periphery of the curve, and that in every part of it. See MECHANICS.

CENTRIFUGAL-MACHINE, a very curious machine, invented by Mr. Erkine, for raising water by means of a centrifugal force combined with the pressure of the atmosphere.

It consists of a large tube of copper, &c. in the form of a crofs, which is placed perpendicular in the water, and refta at the bottom on a pivot. At the upper part of the tube is a horizontal cog-wheel, which touches the cogs of another in a vertical position; so that by the help of a double winch, the whole machine is moved round with very great velocity.

Near the bottom of the perpendicular part of the tube is a valve opening upwards; and near the two extremities, but on the contrary sides of the arms, or crofs part of the tube, are two other valves opening outwards. These two valves are, by the assistance of springs, kept shut till the machine is put in motion, when the centrifugal velocity of the water forces them open, and discharges itself in a cistern or refevoir placed there for that purpose.

On the upper part of the arms are two holes, which
are closed by pieces screwing into the metal of the tube. Before the machine can work, these holes must be opened, and water poured in through them, till the whole tube be full: by this means all the air will be forced out of the machine, and the water supported in the tube by means of the valve at the bottom.

The tube being thus filled with water, and the holes closed by their screw caps, it is turned round by means of the winch, when the water in the arms of the tube acquires a centrifugal force, opens the valves near the extremities of the arms, and flies out with a velocity nearly equal to that of the extremities of the fall arms.

The above description will be very easily understood by the figure we have added on Plate CXXVII., which is a perspective view of the centrifugal machine, erected on board a ship. ABC is the copper tube. D, a horizontal cog-wheel, furnished with twelve cogs. E, a vertical cog-wheel, furnished with thirty-six cogs. F, F, the double winch. a, the valve near the bottom of the tube. b, b, the two pivots on which the machine turns. c, one of the valves in the crofs-piece; the other at d, cannot be seen in this figure, being on the other side of the tube. e, e, the two holes through which the water is poured into the machine. GH, the cillern or refervoir. I, I, part of the ship's deck. The diftance between the two valves, c, d, is fix feet. The diameter of these valves is about three inches; and that of the perpendicular tube about seven inches.

If we suppose the men who work the machines can turn the winch round in three seconds, the machine will move round its axis in one second; and consequently each extremity of the arms will move with a velocity of 18.8 feet in a second. Therefore a column of water of three inches diameter will flye through each of the valves with a velocity of 18.8 feet in a second; but the area of the aperture of each of the valves is 7.14 inches; which being multiplied by the velocity in inches = 225.6, gives 1610.784 cubic inches, the quantity of water discharged through one of the apertures in one second; so that the whole quantity discharged in that space of time through both the apertures is 3221.568 cubic inches; or 193294.08 cubic inches in one minute. But 60812 cubic inches make a tun, or beer-measure; consequently, if we suppose the centrifugal machine revolve round its axis in one second, it will raise nearly 3 tons 44 gallons in one minute: but this velocity is certainly too great, at least to be held for any considerable time; so that, when this and other deficiencies in the machine are allowed for, two tons is nearly the quantity that can be raised by it in one minute.

It will perhaps be unnecessary to observe, that as the water is forced up the perpendicular tube by the pressure of the atmosphere, this machine cannot raise water above 32 feet high.

An attempt was made to substitute this machine in place of the pumps commonly used on ship-board, but the labour of working was found to be so great as to render the machine inferior to the chain-pump. A considerable improvement, we apprehend, would be, to load with a weight of lead the ends of the tubes thro' which the water flies, which would make the machine turn with a great deal more ease, as the centrifugal force of the lead would in some measure act the part of a centrifugal flye.
rions of these orders; and the centurions are sometimes styled *principes ordinum*, and *principes centurionum*. We may take notice too what a large field there lay for promotion: first through all the orders of the hastati; then quire through the principes; and afterwards from the lat order of the triarii to the primipilus, the most honourable of the centurions, and who delights to be particularly described. This officer, besides his title of primipilus, went under the several titles of *dux legionis*, *praefidius legionis*, *primus centurionum*, and *primus centurio*; and was the first centurion of the triarii in every legion. He preceded over all the other centurions, and generally gave the word of command by order of the tribunes. Besides this, he had the care of the eagle, or chief standard, of the legion: hence, *aquila praefis*, is to bear the dignity of primipilus; and hence *aquila* is taken by Pliny for the said office. Nor was this station only honourable, but very profitable: for he had a special stipend allowed him, probably as much as a knight's elate; and, when he left that charge, was repaid equal to the members of the equestrian order, bearing the title of *primipilarius*, in the same manner as those who had discharged the greatest civil offices were dyed over after, *confulares*, *centuriae*, *confivia*.

**CENTURIPES, Centurips, or Centuripe, (anc. geog.)** a town in the fourth-west of the territory of Etna, on the river Cyamatorn: Now *Centorsi, or Centuripe*. It was a democratical city, which, like Syracuse, received its liberty from Timoleon. Its inhabitants cultivated the fine arts, particularly sculpture and engraving. In digging for the remains of antiquities, cameos are no where found in such abundance as at Centuripe and its environs. The situation of the place is romantic: it is built on the summit of a vast group of rocks, which was probably chosen as the most difficult of access, and consequently the propertist in times of civil commotion. The remains still existing of its ancient bridge are a proof of its having been a considerable city. Cicero speaks of it as such. It was taken by the Romans, plundered and oppressed by Verris, destroyed by Pompey, and restored by Otho, who made it the residence of a Roman colony.

**CENTURY, in a general sense, any thing divided into, or consisting of, an hundred parts. The marquis of Worcester published a *Century* of inventions, (for a specimen of which, see *Acoustics*, p. 27,) and Dr Hooke has given a *decimate* of inventions, as part of a *Century*, of which he affirmed himself master. It is remarkable, that both in the century of the former, and the decimate of the latter, we find the principle on which Savary's fire or steam engine is founded. See *Steam-Engine*.**

**CENTURY in antiquity. The Roman people, when they were assembled for the electing of magistrates, enacting of laws, or deliberating upon any public affair, were always divided into centuries, and voted by centuries, in order that their votes might be the more easily collected, whence these assemblies were called *comitia centuriata*. The Roman cohorts were also divided into centuries. See *Century* and *Cohort*.**

**CENTURION, (in chronology, the space of one hundred years. This method of computing by centuries is generally observed in church history, commencing from the time of our Saviour's incarnation: in which sense we say the first century, the second century, &c.**

**CENTURIES of Magdeburg, a famous ecclesiastical history, ranged into 13 centuries, carried down to the year 1298, compiled by several hundred protestants of Magdeburg, the chief of whom was Placius Illyricus.**

**CENTUSSIS, in Roman antiquity, a coin containing 100 asses.**

**CENTZONTLI, in ornithology, the Mexican name of the *Turdus polyglottus*. See *Turdus*.**

**CEODES, in botany: A genus of the dioecia order, belonging to the polygama class of plants. There is no calyx; the corolla is monopetalous, with a short turbinated tube; the flamina are ten subulated filaments; the anthera roundish.**

**CEORLES, the name of one of the classes or orders into which the people were distinguished among the Anglo-Saxons. The ceorles, who were perfons completely free, and defended from a long race of freemen, constituted a middle class between the labourers and mechanics (who were generally slaves, or defended from slaves) on the one hand, and the nobility on the other. They might go where they pleased, and pursue any way of life that was most agreeable to their humour; but for many of them applied to agriculture, and farming the lands of the nobility, that a ceorl was the most common name for a husbandman or farmer in the Anglo-Saxon times. These ceorls, however, seem in general to have been a kind of gentlemen farmers; and if any one of them profpered so well as to acquire the property of five hides of land, upon which he had a church, a kitchen, a bell-tower, and great gate, and obtained a seat and office in the king's court, he was esteemed a nobleman or thane. If a ceorl applied to learning, and attained to priest's orders, he was also considered as a thane; his wardrobe, or price of his life, was the same, and his testimony had the same weight in a court of justice. When he applied to trade, and made three voyages beyond sea, in a ship of his own, and with a cargo belonging to himself, he was also advanced to the dignity of a thane. But if a ceorl had a greater propensity to arms than to learning, trade, or agriculture, he then became a soldier, or military retainer, to some potent man. Thus the temple of honour and the several professions esteemed worthy of a freeman.**

**CEOS, CEA, CIA, or COS, (anc. geog.) one of the Cyclades, lies opposite to the promontory of Achaia called *Santium*, and is 50 miles in compass. This island is commended by the ancients for its fertility and richness of its pastures. The first silk stuffs, if Pliny and Solinus are to be credited, were wrought here. Ceos was particularly famous for the excellent figs it produced. It was first peopled by Aritaeus, the son of Apollo and Cyrene, who, being grieved for the death of his son Aitaeus, retired from Thebes, at the persuasion of his mother, and went over with some Theban...**
CEPHALANTHUS, BUMBLE-WOOD: (1) CEPHALIC, in a general meaning, signifies any thing belonging to the head.

CEPHALIC Medicines, are remedies for disorders of the head. Cordials are comprehended herein, as are all whatever promotes a free circulation of the blood through the brain.

Except when the disorder arises from excess of heat, or an inflammatory disposition in the head, moist topicals should never be used; but always dry ones.

To rub the head after it is shaved proves an infallable cure for a cephalalgia, a stuffing of the head, and a weakness of the eyes, arising from a weak and relaxed state of the fibres. And as by every fresh evacuation of the humours their quantity is not only lessened, but also their recommementulous parts derived thither, the more frequently the head is shaved, the larger quantity of humour is discharged; so that the frequent shaving of the head and beard is likewise a potential blister; and in as much as it is useful, it is a cephalic. CEPHALIC Vein, in anatomy, creeps along the arm between the skin and the muscles, and divides it into two branches: the external goes down to the wrist, where it joins the basilica, and turns up to the back of the hand; the internal branch, together with a small one of the basilica, makes the median. The ancients used to open this vein for disorders of the head, for which reason it bears this name; but a better acquaintance with the circulation of the blood informs us, that there is no foundation for such a notion.

CEPHALENIA, or CEPHALENIA, an island of the Ionian sea between Ithaca and Zacynthus, known in Homer's time by the names of Samus and Epirus Melana, is about eighty miles in length, forty in breadth, and a hundred and thirty in compass. It had anciently four cities, one of which bore the name of the island. Strabo tells us, that in his time there were only two cities remaining; but Pliny speaks of three; adding, that the ruins of Same, which had been destroyed by the Romans, were still in being. Same was the metropolis of the island, and is supposed to have flourished in the place which the Italians call Porto Guiscardo. The names of the four cities were, according to

CEOS, AS THAT TIME UNINHABITED. Diodorus Siculus tells us, that he retired to the island of Cos; but the ancients, as Servius observes, called both these islands by the name Cos. Be that as it will, the island of Cos became so populous, that a law prevailed there, commanding all persons upwards of sixty to be poisoned, that others might be able to subist; so that none above sixty were to be seen in the island, being obliged, after they arrived at that age, either to submit to the law, or abandon the country, together with their effects. Cos had, in former times, four famous cities, viz. JULIS, Carthaca, Corellia, and Praetoria. The two latter were, according to Pliny, swallowed up by an earthquake. The other two flourished in Strabo's time. Carthaca stood on a rising ground, at the end of a valley, about three miles from the sea. The situation of it agrees with that of the present town of Zia, which gives name to the whole island. The ruins both of Carthaca and Julis are still remaining; those of the latter take up a whole mountain, and are called by the modern inhabitants Polis, that is, the city. Near this place are the ruins of a stately temple, with many pieces of broken pillars, and statues of most exquisite workmanship. The walls of the city were of marble, and some pieces are still remaining above 12 feet in length. Julis was, according to Strabo, the birth place of Simonides, Bacchylides, and others from that on each side of

CEPA, the ONION. See ALLIUM.

The leaves stand opposite by pairs on the twigs, and also sometimes by threes, and are of a light green colour. Their upper surface is smooth; they have a strong nerve running from the foot-stalk to the point, and several others from that on each side to the borders: These, as well as the foot-stalk, in the autumn dye to a reddish colour. The flowers, which Cephalene, are aggregate flowers, properly so called, are produced at the ends of the branches, in globular heads, in July. The florets which compose these heads are funnel-shaped, of a yellow colour, and fastened to an axis which is in the middle.—The cephalanthus is propagated from seeds, which are exported to Great-Britain. These should be sown as soon as they arrive, and there will be a chance of their coming up the first spring; though they often lie till the spring after before they make their appearance. They may be sown in good garden mould of almost any soil, if somewhat moist the better, and should be covered about a quarter of an inch deep. This throb is also propagated by layers. If the young shoots are laid in autumn, they will have stuck good root by the autumn following, and may be then taken up, and set in the places where they are designed to remain. Cuttings of this tree, also, planted in the autumn in a rich, light, moist soil, will grow; and by that means also plenty of these plants may be soon obtained.
CERATONIA, the CAROB TREE, or St John's bread: A genus of the polyandria order, belonging to the leguminosae clafs of plants; and in the natural method ranking under the 33d order, Leguminosae. The caulis is diphylous, and grown to the germe; there is no corolla; the stamens are two; the seed is two-horned and compli­

CERASUS, in botany. A genus of the monogynia order, belonging to the monogynia clafs of plants; and in the natural method ranking under the 30th order, Holocarpaceae. The male calyx is bipartite; there is no corolla; the filament is long: The female calyx is diphylous, and grown to the germe; there is no corolla; the stamens are two; the seed is two-horned and compli­
CEREBUS, in fabulous history, a dreadful three-headed mastiff, born of Typhon and Echidna, and placed to guard the gates of hell. He fawned upon those who entered, but devoured all who attempted to get hence. He was, however, mastered by Hercules, who dragged him up to the earth, when, in struggling, a foam dropped from his mouth, which produced the poisonous herb called aconite or wolf's-bane.

Some have supposed that Cerberus is the symbol of the earth, or of all-devouring time; and that its three heads represent the present, past, and future. The victory obtained by Hercules over this monster, denotes the conquest which this hero acquired over his passions. Dr Bryant supposes that Cerberus was the name of a place, and that it signified the temple of the Sun; deriving it from Kir-Abor, the place of light. This temple was also called Tor-Caphe-El, which was changed to Tor-Caphe-Hel, and hence Cerberus was supposed to have had three heads. It was likewise called Tor-Kera, Turris Regia; whence τηρα, from τρις, three, and κεφαλή, head.

CERCEI, in heraldry: a crofs cercei is a crofs which, opening at the ends, turns round both ways like a ram's horn. See CROSS.

CERCIS, the Judas-tree: A genus of the monogynia order, belonging to the decidua class of plants; and in the natural method ranking under the 33d order, Lomentaceous. The calyx is quinquedentate, and gibbose below; the corolla papilionaceous, with a short vexillum or flag-petal under the wings or side-petals; a leguminous plant. There are

1. The bulbiferum, common Judas-tree, or Italian cercis, a native of Italy and other parts of the south of Europe.—These differ in the height of their growth in different places: in some they will arrive to be fine trees, of near twenty feet high; whilst in others they will not rise to more than ten or twelve feet, sending forth young branches irregularly from the very bottom. The stem of this tree is of a dark greyish colour, and the branches, which are few and irregular, have a purple tint. The leaves are smooth, heart-shaped, and roundish, of a pleasant green on their upper surface, hoary underneath, and grow alternately on long footstalks. The flowers are of a fine purple: They come out early in the spring, in clusters, from the side of the branches, growing upon short foot-stalks; and in some situations they are succeeded by long flat pods, containing the seeds, which, in very favorable seasons, ripen in England. Some people are fond of eating these flowers in faggards, on which account alone in some parts this tree is propagated. The varieties of this species are, 1. The Flesh-coloured; 2. The White-flowered; and, 3. The Broad-podded Judas-tree. 

2. The Canadianis, or Canadian cercis, will grow to the size of the first sort in some places. The branches are also irregular. The leaves are cordate, downy, and placed alternately. The flowers usually are of a palish red colour, and show themselves likewise in the spring, before the leaves are grown to their size. These too are often eaten in faggards, and afford an excellent pickle. There is a variety of this with deep red, and another with purple flowers. The pleasure which these trees will afford in a plantation may be easily conceived, not only as they exhibit their flowers in clusters, in different colours, early in the spring, before the leaves are grown to such a size as to hide them; but from the different size of the upper and lower leaves of the branches; above being of a fine green, the other of a hoary cast: So that on the same tree, even in this respect, is shown variety; an improvement whereof is made by the waving winds, which will present them alternately to view.

Propagation. As these species will not take root by layers, they must be propagated by seeds, which may be had from abroad. They are generally brought us found and good, and may be sown in the months of February or March. Making any particular compost for their reception is unnecessary; common garden mould, of almost every sort, will do very well, and this being well dug, and cleared of all roots, by watering in the dry season; will prevent them alternately to view. So that whoever is desirous of drawing the seedlings of a year old to plant out, must not destroy the bed, but draw them carefully out, and sifted over the seeds, after they are sown, about half an inch thick. Part of the seeds will come up in the spring, and the others will remain until the spring following; so that whoever is desirous of drawing the seedlings of a year old to plant out, must not destroy the bed, but draw them carefully out, and after that there will be a succeeding crop. However, be this as it will, the seeds being come up, they must be weeded, and encouraged by watering in the dry season; and they will require no further care during the first summer. In the winter also they may be left to themselves, as they are very hardy; though not so much but that the ends of the branches will be killed by the frost, may, sometimes, to the very bottom of the young plant, where it will shoot out again fresh in the spring. Whoever, therefore, is desirous of securing his seedlings, plants from this evil, should have his beds hooped, in order to throw mats over them during the hard frosts. Toward the latter end of March, or beginning of April the plants having been in the seed-bed one or two years, they should be taken out, and planted in the nursery: The distance of one foot aunder, and two feet in the rows, should be given them. Hoeing, the weeds down in the summer must also be allowed, as well as digging between the rows in the winter. Here they may stand until they are to be removed finally; but they must be gone over in the winter with the knife, and such irregular branches taken off.
After the battle of Cannae, the desolation was so great at Rome, that there were no women to celebrate the feast, by reason they were all in mourning; so that it was omitted that year.

Cerealia, in botany, from Ceres the goddess of corn; Linnaeus's name for the larger eculent seeds of the grapes: these are rice, wheat, rye, barley, oats, millet, panic grass, Indian millet, and maize. To this head may be likewise referred dannel, (tolium); which, by preparation, is rendered eculent.

Cerebellum, the hinder part of the head. See Anatomy, n° 133.

Cerebrum, the brain. Its structure and use are not so fully known as some other parts of the body, and different authors consider it in various manners. However, according to the observations of those most famed for their accuracy and dexterity in anatomical inquiries, its general structure is as given in Anatomy, n° 132.

Dr Hunter observes, that the principal parts of the medullary substance of the brain in idiots and madmen, such as the thalamus, the pons or bridge, and the other evil: this last, according to him, was the creator of the world, and the god that appeared under the old law. The first, whom he called unknown, was the father of Jesus Christ; who, he taught, was incarnate only in appearance, and was not born of a virgin; nor did he suffer death but in appearance. He denied the resurrection; and rejected all the books of the Old Testament, as coming from an evil principle. Marcion, his disciple, succeeded him in his errors.

Cerealia, in antiquity, feasts of Ceres, instituted by Triptolemus, son of Cereus king of Eleusis in Attica, in gratitude for his having been instructed by Ceres, who was supposed to have been his nurse, in the art of cultivating corn and making bread.

There were two feasts of this kind at Athens; and one called Eleusinia, the other Theoaphoria. See the article Eleusinia. What both agreed in, and was common to all cerealia, was, that they were celebrated with a world of religion and purity; so that it was esteemed a great pollution to meddle, on those days, in conjugal matters. It was not Ceres alone that was honoured here, but also Bacchus. The victims offered were hogs, by reason of the waste they make in the products of the earth: whether there was any wine offered or not, is matter of much debate among the critics. Plautus and Macrobius seem to countenance the negative side: Cato and Virgil the positive. Macrobius says, indeed, they did not offer wine to Ceres, but mulsum, which was a composition of wine and honey boiled up together: that the sacrifice made on the 21st of December to that goddess and Hercules, was a pregnant sow, together with cakes and mulsum; and that this is what Virgil means by Mili Baccho. The cerealia passed from the Greeks to the Romans, who held them for eight days successively; commencing, as generally held, on the fifth of the ides of April. It was the women alone who were concerned in the celebration, all dressed in white: the men, likewise in white, were only spectators. They eat nothing till after sun-set; in memory of Ceres, who in her search after her daughter took no repast but in the evening.
of each rite into the church, and its gradual advancement to superstition therein. Many of them were borrowed from Judaism; but more seemingly from Paganism. Dr Middleton has given a fine discourse on the conformity between the pagan and Paphian ceremonies, which he exemplifies in the use of incense, holy water, lamps, and candles, before the thrones of saints, votive gifts or offerings round the thrones of the deceased, &c. In effect, the altars, images, crofes, processions, miracles, and legends; nay, even the most hierarchically, pontifical, religious orders, &c. of the present Romans, he shows, are all copied from their heathen ancestors.—We have an ample and magnificent account of the religious ceremonies and customs of all nations in the world, represented in figures delineated by Picart, with historical explanations, and many curious dissertations.

Mater of the Ceremonies, an officer instituted by King James I. for the more honourable reception of ambassadors and strangers of quality. He wore about his neck a chain of gold, with a medal under the crown of Great Britain, having on one side an emblem of peace, with this motto, Beati pacifici; and on the other, an emblem of war, with Dies et mon droit: his salary is 500l. per annum.

Affiant Mater of the Ceremonies, is to execute the employment in all points, whenever the master of the ceremonies is absent. His salary is 14l. 13s. and 4d. per annum.

Marshall of the Ceremonies is their officer, being subordinate to them both. His salary is 100l. per annum.

Cerena, a town in the kingdom of Naples, and in the Hither Calabria, with a bishop's see. It is seated on a rock, in E. Long. 17° 5'. N. Lat. 39° 23'.

Ceres, a Pagan deity, the inventor or goddess of corn; in like manner as Bacchus was of wine.

According to the poets, she was the daughter of Saturn and Ops, and the mother of Proserpine, whom the had by Jupiter. Pluto having stolen away Proserpine, Ceres travelled all over the world in quest of her daughter, by the help of a torch, which she had lighted in Mount Etna.

As Ceres was thus travelling in search of her daughter, she came to Celeus king of Eleusis, and under took to bring up his infant son Triplolemus. Being desirous to render her charge immortal, she fed him in the day-time with sweet milk, and in the night covered him with fire. Ceres observing an unusual improvement in his son, resolved to watch his nurse, to which end he hid himself in that part of the house where she used to cover the child with fire; but when he saw her put the infant under the embers, he cried out and discovered himself. Ceres punished the curiosity and indiscretion of the father with death. Afterwards she taught the youth the art of sowing corn and other fruits, and mounted him in a chariot drawn by winged dragons, that he might traverse the world, and teach mankind the use of corn and fruits. After this, having discovered, by means of the nymph Arethusa, that Proserpine was in the infernal regions, she applied to Jupiter, and obtained of him that Proserpine should be restored, on condition that she had tasted nothing during her stay in that place: but it being discovered, by the information of Afcalaphus, that, as she was walking in Pluto's orchard, she had gathered an apple, and had tasted of some of the seeds, she was forever forbidden to return. Ceres, out of revenge, turned Afcalaphus into an owl. At length, Jupiter, to mitigate her grief, permitted that Proserpine should pass one half of the year in the infernal regions with Pluto, and the other half with her mother on earth.

Cicero speaks of a temple of Ceres at Catanea in Sicily, where was a very ancient statue of that goddess, but entirely concealed from the sight of men, every thing being performed by matrons and virgins.

Ceret, a town of France in Roussillon, with a magnificent bridge of a single arch. It is seated near the river Tec, in E. Long. 2° 45'. N. Lat. 42° 23'.

Cereus, in botany. See Cactus.

Cerigo, an island in the Archipelago, anciently called Cythera; noted for being the birth-place of Helen, and, as the poets say, of Venus. At present, there is nothing very delightful in the place; for the country is mountainous, and the soil dry. It abounds in hares, quails, turtle, and excellent falmons. It is about 50 miles in circumference, and had formerly good towns; but there is now none remaining but that which gives name to the island. This is strong both by art and nature, it being seated on a craggy rock. The inhabitants are Christian Greeks, and subject to the Venetians, who keep a governor there, whom they change every two years.

Cerines, a town in the island in Cyprus, with a good castle, an harbour, and a bishop's see. E. Long. 33° 25'. N. Lat. 35° 22'.

Cerinthian, ancient heretics, who denied the deity of Jesus Christ. They took their name from Cerinthus, one of the first heresiers in the church, being contemporary with St John. See Cerinthus.

They believed that Jesus Christ was a mere man, born of Joseph and Mary; but that, in his baptism, a celestial virtue descended on him in form of a dove; by means whereof he was consecrated by the holy Spirit, and made Christ. It was by means of this celestial virtue, therefore, that he wrought so many miracles; which, as he received it from heaven, quitted him after his passion, and returned to the place whence it came; so that Jesus, whom they called a pure man, really died and rose again; but that Christ, who was distinguished from Jesus, did not suffer at all. It was partly to refuse this sect, that St John wrote his gospel. They received the gospel of St Matthew, to counterbalance their doctrine of circumcision, from Christ's being circumcised; but they omitted the genealogy. They discarded the epistles of St Paul, because that apostle held circumcision abolished.

Cerinthus, a heresiarch, contemporary with the P...
Ceropogia, Certhis, apostles, ascribed the creation not to God, but to angels. He taught that Jesus Christ was the son of Joseph, and that circumcision ought to be retained under the gospel. He is looked upon as the head of the converted Jews, who raised in the church of Antioch the tumult of which St. Luke has given the history in the 11th chapter of the Acts. Some authors ascribe the book of the Apocalypse to Cerithius; adding, that he put it off under the name of St. John, the better to authorise his reveries touching Christ's reign upon earth: and it is even certain that he published some works of this kind under the title of Apocalypse. See Apocalyptic.

Ceropogia, in botany: a genus of the monogynia order, belonging to the pterandria class of plants; and in the natural method ranking under the 30th order, Contertae. There are two erect follicles; the seeds plumose or covered with a feathered pappus; the limb of the corolla convolute or closing at top.

Ceruthia, in ornithology, the creeper or ox-eye, a genus belonging to the order of picae. The beak is arched, slender, sharp, and triangular; the tongue is sharp at the point; and the feet are of the walking kind, i.e., having the toes open and unconnected. Of this genus near 50 species have been enumerated by ornithologists; but Mr. Latham supposes that many now described as species, will be found hereafter to be mere varieties; which, he adds, is no wonder, since many creepers do not gain their full plumage till the third year's moult. The following are a few of the most remarkable:

1. The familiaris, or common ox-eye, is grey above, and white underneath, with brown wings, and ten white spots on the ten prime feathers. This bird is found in most parts of Europe, though it is believed nowhere so common as in Britain. It may be thought more scarce than it really is by the less attentive observer; for, supposing it on the body or branch of any tree, the moment it observes any one, it gets to the opposite side, and so on. Let a person walk round the tree ever so often. The facility of its running on the bark of a tree, in all directions, is wonderful: this it does with as much ease as a fly on a glass window. Its food is principally, if not wholly, insects, which it finds in the clinks and among the moss of trees. It builds its nest in some hole of a tree, and lays generally five eggs, very rarely more. These are all-coloured, marked at the end with spots and streaks of a deeper colour; and the shell is observed to be pretty hard. It remains in the places which it frequents during the winter, and builds its nest early in the spring.

2. The hook-billed green creeper has a bill an inch and a quarter long, and bent quite in the shape of a semicircle; the plumage in general is olive green, palest beneath, and somewhat inclined to yellow: the quills and tail are dusky; the legs dusky brown; and the feathers just above the knee, or garter, white. It inhabits the Sandwich Islands in general, and is one of the birds whose plumage the natives make use of in constructing their feathered garments; which, having three or greenish feathers intermixed with the beautiful scarlet and yellow ones belonging to the next species, and hence yellow-tufted Bee-eater*, make some of the most beautiful coverings of these islanders.

3. The hook-billed red creeper has the bill somewhat less hooked than the last species; the general colour of the plumage is scarlet; wings and tail black. In some birds the forehead is of a buff-colour; and the parts about the head and neck have both a mixture of buff and dusky black, which are suspected to be the birds not yet arrived at their full plumage.

4. The pullices, or brown and white creeper, according to Edwards, is not above half the size of the European creeper. The upper part of the body is brown, with a changeable gloss of copper; the under parts are white; the quills brown, edged with glossy copper; the tail blackish, the outer feather tipped with white. The bird from which Edwards drew his figure had a label tied to it, by the name of Honey-thief. And that they are fond of honey is manifest, from those who keep birds at the Cape of Good Hope having many forts in large cages, and supplying them with only honey and water; but besides this, they catch a great many flies, which come within the reach of their confinement; and these two make up their whole subsistence; indeed, it has been attempted to transport them to the Cape of Good Hope, but the want of flies on board a ship prevented them living more than three weeks; so necessary are insects to their subsistence.

5. The Loteni, or Loten's creeper, has the head, neck, back, rump, and tail coverts, of green gold; beneath, from the breast to the vent, of velvet black, which is separated from the green on the neck by a transverse bright violet band, a line and half in breadth: the inner wing coverts are of this last colour; the middle coverts are of green gold; and the greater coverts are of very fine black, edged with green gold on the outer edge: the quills are of the same colour, as also the tail feathers. The female differs in having the breast, belly, sides, thighs, under wing and tail coverts, of a dirty white, spotted with black; and the wings and tail not of so fine a black. It inhabits Ceylon, Madagascar; and is called Angalanian.

Buffon tells us, that it makes its nest of the down of plants, in form of a cup, like that of a chaffinch, the female laying generally five or six eggs; and that it is sometimes choked by a spider as large as itself, and very voracious, which feizes on the whole brood, and sucks the blood of the young birds.

6. The cornelia, or blue creeper, has the head of a moist elegant blue; but on each side there is a stripe of black like velvet, in which the eye is placed: the chin and throat are marked with black in the same manner; the rest of the body violet blue. It inhabits Cayenne. Sebas says, that it makes its nest with great art. The outside is composed of dry stalks of grass, or such like; but within of very downy soft materials, in the shape of a retort, which it suspends from some weak twig, at the end of a branch of a tree; the opening or mouth downwards, facing the ground: the neck is a foot in length, but the real nest is quite at the top, so that the bird has to climb up this funnel-like opening to get at the nest. Thus it is secure from every harm; neither monkey, snake, nor lizard, daring to venture at the end of the branch, as it would not steadily support them.

7. The cardinal creeper, (Lev. Mufi) has the head, neck, and breast, of crimson colour; down the middle of
of the back is a stripe of the same colour to the rump; the rest of the body is black; and the wings and tail are black. It inhabits the cultivated parts of the island of Tanna; there known as Kuyameta, and lives by picking the nectar of flowers.

8. The mocking-crane is of the size of the lesser teal. On the checks is a narrow white spot: the head, especially on the crown, is inclined to violet: the plumage in general is olive green, inclining above; and the head and bill, and in course gives plumage. Bo¡m of flowers which have a plumish-coloured

This bird being fond of the under

hence it was called by the English the Mocking-bird.

of Tanna; is there called Koyameta, and lives by suck­ing through. On

of war, this

permits the

avoid an outlawry, or the like, it was alleged that law, or in the service of the mayor of Bourdeallx, this should hold a sufficient trial of the contempt in refusing to
dispense

the party alleging it, that the custom ought to be thus tried: else it must be tried by the country. As, the custom of distributing the effects of freemen deceased; of enrolling apprentices; or that the mayor is feared of one man and another; if any of these, or other similar points come in issue. 4. The trial of all customs and prudential of the courts shall be by certificate from the proper officers of those courts respectively; and what return was made on a writ by the sheriff or under-sheriff, shall be only tried by his own certificate.

CERTIORARI, in law, a writ which issues out of the chancery, directed to an inferior court, to call the records of a cause there depending, in order that justice may be done. And this writ is obtained upon complaint, that the party who seeks it has received hard usage, or is not like to have an impartial trial in the inferior court. A certiorari is made returnable either in the king's bench, common pleas, or in chancery.

It is not only issued out of the court of chancery, but likewise out of the king's bench, in which last mentioned court it lies where the king would be certified of a record. Indictments from inferior courts, and proceedings of the quarter-sessions of the peace, may also be removed into the king's bench by a certiorari: and here the very record must be returned, and not a transcript of it; though usually in chancery, if a certiorari be returnable there, it removes only the tenor of the record.

CERTITUDE, considered in the things or ideas which are the objects of our understanding, is a necessary agreement or disagreement of one part of our knowledge with another, as applied to the mind, it is the perception of such agreement or disagreement; or such a firm, well-grounded assent, as excludes not only all manner of doubt, but all conceivable possibility of a mistake.

There are three sorts of certitude, or assurance, according to the different natures and circumstances of things. 1. A physical or natural certitude, which depends upon the evidence of sense; as that I see such or such a colour, or hear such or such a sound; no body questions the truth of this, where the organs, the medium, and the object, are rightly disposed. 2. Mathematical certitude is that arising from mathematical evidence; such is, that the three angles of a triangle are equal to two right ones. 3. Moral certitude is that founded on moral evidence, and is frequently equivalent to a mathematical one; as that there was formerly such an emperor as Julius Cæsar, and that he wrote the commentaries which pass under his name; because the historians of these times have recorded it, and no man has ever disproved it since: this affords a moral certitude, in common sense so great, that one would be thought a fool or a madman for denying it.

CERTOSA, a celebrated Cistercian monastery, in the territory of the Pavie, in the duchy of Milan, four miles from Pavia; its park is surrounded with a wall 20 miles in circumference; but there are several small towns and villages therein.

CERVANTES. See SAAVEDRA.

CERVERA, a town of Spain, in Catalonia, seated on a small river of the same name, in E. Long. 1° 9'. N. Lat. 41° 28'.

CERVIA, a sea-port town of Italy, in Romagna, with a bishop's see, seated on the gulf of Venice, in E. Long. 12° 5'. N. Lat. 44° 16'.

CERVICAL, among anatomists, denote the arteries, veins, &c. which pass through the vertebrae and muscles of the neck, up to the skull.
CERVIX, in anatomy, properly denotes the hind part of the neck; as contradistinguished from the fore part, which is called jugulum, or the throat.

Cervix of the Scapula, denotes the head of the shoulder-blade, or that upper process whose sinea receives the head of the humerus.

Cervix of the Uterus, the neck of the uterus, or that oblong canal, or passage between the internal and external orifices, which receives and includes the penis like a sheath, whence it is also called vagina.

Cerumen, a thick, viscous, bitter, excrementitious humour, separated from the blood by proper glands placed in the meatus auditorium, or outer passage of the ear.

Ceruss, white-lead, a sort of calx of lead, made by exposing plates of that metal to the vapour of vinegar. See Chemistry-Index.

Cerofs, as a medicine, is used externally either mixed in ointments, or by sprinkling it on old gleetting and watery ulcers, and in many diseas of the skin. If, when it is reduced into a fine powder, it is received in with the breath in inspiration, and carried down into the lungs, it causes incurable althmas. Instances of the very pernicious effects of this metal are too often seen among those persons who work in any form, but particularly among the workers in white-lead.

The painters use it in great quantities; and that it may be afforded cheap to them, it is generally adulterated with common whiting.

Cervus, or Deer, in zoology, a genus of quadrupeds belonging to the order of Pecora. The horns are solid, brittle, covered with a hairy skin, and growing from the top; they likewise fall off and are renewed annually. There are eight fore-teeth in the under jaw, and they have no dog-teeth. The species of this genus enumerated by Linnaeus are seven, viz.

1. The Camelopardalis, or Giraffe, with simple or unbranched horns, straight, about six inches long, covered with hair, and terminate at the end and tuffed; if they touch a tubercle, about two inches high, resembling a third horn. The fore legs are not much longer than the hind legs; but the shoulders are of a vast length, which gives the disproportionate height between the fore and hind parts: the head is like that of a flag; the neck is slender and elegant, and on the upper side is a short mane: the ears are large: the legs are strong, covered with hairs: the rump, was confirmed by Mr Gordon, who relates, that a giraffe, which he had wounded, suffered him to approach it as it lay on the ground, without offering to strike with its horns, or showing any inclination to revenge itself: he even stroked it over its eyes several times, when it only closed them, without any signs of resentment. Its throat was afterwards cut for the sake of its skin; and when in the pangs of death, it drank from a river, the surface of which is lower than the bank on which it stands.

The giraffe here described, which Mr Gordon, who dissected it, says was the largest he had ever seen, was 15 feet 4 inches Rhinland measure (about 15 feet 10 inches English) from the ground to the top of its head; the length of the body, from the chest to the rump, was 5 feet 7 inches Rhinland measure. M. Vaillant affirms, that he has seen several which were at least 17 feet high; and M. Vosmaer declares, that he has been afforded by some very respectable inhabitants of the Cape, that they had seen and killed giraffes, which
The fleece of the moose is extremely sweet and nourishing. The Indians say, that they can travel three times farther after a meal of moose, than after any other animal food. The tongues are excellent; but the nofe is perfect marrow, and esteemed the greatest delicacy in Canada. The skin makes excellent buff; being strong, soft, and light. The Indians dress the hide, and, after soaking it for some time, stretch and render it supple by a lather of the brains in hot water. They not only make their snow-foles of the skin, but after a chase form the canoes with it: theyfew the skins neatly together, cover the frames with an unctuous earth, and embark in them with their spoils to return home. The hair on the neck, withers, and hams of a full-grown elk, is of much use in making mattresses and faddles; being by its great length well adapted for those purposes. The palmed parts of the horns are farther excavated by the savages, and converted into ladles, which will hold a pint.

It is not strange that so useful an animal should be a principal object of chase. The savages perform it in different ways. The first, and the more simple, is before the lakes or rivers are frozen. Multitudes assemble in their canoes, and form with them a waft crecent; each horn touching the shore. Another party perform their share of the chase among the woods; they surround an extensive tract, let loose their dogs, and press towards the water with loud cries. The animals, alarmed with the noise, fly before the hunters, and plunge into the lake, where they are killed by the persons in the canoes, prepared for their reception, with lances or clubs. The other method is more artful. The savages inclose a large space with stakes hedged with branches of trees, forming two sides of a triangle: the bottom opens into a second inclosure, completely triangular. At the opening are hung numbers of bales, made of skins of raw hides. The Indians, as before, approach in a canoe, and with all kinds of noise drive into the first inclosure not only the mooses, but the other species of deer which abound in that country: some, in forcing their way into the farther triangle, are caught in the canoes by the neck or horns; and those which escape the canoes, and pass the little opening, find their fate from the arrows of the hunters, directed at them from all quarters. They are often killed with the gun. When they are first unharbour'd, they squat with their hind parts and make water, at which instant the sportman fires; if he misses, the moose sets off in a most rapid trot, making, like the rein-deer, a prodigious rattling with its hoofs, and will run for 20 or 30 miles before it comes to bay or takes the water. But the utmost time for their diversion is the winter. The hunters avoid entering on the chase till the sun is strong enough to melt the frozen crust with which the snow is covered, otherwise the animal can run over the firm surface: they wait till it becomes soft enough to impede the flight of the moose; which finks up to the shoulders, founders, and gets on with great difficulty. The sportsman pursues at his ease on his broad rakers, or snow-
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As weak against the mountain heeds they pull
Their bearing breast in vain, and piteous pray,
He lays them quivering on the enfanglin'd snows,
And with loud thouns rejoicing bears them home.

THOMPSON.

The opinion of this animal's being subject to the epilepsy seems to have been universal, as well as the care it finds by scratchng its ear with the hind hoof till it draws blood. That hoof has been used in Indian medicine for the falling-ICKS; they apply it to the heart of the afflicted, make him hold it in left hand, and rub his ear with it. They use it also in the colic, pleurisy, vertigo, and purple fever; purgnging the hoof, and drinking it in water. The Algonkins pretend that the flesh imparts the disease; but it is notorious that the hunters in a manner live on it with impunity. The favages good omen; and are persuaded that those who dream pretend

The elk

The colour is generally a brown with some black about the face, and a black lift dawn the hind part of the neck and between the shoulders. Stags are common to Europe, Barbary, the north of Asia, and America. In spring, they shed their horns, which fall off spontaneously, or by rubbing them gently against the branches of trees. It is seldom that both horns fall off at the same time, the one generally preceding the other a day or two. The old flags call their horns first, which happens about the end of February or beginning of March. An aged flag, or one in the seventh year or upwards, does not cast his horns before the middle of March; a stag of five years sheds his horns in April; young flags, or those from three to five years old, shed their horns in the beginning, and those which are in their second year, not till the middle or end of May. But in all this there is much variety; for old flags sometimes cast their horns sooner than those which are younger. Besides, the shedding of the horns is advanced by a mild, and retarded by a fever and long winter.

As soon as the flags cast their horns, they separate from each other, the young ones only keeping together. They no longer haunt the deepet recesses of the forest, but advance into the cultivated country, and remain among brothwood during the summer, till their horns are renewed. In this season, they walk with their heads low to prevent their horns from rubbing against the branches; for they continue to have sensibility till they acquire their full growth. The horns of the oldest flags are not half completed in the middle of May, and acquire their full length and hardness before the end of July. Those of the younger flags are proportionally later both in shedding and being renewed. But as soon as they have acquired their full dimensions and solidity, the flags rub them against the trees, in order to clear them of a skin with which they are covered.

Soon after the flags have polished their horns, they begin to feel the impressions of love. Towards the end of August or beginning of September, they leave the coppice, return to the forests, and search for the hinds. They cry with a loud voice; their neck and throat swell; they become perfectly reftless, and traverse in open day the fields and the fallow grounds; they strike their horns against trees and hedges; in a word, they seem to be transported with fury, and run from country to country till they find the hinds or females, whom they pursue and compel into compliance; for the female at first avoids and flies from the male, and never omits to his embraces till she be fatigued with the pursuit. The old hinds likewise come in season before the younger ones. When two flags approach the same hind, they must fight before they enjoy. If nearly equal in strength, they threaten, paw the ground, set up terrible cries, and attack each other with such fury, that they often inflict mortal wounds with the strokes of their horns. The combat never terminates but in the defeat or flight of one of the rivals. The conqueror lores not a moment in enjoying his victory, unless another rival approaches, whom he is again obliged to attack and repel. The oldest flags are always masters of the field; because they are stronger and more furious than the young ones, who must wait patiently till their superiors tire, and quit their mirthfells. Sometimes, however, the young flags accomplish their purpofes when the old ones are fighting, and, after a hafti gratification, fly off. The hinds prefer the old flags, not because they are most courageous, but because they are much more ardent. They are likewise more inoffuant, having often several females at a time; and when a flag has but one hind, his attachment to her does not continue above a few days: He then leaves her, goes in quest of another, with whom he remains a fmall shorter time; and in this manner passes from one to another till he is perfectly exhausted.

This ardour of love lasts only three weeks, during which the flags take very little food, and neither sleep nor reft. Night and day, they are either walking, running, fighting, or enjoying the hinds. Hence, at the end of the rutting season, they are so meagre and exhausted, that they recover not their strength for a confiderable time. They generally retire to the borders of the forests, feed upon the cultivated fields, where they find plenty of nourishment, and remain there till their strength is re-established. The rutting season of old flags commences about the beginning, and ends about the 20th day of September. In those of fix or seven years old, it begins about the 10th of September, and concludes in the beginning of October. In young flags, or those in their third, fourth, or fifth year, it begins about the 20th of September, and terminates about the 15th of October; and at the end of October, the rutting is all over, excepting among the prickets, or those which have entered into their second year; because they, like the young hinds, are lateft of coming into season. Hence, at the beginning of November, the season of love is entirely finifhed; and the flags, during this period of weakness and latitu de, are easily hunted down.
and other nuts are plentiful, the flags soon recover their strength, and a second rutting frequently happens at the end of October; but it is of much shorter duration than the first.

In climates warmer than that of France, the rutting time, like the fawns, is more forward. Aristotle informs us, that, in Greece, it commences in the beginning of August, and terminates about the end of September. The hinds go with young eight months and some days, and seldom produce more than one fawn. They bring forth in May or the beginning of June, and so anxiously conceal their fawns, that they often expose themselves to be chased, with a view to draw off the dogs, and afterwards return to take care of their young. All hinds are not fertile; for some of them never conceive. The barren hinds are grooser and fatter than those which are prolific, and also come soonest in season. The young are not called fawns or saloœ after the sixth month: The {knobs of their horns then begin to appear, and they take the name of knobbars till their horns lengthen into faders, and then they are called brooks and flaggards. During the first season they never leave their mothers. In winter, the flags and hinds of all ages, keep together in flocks, which are always more numerous in proportion to the rigour of the season. They separate in spring: The hinds retire to bring forth; and, during this period, the flocks confisit only of knobbars and young flags. In general, the flags are inclined to associtate, and nothing but fear or necessity obliges them to differce.

The life of the flag is sentient in alternate plenty and want, vigour and debility, health and sickness, without having any change introduced into his constitution by those opposite extremes. He lives as long as other animals which are not subjected to such vicissitudes. As he grows five or six years, he lives seven times that number, or from 35 to 40 years. What has been reported concerning the longevity of the flag merits no credit. It is only a popular prejudice which prevailed in the days of Aristotle, and which that philosopher considered as improbable, because neither the time of gestation nor the growth of the young flag, indicated long life. This authority ought to have abolished the prejudice; but it has been renewed, in the ages of ignorance, by a fabulous account of a flag taken by Charles VI. in the forest of Senlis, with a collar upon which was written this inscription, Caesar hoc me donavit. The love of the marvellous inclined men to believe that this animal had lived 1000 years, and had his collar from a Roman Emperor, rather than to sup­pose that he came from Germany, where all the emperors take the name of Caesar.

The flag appears to have a fine eye, an acute snell, and an excellent ear. When listening, he raises his head, erects his ears, and hears from a great distance. When he is going into a copice, or other half covered place, he flops to look round him on all sides, and scents the wind, to discover if any object is near that might disturb him. He is a simple and yet a curious and crafy animal. When hailed or called to from a distance, he flops short, and looks steadfastly, and with a kind of admiration at carriages, cattle, or men; and if they have neither arms nor dogs, he moves on unconcernedly, and without flying. He appears to listen with great tranquillity and delight to the shepherd's pipe; and the hunters sometimes employ this artifice to encourage and deceive him. In general, he is least afraid of men than of dogs, and is never suspicious, or uses any arts of concealment, but in proportion to the disturbances he has received. He eats little, and has a choice in his aliments; and after his stomatch is full, he lies down, and ruminates at leisure. He seems to ruminate with less facility than the ox. It is only by violent shakes that the flag can make the food rise from his first stomatch. This difficulty proceeds from the length and direction of the passage through which the aliment has to go. The neck of the ox is short and straight, but that of the flag is long and arched; and therefore greater efforts are necessary to raise the food. These efforts are made by a kind of hiccup, the movement of which is apparent, and continues during the time of ruminnation. His voice is stronger and more quivering, in proportion as he advances in years. The voice of the hind is shorter and more feeble. She never bellows from love, but from fear. The flag, during the rutting season, bellows in a frightful manner: He is then so transported, that nothing disturbs or terrifies him. He is therefore easily surpriséd; as he is loaded with fat, he cannot keep long before the dogs. But he is dangerous when at bay, and attacks the dogs with a species of fury. He drinks none in winter nor in spring, the dews and tender herbage being then sufficient to extinguish his thirst; but during the parching heats of summer, to obtain drink, he frequents the brooks, the marshes, and the fountains; and in the season of love, he is so over-heated, that he searches every where for water, not only to satisfy his immoderate thirst, but to bathe and refresh his body. He then swims easier than at any other times on account of his fatness. He has been observed crossing very large rivers. It has even been alleged, that, attracted by the odour of the hinds, the flags, in the rutting season, throw themselves into the sea, and pass from one island to another at the distance of several leagues. They leap still more nimbly than they swim; for, when pursuing, they easily clear a hedge or a pale fence of six feet high. Their food varies in different seasons. In autumn, after rutting, they search for the buds of green shrubs, the flowers of broom or heath, the leaves of brambles, &c. During the fnows of winter, they feed upon the bark, moss, &c. of trees; and in mild weather, they browse in the wheat-fields. In the beginning of spring, they go in quest of the catkins of the trembling poplar, willow, and hazel-trees, the flowers and buds of the cornel tree, &c. In summer, when they have great choice, they prefer rye to all other grain, and the black berry-bearing alder to all other wood. The flesh of the fawn is very good; that of the hind and knlobber not absolutely bad; but that of the flag has always a strong and disagreeable taste. The skin and the horns are the most useful parts of this animal. The skin makes a pliable and very durable leather. The horns are used by cutlers, sword-fippers, &c. and a volatile spirit, much employed in medicine, is extracted from them by the chymists.

In America, flags feed eagerly on the broad-leaved Kalma; yet that plant is a poison to all other horned animals: their intestines are found filled with it during winter. If their carriages are given to dogs, they become stupified, and as if drunk, and often are so ill
Cervus

as hardly to escape with life. The American flags grow very fat; their tallow is much esteemed for making of candles. The Indians eat them. As they are very shy animals, the natives cover themselves with a hide, leaving the horns erect; under the shelter of which they walk within the reach of the herd. De Bríe, in the 25th place of the History of Florida, gives a very correct representation of this animal method of obtaining food when it was visited by the French in 1564. Their skins are an article of commerce imported by the Hudson's Bay Company; but brought from the distant parts far inland by the Indians, who bring them from the neighbourhood of the lakes. In most parts of North America they are called the grey moose, and the elk; this has given occasion to the mistaken notion of that great animal being found in Virginia and other southern states.

In Britain the flag is become less common than formerly; its excelle vicissitudes during the rutting season, and the badness of its flesh, induce most people to part with the species. Stags are still found wild in the Highlands of Scotland; in herds of four or five hundred, the stag at full liberty over the wild hills of the north. Formerly the great Highland chiefs used to hunt with the magnificence of an eastern monarch, assembling four or five thousand of their clans, who drove the deer into the toils, or to the stations the lairds had placed themselves in; but as this pretence was frequently used to collect their valiant for rebellious purposes, an act was passed prohibiting any assemblies of this nature. Stags are likewise met with on the moors that border on Cornwall and Devonshire; and in Ireland on the mountains of Kerry, where they add greatly to the magnificence of the romantic scenery of the lake of Killarney. The flags of Ireland during its unseasonable state, and while it remained an almost boundless track of forest, had an exact agreement in habit with those that range at present through the wilds of America. They were less in body, but very fat; and their horns of a size far superior to those of Europe, but in form agreed in all points.

The chase of the flag has been formed into an art, and requires a species of knowledge which can only be learned by experience: It implies a royal assembly of men, hounds, and dogs, all so trained, prattled, and disciplined, that their movements, their researches, and their skill, must concur in producing one common end. The huntman should know the age and the sex of the animal; he should be able to distinguish with precision, whether the flag he has harassed with his hounds be a knapper, a young flag, in his sixth or seventh year, or an old flag. The chief marks which convey this intelligence is derived from the foot, and the excrement. The foot of the flag is better formed than that of the hind, or female. Her leg is more gross and nearer the heel. The impressions of his feet are rounder, and farther removed from each other. He moves more regularly, and brings the hind-foot into the impression made by the fore-foot. But the distance between the steps of the hind are shorter, and her hind-feet strike not regularly the track of the fore-feet. Stags, for this reason, always place their hind-foot exactly in the track of the fore-foot, excepting when they find their food. On this point, the old flags mingle as often as the young ones, but in this they are more regular than the hind or young flag, placing the hind-foot always at the side of the fore-foot, and never beyond or within it. When the huntman, from the dryness of the season, or other circumstances, cannot judge by the foot, he is obliged to trace the animal backwards, and endeavour to find its dung. This mark requires, perhaps, greater experience than the knowledge of the foot; but without it the huntman would be unable to give a proper report to the company. After the report of the huntman, and the dogs are led to the refuge of the flag, he ought to encourage his hound, and make him rest upon the track of the flag, till the animal be unharnessed. Instantly the alarm is given to uncouple the dogs, who, by the voice of the chase, and the horn of the huntman. He should also diligently observe the foot of the flag, in order to discover whether the animal has flattered, and substituted another in its place. But it is then the business of the hunters to separate, and to recall the dogs which have gone astray after false game. The huntman should always accompany his dogs, and encourage, without preying them too hard. He should assist them in detecting all the arts of escape used by the flag; for this animal has remarkable address in deceiving the dogs. With this view he often returns twice or thrice upon his former steps; he endeavours to raise hinds or younger flags to accompany him, and draw off the dogs from the object of their pursuit: he then flies with redoubled speed, or springs off at sides, lies down on his belly, and conceals himself. In this case, when the dogs have lost his foot, the huntmen, by going backwards and forwards, assist them in recovering it. But if they cannot find it, they suppose that he is refting within the circuit they have made, and go in quest of him. But if they are still unable to discover him, there is no other method left, but, from viewing the country, to conjecture where he may have taken refuge, and repair to the place. As soon as they have recovered his foot, and put the dogs upon the track, they pursue with more advantage, because they perceive that the flag is fatigued. Their armour augments in proportion to his fethenefis; and their scent becomes more dillie than the animal grows warm. Hence they redouble their cries and their speed; and though the flag prefers still more arts of escape than formerly, as his swiftness is diminished, his arts and doubtings become gradually less effectual. He has nev*o, other resource but to fly from the earth which he tread, and get into the waters, in order to cut off the scent from the dogs. The huntmen go round these waters, and again put the dogs on the track of his foot. The flag, after taking to the water is incapable of running, far, and is soon at bay. But he still attempts to defend himself by his horns, wounds the dogs, and even the huntmen when too forward, by blows with his horns, till one of them cuts his


4. The Tarandus, or Rein-deer, is a native of Lapland, and the northern parts of Europe, Asia, and America. The horns are large, cylindrical, branched, and palmed at the tops. Two of the branches hang over the face. He is about the size of a buck, of a dirty whitish colour; the hairs of his skin are thick and strong. To the Laplanders this animal is the sublimate of the horse, the cow, the goat, and the sheep; and is their only wealth: the milk affords them cheese; the bones, spoons. During the winter it supplies the want of a horse, and draws their sledges with amazing swiftness, over the frozen lakes and rivers, or over the snow, which at that time covers the whole country. A rich Laplander ispossessed of a herd of 1000 rein deer. In autumn they seek the reach of the wild rein; which they kill for the sake of the skins, either to clothe themselves, or to cover their tents. They know not the cleanly delicacy of the milk or cheese; but they are likely to attack the drove, detach and hum them down: the wolves, who single out the richest of the fpecies is not so universal as the fog: rare in France and Germany. It is found in Greece, the Holy Land, and the north of China. They are very numerous in England; but, except on a few chafes, confined in parks. None originally in America. They are easily tamed; and their flesh, which goes by the name of venison, is in high esteem among the luxurious. During rutting-time they will contend

raw, dressed, and dried and smoked with the snow

latch. The wearied hunters will drink the raw blood; but it is usually dressed with the berries of the heath: they eagerly devour the contents of the stomach, but use the intestines boiled. They are very fond of the fat, and will not lose the least bit. The skin, sometimes a part of their clothing, dressed with the hair on, is soft and plant; it forms also the inner lining of their tents, and most excellent blankets. The tendons are their bow-string, and when split are the threads with which they sew their jackets.

The Greenlanders, before they acquired the knowledge of the gun, caught them by what was called the clapper-hunt. The women and children surrounded a large space, and, where people were wanting, set up poles capped with a turf in certain intervals, to terrify the animals; they then with great noise drove the reindeer into the narrow defiles, where the men lay in wait and killed them with harpoons or darts. But they are now become very scarce.

The rein-deers are found in the neighborhood of Hudson's Bay; in most amazing numbers, columns of eight or ten thousand are seen annually passing from north to south in the months of March and April, driven out of the woods by the wathenred, seeking refreshment on the shore, and a quiet place to drop their young. They go to rut in September, and the males soon after fled their horns; they are at that season very fat, but for rank and bulky as not to be eatable. The females drop their young in June, in the most frequented spots they can find; and then they likewise lose their horns. Beasts of prey follow the herds; first, the wolves, who single out the stragglers (for they know not the cleanest delicacy of the milk or cheese); next, the dogs, who glide up the sides of the herds, and then they eagerly devour the contents of the stomach, which is composed of butter. The skins and horns are also an article of commerce, and used in London by the bakers. The Indians shoot them in the winter. The English make hedges with stakes and boughs of trees along the woods for five miles in length, leaving openings at proper intervals behind with snares, in which multitudes are taken. The Indians also kill great numbers during the seasons of migration, watching in their canoes, and spearing them while passing over the rivers of the country, or from island to island; for they swim most admirably well.
with each other for their mistresses, but are less fierce than the flag; during that season, the male will form a hole in the ground, make the female lie down in it, and then often walk round and smell at her. Moore speaks of a species found on the banks of the Gambia, in the interior parts of Africa, near Barracouda, called Tungong, which he says differed not in form from the English fallow-deer; only that its size was equal to that of a small horse, and weighed 300 lb. It had also on its neck an erect black mane, four or five inches long.—Mr White, in his Natural History of Peliborn, mentions as a piece of information to naturalists, that if some curious gentleman would procure the head of a fallow-deer, and have it buried, to obviate any inconveniency, they can open two thistles, which he found it furnished with two piricaula, or breathing places, beside the nostrils; probably analogous to the pidentia lacrymatoria in the human head. When deer are thirsty they plunge their noses, like some horses, very deep under water, while in the act of drinking, and continue in that situation for a considerable time; but, to obviate any inconveniency, they can open two vents, one at the inner corner of each eye, having a communication with the nose. This seems, as our author observes, to be an extraordinary provision of nature; for it looks as if these creatures could not be suffocated, though their mouths and nostrils were both stopped. This curious formation of the head, he further remarks, may be of singular service to beasts of chase, by affording them free respiration; and no doubt these additional nostrils are thrown open when they are hard run. Mr Pennant has observed the same curious organization in the antelope. See Capra.

6. The Capreolus, or Roe-buck, has erect cylindrical, branched horns, and forked at the top. His size is only three feet nine inches long, two feet three inches high before, and two feet seven inches high behind: weight from 50 to 60 lb. Though the leaf of the deer-kind, his figure is most elegant and handsonde. His eyes are more brilliant and animated than those of the flag. His limbs are more nimble, his movements quicker, and he bounds, seemingly without effort, with equal vigour and agility. His coat, or hair, is always clean, smooth, and glossy. He never wallows in the mire like the flag. He delights in dry and elevated situations, where the air is purest. He is likewise more crafty, conceals himself with greater address, is more difficult to trace, and derives superior resources from instinct; for though he has the misfortune to leave behind him a stronger fcent than the flag, which redoubles the ardour and appetite of the dogs, he knows how to withdraw himself from their pursuit, by the rapidity with which he begins his flight, and by his numerous refinblings. He delays not his arms of defence till his strength fails him; but, as soon as he finds that the first efforts of a rapid chase have been unsuccessful, he repeatedly returns on his former steps; and after confounding by these opposite movements, the direction he has taken, after intermixing the present with the past emanations from his body, he rises from the earth with a great bound, and retiring to a hide, he lies down flat on his belly; and in this immovable situation, he allows the whole troop of his deceived enemies to pass very near him.

The roe-deer differs from the flag and fallow-deer in disposition, temperament, manners, and almost every natural habit. Instead of associating in herds, they live in separate families. The father, mother, and young, go together, and never mix with strangers. They are constant in their amours, and never unfaithful like the flag. As the females generally produce two fawns, the one male and the other female, these young animals, brought up and nourished together, acquire to their mutual affection, that they never quit each other, unless one of them meets with a misfortune, which never ought to separate lovers. This attachment is more than love; for though always together, they feel the aridure of the rut but once a year, and it continues only fifteen days, commencing at the end of October, and ending before the fifteenth day of November. They are not then, like the flag, overloaded with fat; they have no strong smell, no fury, in a word, nothing that can change the state of their bodies. During this period, they indeed suffer not their fawns to remain with them. The father drives them off, as he is obliged to oblige them to yield their place to those which are to succeed, and to form new families for themselves. However, after the rutting season is past, the fawns return to their mother, and remain with her some time; after which they separate for ever, and remove to a distance from the place which gave them birth.

The female goes with young five months and a half, and brings forth about the end of April or beginning of May. She produces two at a time, which he is obliged to conceal from the buck while very young. In 10 or 12 days they acquire strength sufficient to enable them to follow her. When threatened with danger, the hides them in a close thicket, and, to preserve them prefers herself to be chased. But notwithstanding all her care and anxiety, the young are sometimes carried off by men, dogs, or wolves.

Roe-bucks prefer a mountainsous woody country to a plain one. They were formerly very common in Wales, in the north of England, and in Scotland; but at present the species nowhere exists in Great-Britain, except in the Scottish highlands. In France they are more frequent; they are also found in Italy, Sweden, and Norway; and in Asia they are met with in Siberia. The first that are met with in Great Britain, are in the woods on the south side of Loch-Rannoch, in Perthshire: the laft in thofe of Longwai, on the southern borders of Caithness; but they are most numerous in the beautiful forests of Invercauld, in the midft of the Grampian hills. They are unknown in Ireland. Wild roes, during summer, feed on grasses; and are very fond of the rubus fatustilis, called in the Highlands the roebuck berry; but in the winter time, when the ground is covered with snow, they browse on the tender branches of the fir and birch.

7. The Guinecenis, about the size of a cat, is of a greyish colour, and black underneath. It is a native of Guinea, and the size and figure of its horns have not been hitherto described with any precision.

8. The Axis, or Speckled Deer, has slender trifurcated horns; the first branch near the base, the second near the top, each pointing upwards. This species is about the size of the fallow-deer; of a light red colour; the body beautifully marked with white spots; along
The hunters are sure of finding the game there; for notwithstanding they are often disturbed, the buffaloes and deer are so passionately fond of the favourable regale, as to bid defiance to all danger, and return in droves to these favourite haunts.

The deer are of the first importance to the savages. The skins form the greatest branch of their trade, by which they procure from the colonists, by way of exchange, many of the articles of life. To all of them the flesh is the principal food throughout the year; for drying it over a gentle but clear fire, after cutting it into small pieces, it is not only capable of long preservation, but is very portable in their sudden excursions, especially when reduced to powder, which is frequently done.

Hunting is more than an amusement to these people. They give themselves up to it not only for the sake of subsistence, but to fit themselves for war, by habituating themselves to fatigue. A good hunter is an able warrior. Those who fail in the sports of the field are never supposed to be capable of supporting the hardships of a campaign; they are degraded to ignoble offices, such as dressing the skins of deer, and other employments allotted only to slaves and women.

When a large party meditates a hunting-march, which is usually at the beginning of winter, they agree on a place of rendezvous, often 500 miles distant from their homes, and a place perhaps that many of them had never been at. They have no other method of fixing on the spot than by pointing with their finger. The preference is given to the eldest, as the most experienced. When this matter is settled, they separate into small parties, travel and hunt for subsistence all the day, and rest at night; but the women have no certain resting-places. The savages have their particular hunting countries; but if they violate the limits of those belonging to other nations, feuds ensue, fatal as those between Percy and Douglas in the famed Chevi Chace. As soon as they arrive on the borders of the hunting country (which they never fail doing to a man, be their respective routes ever so distant or so various), the captain of the band delineates on the bark of a tree his own figure with a rattlesnake twined round him with diffused mouth; and in his hand a bloody tomahawk. By this he implies a destructive menace to any who are bold enough to invade their territories, or to interrupt their diversion.—The chase is carried on in different ways. Some surprise the deer by using the flail of the head, horns, and hide; but the general method is performed by the whole body. Several hundreds distinguish in a line, encompassing a vast space of country, fire the woods, and drive the animals into some strait or peninsula, where they become an easy prey. The deer alone are not the object; foxes, raccoons, bears, and all beasts of fur, are thought worthy of attention, and form articles of commerce with the Europeans.

The number of deer destroyed in some parts of America is incredible; as is pretended, from an absurd idea which the savages have, that the more they destroy, the more they shall find in succeeding years. Certain it is that multitudes are destroyed; the tongues only preferred, and the carcasses left a prey to wild beasts. But the motive is much more political. The savages...
in the civil law for a voluntary surrenders of a person's effects to his creditors, to avoid imprisonment. See the article Bankrupt.

In several places the cession carried with it a mark of infamy, and obliged the person to wear a green cap or bonnet; at Lucca, an orange one; to neglect this was to forfeit the privileges of the cession. This was originally intended to signify that the cessionary became poor through his own folly. The Italian lawyers describe the ceremony of cession to consist in striking the bare breech three times against a stone, called *Lapis Vituperis*, in presence of the judge. Formerly it consisted in giving up the girdles and keys in court: the ancients using to carry at their girdles the chief utensils whereby they got their living; as the scrivener his escritoire, the merchant his bag, &c.

The form of cession among the ancient Gauls and Romans was as follows: The cessionary gathered up dust in his left hand from the four corners of the house, and standing on the threshold, holding the door post in his right hand, threw the dust back over his shoulders; then stripping to his shirt, and quitting his girdle and bags, he jumped with a pole over the hedge; hereby letting the world know, that he had nothing left, and that when he jumped all he was worth was in the air with him. This was the cession in criminal matters. In civil cases, it was sufficient to lay a bough, a switch or a broken straw, on the threshold: this was called *obrenerenda per durtillum et felucam*.

Cession, in the ecclesiastical law, is when an ecclesiastical person is created a bishop, or when a person of a parish takes another benefice, without dispensation, or being otherwise qualified. In both these cases their first benefices became void by cession, without any renunciation; and to those livings that the person had, who was created bishop, the king may present for that time, whoever is patron of them; and in the other case the patron may present: but by dispensation of retainer, a bishop may retain some or all the preferments he was intituled to before he was made bishop.

CESTRUM, bastard jasmine: A genus of the monogynia order, belonging to the pentandra clafs of plants; and in the natural method ranking under the 28th order, *Lorideae*. The corolla is funnel-shaped; the stamens each sending out a little tooth about the middle of the inside. There are six species, all of them natives of the warmest parts of America; so cannot be preferred in Britain without artificial heat. They are flowering shrubs, rising in height from five to twelve feet, with flowers of a white, herbaceous, or pale yellow colour. The flowers of one species commonly called *Badmington Jasmine*, have the property of sending out a strong scent after sunet. They may be propagated either by seeds or cuttings.

CETUI, a French word, signifying he or him, frequently used in the English law writings. Thus, *Cetui qui trueta*, a person who has lands, &c., committed to him for the benefit of another; and if such person does not perform his trust, he is compellable to it in chancery, *Cetui qui vie*, one for whose life any lands, &c., are granted. *Cetui qui usque*, a person to whose use any one is infeoff'd of lands or tenements. Formerly the seoffees to usfs were deemed owners of the
CETUS, in astronomy, the whale; a large constellation of the southern hemisphere, under Pisces, and next the water of Aquarius. The stars in the constellation Cetus, in Ptolemy's catalogue, are twenty-two; in Tycho's twenty-one; in Hevelius's forty-five; in the British catalogue ninety-seven.

Cetus is represented by the poets, as the sea-monster which Neptune, at the suit of the nymphs, sent to devour Andromeda for the pride of her mother, and which was killed by Perseus. In the mandible of cetus is a variable star which appears and disappears periodically, passing through the several degrees of magnitude both increasing and diminishing, in about 333 days. See Astronomy, no. 45.

CEVA, a strong town of Piedmont in Italy, seated upon the river Tanero, with a strong fort, in E. Long. 8. 8 N. Lat. 44. 20.

CEVENNES, mountains of Languedoc in France, remarkable for the frequent meetings of the Protestants there as a place of security against the tyranny of their governors. In queen Anne's reign there was an attempt made to shift them by an English fleet in the Mediterranean; but to no purpose, for the French had occupied the passes.

CEUTA, a maritime town of Barbary in Africa, and in the kingdom of Fez, seated on the straits of Gibraltar, opposite that place, in W. Long. 6. 25 N. Lat. 36. 35. John king of Portugal took it from the Moors in 1415, but it now belongs to Spain. In 1697, it sustained a vigorous siege by the Moors.

CEYLON, a large island in the East Indies, about 250 miles in length and 200 in breadth. It abounds in trees and shrubs, valuable both on account of their timber and the guns or spicas they produce. Among these Mr. Ives enumerates the euphorbium, tulip-tree, ebony, red-wood, caffia, cocoa-nut, cotton, lime, mango, citron, coffee; the trees producing balam of cassia, gum gamboge, lac, and anguvenale. This last is as yet unknown in Europe; but, according to the information of a Dutch surgeon, an oil or balsam is produced from it by distillation, which is of great use in paralytic complaints. There is also another gum named badule, which has been but lately discovered, and of which the ues is as yet unknown. Here is also the black and yellow teak, the wood of which is of a most beautiful grain, but so hard that the cutting of it proves very destructive to the carpenters' tools. But the most remarkable, as well as the most useful, of the vegetable productions of Ceylon, is the cinnamon-tree, which grows wild in every wood on the south-west part of the island. The very young trees are not fit for binding, and the old ones are cut down for firewood. The common flowering shrubs, of which the whole island is full, send forth a most agreeable fragrance every morning and evening. It abounds with high hills, between which the soil is a fair red earth; and the valleys are extremely pleasant, having a clear rivulet running thro' almost every one of them. Thus the finest fruits grow in vast plenty, and may be had at the most trifling rates; a pine-apple being bought for less than a penny, and so of the rest. Other provisions are almost equally cheap.

CETACEOUS, an appellation given to the fishes of the whale kind; the characters of which are: they have no gills; there is an orifice on the top of the head, through which they breathe; and one back fin; the number of their fins never exceed three, viz. two pectoral fins, and one back fin; but in some species the last is wanting. Their tails are placed horizontally, or flat in respect to their bodies; contrary to the direction of those of all other fishes, which have them in a perpendicular line. This situation of the tail enables them to force their bodies slowly to the surface of the water to repel, and then to perform several other functions. They have the power of uttering sounds, such as bellowing and making other noises denied to genuine fish. Like land animals they show in all their actions a great power of charming and conciliating love.

Nature on this tribe hath bestowed an internal structure in all respects agreeing with that of quadrupeds; and in a few others the external parts in both are similar. Cetaceous fish, like land animals, breathe by means of lungs, being destitute of gills. This obliges them to rise frequently on the surface of the water to repel, to sleep on the surface, as well as to perform several other functions. They have the power of uttering sounds, such as bellowing and making other noises denied to genuine fish. Like land animals they show in all their actions a great power of charming and conciliating love.

Notwithstanding the many parts and properties which cetaceous fish have in common with land animals, yet there still remain others which render it more natural to place them, with Ray, in the rank of fish; the form of their bodies agrees with that of fish; they are entirely naked, or covered only with a smooth skin; they live conflantly in the water, and have all the actions of fish.

CETE, the name of Linnaeus's seventh order of mammalia, comprehending the Monodon, Balea, Physeter, and Delphinus.

CETERACH, in botany, the trivial name of a species of Asplenium.

CETTE, a maritime town of France, in Languedoc, seated at the place where the canal of Languedoc begins, between Montpellier and Aigues, on the bay of Maguelone in the Mediterranean sea. E. Long. 3. 15 N. Lat. 43. 25.

CETUS, among ancient poets, a fine embroidered girdle said to be worn by Venus, to which Homer attributes the power of charming and conciliating love. The word is also written cethun and cethon; it comes from cestus, a girdle, or other thing embroidered or wrought with a needle; derived, according to Servius, from cestus, pangere; whence also inceus, a term used at first for any indecency by undoing the girdle, &c. but now restrained to that between persons near akin. See INTOX.

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Ceylon—cheap; a dozen of fowls or five ducks being sold for a rupee, not quite half-a-crown of English money. Here the Dutch show a poisonous fruit called by them Adam's apple. In shape it resembles the quarter of an apple cut out, with the two inlines a little convex, and a continued ridge along the outer edges; and is of a beautiful orange colour. Pepper, ginger, and cardamoms, are also produced here; as well as five kinds of rice, which ripen one after another.

Ceylon produces also topazes, garnets, rubies, and other precious stones, which are discovered by washing the soil wherein they grow. It has likewise ores of copper, iron, and probably of tin, with veins of black crystal.

Common deer are found in this island in great abundance, as well as Guinea-deer; but the horned cattle are both very small and scarce, six of them weighed all together, but 714 pounds, and one of these weighed only 70 pounds. They have, however, the largest and best elephants in the world; and their woods are infested by tygers, the most terrible of all ravenous beasts. They abound also with snakes of a monstrous size, one of which has been known to destroy a tyger and devour him at one meal. Mr Ives saw one 15 feet long and 30 inches in circumference. Spiders, centipedes, and scorpions, also grow here in an enormous size. Our author saw a spider here as large as a road, with brown hair upon it, and legs as thick as the Shank of a large tobacco-pipe. A scorpion, taken out of a piece of wood, was eight inches long, from head to tail, exclusive of the claws; the shell was as hard as that of a crab: and our author killed a centipede more than seven inches long. Here the mantis or creeping leaf is met with; which our author supposes to be a species of grasshoppers, having every member we fee in common insects, though in shape and appearance it greatly resembles a leaf. It is of a green colour. The sea-coasts abound with fish, which are to be had very cheap. Neither harp-hells nor ventile-trains were seen here; but there are abundance of painted cockles, and others commonly called Panama shells.

"The natives of this island (says our author) are the stoutest Indians I ever saw. Mr Knox in his history reports many strange things of their religion and customs, none of which I had any opportunity of seeing. He says 'that they have various ways of treating their dead. Some burn them, which is not uncommon in India; while others throw their limbs up into the forks of trees.' This may be true, because when our wood-cutters were once hewing down a flack of timber, there fell from it the skull and many bones of a human body; and I also saw here a human body hanging on a tree. Other historians relate, that the natives of Ceylon feed on human flesh; nay, that they eat the bodies of their deceased parents, imagining that no other sepulchre is so fit for them as their own bowels, since thereby they think they are changed into their own substance, and live again in themselves. This shocking custom is reported of the ancient Scythians, and possibly might have been used by the inhabitants of Ceylon, but is now in both countries entirely abolished; and yet even at this day these islanders are said to make cups of their parents skulls, with a view, that in midst of their mirth and jollity they may be sure to preserve a respectful remembrance of them."

The Ceylonese make use of boats hollowed out of the trunks of trees, which are about 12 or 14 feet long, but only as many inches broad within. The tree part in the bottom is much larger; but when the boat, on account of the size of the tree, is too small, they make a trough on the top of it square at both ends. Some boats, however, are much larger, being built between two trees; and with these they coast along shore; the others are for fishermen. It lies from E. Long. 78° to 82°, and from N. Lat. 5° to 10°.

The conquest of this island was the first attempt of Albuquerque the celebrated Portuguese admiral. He found it well peopled, and inhabited by two different nations, the Bedus inhabiting the northern, and the Gingles who dwelt in the southern parts. The former were very barbarous, but the latter a good deal more polished. Besides the advantages already mentioned, which these nations derived from their mines of precious stones, they carried on the greatest pearl-fishery in the East. These nations the Portuguese conquered, and tyrannized over in such a manner, that they afflicted the Dutch in expelling them from the island; and by their united efforts this was accomplished in 1658, after a bloody and obstinate war. All the Portuguese settlements fell into the hands of the Dutch East India company, who still keep possession of them, excepting a small district on the eastern coast without any port, from whence the sovereign of the country had his seat. These settlements formed a regular track, extending from two to twelve leagues into the inland parts of the island. The company have appropriated all the productions of the island. The several articles of trade are, 1. Amethysts, sapphires, topazes, and rubies; the last are very small, and very indifferent. The Moors, who come from the coast of Coromandel buy them, paying a moderate tax; and when they are cut, sell them at a low price in the different countries. 2. Pepper, which the company buy for about 4d. per pound; coffee, for which they only pay 2d. and cardamom, which has no fixed price. These articles are all of an inferior quality, and through the indolence of the inhabitants will never turn to any account. 3. An hundred bales of handkerchiefs, pagnes, and gingham, of a fine red colour, which are fabricated by the Malabars of Jafnapatan. 4. A small quantity of ivory, and about 50 elephants, which are carried to the coast of Coromandel. 5. Areca, which the company buys at about 8s. 9d. the ammona, and sells on the spot at L. 1, 12s. to the merchants of Bengal, Coromandel, and the Maldives; who give in return rice, coarse linen, and cowries. 6. The pearl fishery, which was formerly of great consequence; but is now so much exhausted as not to bring in more than L. 8,750 per annum. The annual expenses of the colony may amount to about L. 96,250; their revenues and small branches of commerce produce only about L. 87,500.

-This deficiency must be supplied out of the pro-
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Chace  fits arising from the cinnamon trade; and they are ob-
liged to provide for the expences of the wars in which
they are frequently engaged with the king of Candy,
who is present the sole sovereign of the island. These
are very detrimental to the interests of the Holland-
ers; for which reason they endeavoured to engage
the good will of this monarch by showing him all ima-
ginable civilities. The harmony, however, has been
often interrupted. In a bloody war which terminated
on the 14th of February 1766, the Ceylonese monarch
was driven from his capital, so that the Dutch made a
very advantageous treaty. Their sovereignty was
acknowledged over all that part of the country they
possessed before the troubles broke out; and that part
of the coasts held by the natives was ceded to them.
They were allowed to gather cinnamon in all the
plains; and the court was to sell them the best for,
which is produced in the mountains, at the rate of
L. x. 16s. 8d. for 18 lb. The government engaged to
have no connection with any foreign power; and
even to deliver up any Europeans who might happen
to stray into the island. In return for so many conces-
sions, the king was to receive annually the value of
the produce of the ceded coasts; and from thence his
subjects were to be furnished gratis with as much salt
as they had occasion for. The Ceylonese are in the
most miserable situation: they are in a state of total
inactivity; live in huts without any furniture; and
subsist upon fruits; those who are the most affluent
have no other covering than a piece of coarse linen
wreath about their waist.

CHACE.  See CHAIS.

CHACO, a large country of South America situ-
ated between 19° and 37° S. Lat. It belongs to the
Spaniards, by whom it was conquered in 1536. It is
not naturally fruitful, but abounds in gold mines, which
are so much the more valuable that they are easily
worked. The works are carried on by about 8000
blacks, who deliver every day to their masters a cer-
tain quantity of gold; and what they can collect
above this, belongs to themselves; as well as what
they find on those days that are consecrated to religion
and reft, upon condition that during the festival they
maintain themselves. This enables many of them to
purchase new property; after which they intermarry
with the Spaniards.

CHADCHOD, in Jewish antiquity, Ezekiel men-
tions chadchud among the several merchandizes which
were brought to Tyre. The old interpreters, not
very well knowing the meaning of this term, con-
tinued it in their translotion. St Jerom acknowledges
that he could not discover the interpretation of it.
The Chaldee interprets it pearls; others think that
the onyx, ruby, carbuncle, crystal or diamond is
meant by it.

CHÆRONEA, (anc. geog.) the laft town, or
rather the last village, of Boeotia, towards Phocis;
the birth-place of Plutarch: famous for the fatal defeat
of the confederate Greeks by Philip of Macedon. This
place was confidered by Philip as well adapted to the
operations of the Macedonian phalanx; and the ground
for his encampment, and afterwards the field of battle,
were chosen with equal fagacity: having in view on
one fide a temple of Hercules, whom the Macedonians
regarded as the author of their royal house, and the
high protector of their fortune; and on the other the
banks of the Thermodon, a small river flowing into
the Cephisus, announce by the oracles of Greece as
the defiled fene of defolation and woe to their unhap-
py country. The generals of the confederate Greeks
had been much lefs careful to avoid themselves of
the powerful functions of superition. Unrestrained by
inafficiencs, the Athenians had left their city at the
exftoration of Demofthenes, to wait no other omen
but the caufe of their country. Regardles of
oracles, they afterwards advanced to the ill-fated Ther-
modon, accompanied by the Thebans, and the feanty
reinforcements rafied by the islands and fates of Pelo-
ponnisus which had joined their alliance. Their army
amounted to 30,000 men, animated by the noblest
calfe for which men can fight, but commanded by the
Athenians Lycicles and Chares; the firft but little, and
the second unfavourably known; and by Theagenes
the Theban, a perfon strongly fpofed of treafcry: all
three creatures of cabal and tools of faction, flames
of interefi or voluptuousness, whose characters (es-
pecially as they had been appointed to command the only
flates whose fame, rather than virtue, yet oppofed the
public enemy) are alone fufficient to prove that Greece
was rife for ruin.

When the day approached for abolifhing the totter-
ing independence of thofe turbulent republics, which
their own internal vices, and the arms and intrigues of
Philip, had been gradually undermining for 22 years,
both armies formed in battle array before the riing
of the sun. The right wing of the Macedonians was
headed by Philip, who judged proper to oppose in
perfon the dangerous fury of the Athenians. His son
Alexander, only 19 years of age, but surrounded by
experienced officers, commanded the left wing, which
faced the Sacred Band of the Thebans. The auxi-
ilaries of either army were pofed in the centre. In
the beginning of the action, the Athenians charged
with impetuosity, and repelled the oppofing divisions
of the enemy; but the youthful ardour of Alexander
obliged the Thebans to retire, the Sacred Band being
cut down to a man. The activity of the young prince
completed their diforder, and purfued the scattered
multitude with his Thelfian cavalry.

Meantime the Athenian generals, too much elated
by their firft advantage, loft the opportunity to im-
profe it; for having repelled the centre and right wing
of the Macedonians, except the phalanx, which was
compofed of choft men, and immediately commanded
by the king, they, instead of attempting to break this
formidable body by attacking it in flank, pressed for-
ward againft the fugitives, the infolent Lycicles ex-
claiming in vain triumph, "Purfue, my brave coun-
trymen! let us drive the cowards to Macedon." Philip
oberved this rash folly with contempt; and faying to
thofe around him, "Our enemies know not how to
conquer," commanded his phalanx, by a rapid evolui-
on, to gain an adjacent eminence, from which they pour-
ed down, firm and collected, on the advancing Athen-
ians, whose confidence of success had rendered them
totally insenfible to danger. But the irresistible shock of the
Macedonian spear converted their fury into defpair.
Above a thoufand fell, two thoufand were taken pri-
soners.
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Antipater, the most trusted of his ministers, to offer
them peace on such favourable terms as they had little
reason to expect. They were required to send deputies
to the Ithmus of Corinth, where, to adjust their
respective contingents of troops for the Persian expe-
dition, Philip proposed assembling early in the spring
a general convention of all the Grecian states; they
were ordered to surrender the life of Samos, which
actually formed the principal station of their fleet, and
the main bulwark and defence of all their maritime or
inflar possessions; but they were allowed to enjoy,
unmolested, the Attic territory, with their hereditary
form of government.

CHÆROPHYLLUM, CHERVIL: A genus of the
digynia order, belonging to the pentandria clas of
plants; and in the natural method ranking under the
45th order, Umbellateae. The involucrum is reflexed-concave; the petals inflexed-cordate; the fruit oblong
and smooth. There are seven species, of which,
called cow-weed and wild chervil, are weeds common
in many places of Britain. The roots of the fifth have
been found poisonous when used as parfuits; the
fruits afford an indifferent yellow dye; the leaves
and stalks a beautiful green. Its preference indicates
a fertile and grateful soil. It ought to be rooted out
from all pastures early in the spring, as no animal
but the ass will eat it. It is one of the most early
plants in flowering, so that by the beginning of April
the leaves are near two feet high. The leaves are
recommended by Geoffroy as aperient
and diuretic, and at the same time grateful to the palate and
stomach. He even afferts, that dropsies which do not
yield to this medicine can scarcely be cured by any
other. He directs the juice to be given in the dose of
three or four ounces every fourth hour, and continued
for some time either alone, or in conjunction with
nirc and syrup of the five opening roots.—The other
species of chærophyllum are not cultivated of any remark-
able property.

CHÆTODON, in ichthyology, a genus of fishes
belonging to the order of thoracii. The teeth are
very numerous, thick, succulent, and flexible; the rays
of the gills are fix. The back-fin and the fin at the
anus are fleshy and squamous. There are 23 species,
distinguished from each other principally by the figure
of the tail, and the number of spines in the back-fin.
The most remarkable is the rostratus, or shooting-fish,
having a hollow, cylindrical beak. It is a native of
the East Indies, where it frequents the sides of the
sea and rivers in search of food, from its singular
manner of obtaining which it receives its name. When
it spits a fly sitting on the plants that grow in shallow
water, it swims on to the distance of five, or
six feet; and then, with a surprising dexterity, it
ejcts out of its tubular mouth a single drop of water,
which never fails striking the fly into the water, where
it soon becomes its prey.

CHAFF, in husbandry, the husks of the corn, se-
parated by screening or winnowing it. It signifies al-
so the rind of corn, and firaw cut small for the use of
cattle.

CHAFF-Cutter, a machine for making chaff to feed
horses.—The advantages of an easy and expeditious
method of cutting straw into chaff by an engine
which could be used by common labourers have been long
long acknowledged, and various attempts have been made to bring such an engine to perfection. But the objections to most of them have been their complicated structure, their great price, and the noise they make in working; all which inconveniences seem to have been lately removed by an invention of Mr James Pike, watchmaker of Newton Abbot in Devonshire. Of his engine, which is of a simple and cheap construction, the following description, and figure referred to, are extracted from the Transactions of the Society of Arts for 1787.

The engine is fixed on a wood frame, which is supported with four legs, and on this frame is a box for containing the straw, four feet six inches long, and about ten inches broad; at one end is fixed across the box two rollers inlaid with iron, in a diagonal line about an eighth of an inch above the surface; on the ends of these rollers are fixed two strong brass wheels, which takes one into the other. On one of these wheels is a contract wheel, whole teeth taken in a worm on a large arbour; on the end of this arbour is fixed a wooden wheel, two feet five inches diameter and three inches thick; on the inside of part of this wheel is a knife, and every revolution of the wheel the knife passes before the end of the box and cuts the chaff, which is brought forward between the rollers, which are about two inches and a half asunder; the straw is brought on by the worm taking one tooth of the wheel every round of the knife; the straw being too pressed between the rollers, the knife cuts off the chaff with so great ease, that twenty-two bushels can be cut within the hour, and makes no more noise than is caused by the knife passing through the chaff.

A is the box into which the straw is put. B, the upper roller, with its diagonal projecting ribs of iron, the whole moving by the revolution of the brass wheel C on the axis of which it is fixed. D, a brass wheel, having upon it a face wheel, whose teeth take into the endless screw on the arbour E, while the teeth on the edge of this wheel enter between those on the edge of the wheel C. On the axis of the wheel D is a roller, with iron ribs similar to B, but hid within the box. E, the arbour, one of the ends of which being made square and passing through a mortise in the centre of the wooden wheel F, is tightened by a strong ferew and nut; the other end of this arbour moves round in a hole within the wooden block C. H, the knife, made fast by screw to the wooden wheel F, and kept at the distance of nearly three quarters of an inch from it by means of a strip of wood of that thickness, of the form of the blade, and reaching to within an inch of the edge. I, the handle mortised into the outside of the wooden wheel F.

CHAFFER, in zoology, a species of beetle. See SCARABAEUS.

CHAFFERCONNERS, in commerce, printed linens manufactured in the Great Mogul's dominions. They are imported by the way of Surat; and are of the number of those linens prohibited in France.

CHAFFERY, in the iron-works, the name of one of the two principal forges. The other is called the forge. When the iron has been brought at the finery into what is called an ingot, it is hammered into a bar in its middle, but with its two ends rough, the business to be done at the chaffery is the reducing the whole to the same shape, by hammering down these rough ends to the shape of the middle part.

CHAFFINCH, in ornithology, the English name of a species of Fringilla.

CHAGRE, a fort of America in the province of Darien at the mouth of a river of the same name. It has been taken several times by the buccaneers, and last of all by Admiral Vernon in 1740. W. Long. 82° 7'. N. Lat. 9° 50'.

CHAIN, (Catena) a series of several rings, or links, fitted into one another.

There are chains of divers matters, fizes, forms, and for divers uses.—Ports, rivers, streets, &c. are clored with iron chains; rebellious cities are punished by taking away their chains and barriers.

The arms of the kingdom of Navarre are, Chains, Or, in a field Gules. The occasion hereof is referred to the kings of Spain leagued against the Moors; who having gained a celebrated victory against them in 1212, in the distribution of the spoils the magnificent tent of Mitalmai in fell to the king of Navarre, being the first that broke and forced the chains thereof.

A gold chain, is one of the ornaments or badges of the dignity of the chief magistrates of a city, as the mayor of London, the provost and bailies of Edinburgh, &c.—Something like this obtained among the ancient Gauls: the principal ornament of their persons in power and authority was a gold chain, which they wore on all occasions; and even in battle, to distinguish them from the common folders.

Chain also denotes a kind of string, of twisted wire; serving to hang watches, tricker-cases, and other valuable toys upon. The invention of this piece of curious work is owing to the English; whence, in foreign countries, it is denominated the English chain. These chains are usually either of silver or gold, some of gilt copper; the thread or wire of each kind to be very fine.—For the fabric, or making of these chains: a part of the wire is folded into little links of an oval form; the longest diameter about three lines; the shortest one. These, after they have been exactly folded, are again folded into two; and then bound together or interwove, by means of several other little threads of the same thickness; some whereof, which pass from one end to the other, imitate the warp of a stuff; and the others, which pass transverse, the woof. There are at least four thousand little links in a chain of four pendants; which are by this means bound so equally, and withal so firmly together, that the eye is deceived, and takes the whole to consist of one entire piece.

Chain is also a kind of measure in France, in the trade of wood for fuel. There are chains for wood by rale, for wood by the rope, for faggots, for cleft wood, and for round ficks. There are also chains for measuring the sheaves of all sorts of corn, particularly with regard to the payment of tithes; for measuring bottles of hay, and for measuring horses. All these are divided into feet, inches, hands, &c. according to the use they are designed for. CHAIN, in measuring a meafore, consisting of a certain number of links of iron wire, usually a hundred; serving to take the dimensions of fields, &c.
This is what Merienne takes to be the arsipendium of the ancients.

The chain is of various dimensions, as the length or number of links varies: that commonly used in measuring land, called Gunter's chain, is in length four poles or perches: or sixty-six feet, or a hundred links; each link being seven inches . . . Whence it is easy to reduce any number of those links to feet, or any number of feet to links.

This chain is entirely adapted to English measures; and its chief convenience is in finding readily the numbers contained in a given field. Where the proportions of square feet and acres differ, the chain, to have the same advantages as Gunter's chain, must also be varied. Thus in Scotland, the chain ought to be of 74 feet, or 24 Scotch ells, if no regard be had to the difference between the Scotch and English foot; but if regard be had to this difference, the Scotch chain ought to consist of 74½ English feet, or 74 feet 4 inches and ½ of an inch. This chain being divided into a hundred links, each of these will be 8½ inches.

That ordinarily used for large distances, is in length a hundred feet; each link one foot. For small parcels, as gardens, &c., is sometimes used a small chain of one pole, or sixteen feet and a half length; each link one inch . . .

Some in lieu of chains use ropes; but these are liable to several irregularities; both from the different degrees of moisture, and of the force which stretches them. Schwemmer, in his Practical Geometry, tells us, he has observed a rope sixteen feet long, reduced to fifteen in an hour's time, by the mere falling of a hoar frost. To obviate these inconveniences, Wolfin directs, that the little strands whereof the rope consists be twisted contrary ways, and the rope dipped in boiling hot oil; and when dry, drawn through melted wax. A rope thus prepared, will not get or lose any thing in length, even though kept under water all day.

**Chain-Pump.** See Pump.

**Chain-Shot,** two bullets with a chain between them. They are used at sea to shoot down yards or masts, and to cut the throuds or rigging of a ship.

**Top-Chain,** on board a ship, a chain to fling the fall-yards in time of battle, in order to prevent them from falling down when the ropes by which they are hung happen to be shot away or rendered incapable of service.

**Chain-Wales, or Channels, of a ship,** portebollarts, are broad and thick planks projecting horizontally from the ship's side, abreast of and somewhat behind the masts. They are formed to extend the throuds from each other, and from the axis or middle line of the ship, so as to give a greater security and support to the masts, as well as to prevent the throuds from damaging the gunwale, or being hurt by rubbing against it. Every mast has its chain-wales, which are either built above or below the second deck-ports in a ship of the line: they are strongly connected to the side by knees, bolts, and standards, besides being confined thereto by the chains whose upper ends pass through notches on the outer edge of the chain-wales, so as to unite with the throuds above.

**Chains,** in ship-building, are strong links or plates of iron, the lower ends of which are bolted through the ship-side to the timbers.

**Hanging in Chains,** a kind of punishment inflicted on murderers. By Stat. 25. Geo. II. c. 37, the judge shall direct such be executed on the next day but one, unless Sunday intervene; and their bodies to be delivered to the surgeons to be dissected and anatomized; and he may direct them afterwards to be hung in chains. During the interval between sentence and execution, the prisoner shall be kept alone, and sustained only with bread and water. The judge, however, hath power to respite the execution, and relax the other restraints of the act.

**Chain-Island,** an island lately discovered by Captain Wallis in the South-sea. It seemed to be about five miles long and as much broad, lying in the direction of north-west and south-east. It appeared to consist of a double range of woody islands joined together by reefs, so as to compose one island of an oval figure, with a lagoon in the middle. The trees are large; and from the smoke that issued from these woods, it appeared to be inhabited. W. Long. 145. 54. S. Lat. 17. 23.

**Chajotli, or ChavOTT, a Mexican fruit of a round shape, and similar in the husk with which it is covered to the chestnut, but four or five times larger, and of a much deeper green colour. Its kernel is of a greenish white, and has a large stone in the middle, which is white, and like it in subfusance. It is boiled, and the stone eat with it. This fruit is produced by a twining perennial plant, the root of which is also good to eat. See Plate CXXXVIII.

**Chair, (Cathedra)** was anciently used for the pulpit, or suggenn, whence the priest spoke to the people. It is still applied to the place whence professors and regents in universities deliver their lectures, and teach the sciences to their pupils: thus, we say, the professor's chair, the doctor's chair, &c.

**Curule-Chair,** was an ivory seat placed on a car, wherein were seated the prime magistrates of Rome, and those to whom the honour of a triumph had been granted.

**Sedan-Chair,** a vehicle supported by poles, wherein persons are carried; borne by two men. There are two hundred chairs allowed by act of parliament in London; and no person is obliged to pay for a hackney-chair more than the rate allowed by the act for a hackney-coach driven two-thirds parts of the said distance. 9 Ann. c. 19. and 12 Geo. I. c. 12. to four hundred. See Hackney-Coaches.

**Chair** is also applied by the Romanists to certain feasts, held anciently in commemoration of the translation of the fae, or feast of the vicarage of Chrift, by St. Peter. The perforated chair, wherein the new-elected pope is placed, F. Mabillon observes, is to be seen at Rome: but the origin thereof he does not attribute, as is commonly done, to the adventure of Pope Joan; but says there is a mystery in it; and it is intended, to explain to the pope those words of scripture, that God draws the poor from out of the dust and mire.

**Chairman,** the President, or speaker of an assembly,
CHA

CHAIDE, assembly, company, &c. We say, the chairman of a committee, &c.

CHALCE, or CHALEC, a sort of light open chariot, or calash.

CHALCEDON, according to Vicius, was first introduced by Agustus into the use of post-chaises; but the invention is generally ascribed to Trajan, and was probably only improved by Trajan, and succeeding emperors.

CHALAZA, among naturalists, a white knotty sort of string at each end of an egg, formed of a plexus of the fibres of the membranes, whereby the yolks and white are connected together. See Egg.

CHALCAS, in botany: A genus of the monogyne order, belonging to the pentandria clafs of plants. The calyx is quinquepartite; the corolla campullata, with the petals heeled; the stigma round-headed and warty.

CHALCEDON, or CALCEDON, anciently known by the names of Procratellus and Colbusa, a city of Bithynia, situated at the mouth of the Euxine, on the north extremity of the Trachian Bosphorus, over against Byzantium. Pliny, Strabo, and Tacitus, call it The City of the Blind; alluding to the answer which the Pythian Apollo gave to the founders of Byzantium, who, consulting the oracle relative to a place where to build a city, were directed to choose that spot which lay opposite " to the habitation of the blind;" that is, as was then understood, to Chalcodon: the Chalcedonians well deserving that epithet for having built their city and warty.

CHALCEDON, or CALCEDY, in natural history, a genus of the semi-opaque gems. They are of an even and transparent, and entirely free from inclusions, and are found in the Tyssian Apollo gave to the founders of Byzantium, who, consulting the oracle relative to a place where to build a city, were directed to choose that spot which lay opposite " to the habitation of the blind;" that is, as was then understood, to Chalcodon: the Chalcedonians well deserving that epithet for having built their city and warty.

CHALCEDON, in the Christian times, become famous on account of the council which was held there against Eutyches. The emperor Valens caused the walls of this city to be levelled with the ground for riding with Procopius, and the materials to be conveyed to Constantinople, where they were employed in building the famous Valentinian aqueduct. Chalcodon is at present a poor place, known to the Greeks by its ancient name, and to the Turks by that of Cuthaest, or "the judges town."

CHALCEDONY, in natural history, a genus of the semi-opaque gems. They are of an even and transparent, and entirely free from inclusions, and are found in the Tyssian Apollo gave to the founders of Byzantium, who, consulting the oracle relative to a place where to build a city, were directed to choose that spot which lay opposite " to the habitation of the blind;" that is, as was then understood, to Chalcodon: the Chalcedonians well deserving that epithet for having built their city and warty.

CHALCEDON, or CALCEDY, in natural history, a genus of the semi-opaque gems. They are of an even and transparent, and entirely free from inclusions, and are found in the Tyssian Apollo gave to the founders of Byzantium, who, consulting the oracle relative to a place where to build a city, were directed to choose that spot which lay opposite " to the habitation of the blind;" that is, as was then understood, to Chalcodon: the Chalcedonians well deserving that epithet for having built their city and warty.

CHALCIDENE, or CHALCIDYCE, an inland country of Syria, having Antioch or Seleucia on the west, Cyrrhestica on the north, the south Apamene and Coele Syria, and to the east Chalybonitis; being so called from its principal city Chalis. This province, one of the most fruitful in Syria, was feized by Ptolemy the son of Mennecus during the troubles of Syria, and by him as a separate kingdom. His son is flyed by Josephus and Hegesippus only Prince of Chalis, but his son Lyfias is honoured both by Josephus and Dio with the title of King. Upon the death of Antiochus Dionysius king of Syria, Ptolemy attempted to make himself master of Damascus and all Coele Syria; but the inhabitants, having an utter aversion to him on account of his cruelty and wickedness, chose rather to submit to Aretas king of Arabia, by whom Antiochus and his whole army had been cut off. He opposed Pompey on his entering Syria; but was by him defeated, taken prisoner, and sentenced to death; which, however, he escaped by paying a thousand talents, and was left also in possession of his kingdom. After Arifobulus king of Judæa had been poisoned by the friends of Pompey, and Alexander his son beheaded at Antioch, he sent Philippius his son to Acalon, whether the widow of Arifobulus had retired with her children, to bring them all to Chalis: proposing, as he was in love with one of the daughters named Alexandria, to maintain them in his own kingdom in a manner suitable to their rank; but Philippius like-
wife being in love with Alexandria, married her on the way; for which presumption Ptolemy put him to death on his return, and then took her to wife. On account of this affinity, he supported to the utmost of his power Antigonus the younger son of Artibolus who took the field at the head of a considerable army, but on his entering Judea was entirely defeated by Herod. Ptolemy soon after died, and was succeeded by his son Lyfanias; who, espousing the cause of the Ammonian family with great warmth, promised to Barzapharnes who commanded the Parthian troops in Syria, and to Pacorus the king's son, a thousand talents and five hundred women, provided they should put Antigonus in possession of the kingdom of Judea, and depose Hyrcanus. He was not long after put to death by Marc Antony, at the indignation of Cleopatra; who, in order to have his dominions, accused him falsely of having entered into an alliance with the Parthians.

CHALCIDIAN, CHALCIDICUM, or CHALCEDONIUM, in the ancient architecture, a large magnificent hall belonging to a tribunal or court of justice. — Festus says, it took its name from the city of Chaleis; but he does not give the reason. Philander will have it to be the court or tribunal where affairs of money and coinage were regulated; so called from χαλκός, bronze, and δίκαιος, justice. Others say the money was struck in it; and derive the word from χαλκός, and δίκαιος, judge. In Vitruvius, it is used for the auditory of a basilica; in either of the ancient writers for a hall or apartment where the heathen imagined their gods to eat. CHALCIDICE, (anc. geog.) an ancient district of Macedonia, stretching northwards between the Sinus Toronæus and Singiticus. Formerly a part of Thrace, but invaded by Philip of Macedon. Named from the city Chaleis near Olynthus.

CHALCIDIANUS, a famous platonic philosopher in the third century, who wrote a commentary, which is esteemed, from the Timæus of Plato. This work has been translated from the Greek into Latin.

CHALCIS, a city of Chalcidice. See CHALCIDICUS.

(anc. geog.)—Another of Eolia, near the mouth of the river Evenus, on the Ionian Sea, at the foot of a conical mountain; and therefore called by some Echeclus. (Stobaeus, Cato.) on the Eurusipus, the country of Lycochropus the poet, one of the seven which formed the constellation Pleiades. Now Negroponte. E. Long. 24. 30. Lat. 38. 30.—A fourth, the capital of Chalcidice in Syria; differing from the furnaces ad Belum, a mountain or a river; and ad Liburnum, from its situation (Pliny).

CHALCITIS, one of the divisions or districts of Mœmopatia, to the south of Anemuthia, the most northern district, near to Armenia, and situated between Edessa and Carræ. Chalchitis (Pliny), an island opposite to Chaleis.

CHALCODULESAS (Demetrius) a learned Greek, born at Constantineople, left that city after its being taken by the Turks, and afterwards taught Greek in several cities in Italy. He composed a Greek grammar; and died at Milan in 1513.

CHALCODULESAS (Leonius) a famous Greek historian of the 15th century, was born at Athens; and wrote an excellent history of the Turks, from Othman, who reigned about the year 1300, to Mahomet II. in 1422.

CHALDEA, (anc. geog.) taken in a larger sense, included Babylonia; as in the prophecies of Jeremiah and Ezekiel. In a restricted sense, it denoted a province of Babylonia, toward Anaïa Deférar, called in Scripture The land of the Chaldeans. Named from Chas'd the fourth son of Nahor. See BABYLONIA.

CHALDEE LANGUAGE, that spoken by the Chaldeans or people of Chaldea. It is a dialect of the Hebrew.

CHALDEE PARAPHRASE, in the rabbinical style, is called TARGUM. There are three: Chaldee paraphrases in Walton's Polyglot; viz. that of Onkelos, that of Jonathan son of Uziel, and that of Jerusalem.

CHALDRON, a dry English measure, consisting of thirty fix bushels, heaped up according to the sealed bushel kept at Guildhall, London; but on shipboard, twenty-one chaldrons of coals are allowed to the core. The chaldron should weigh two thousand pounds.

CHALCIE, the cup or vessel used to administer the wine in the sacrament, and by the Roman Catholics in the mafs.

The use of the chalice, or communicating in both kinds, is by the church of Rome denied to the laity, who communicate only in one kind, the clergy alone being allowed the privilege of communicating in both kinds.

CHALK, Craea, is a white earth found plentifully in Britain, France, Norway, and other parts of Europe, said to have been originally dug chiefly in the island of Crete, and thence to have received its name of Craea. They have a very easy way of digging chalk in the county of Kent in England. It is there found on the sides of hills, and the workmen undermine it so far as appears proper; then digging a trench at the top as far distant from the edge as the undermining goes at bottom, they fill this with water, which sinks through in the space of a night, upon which the whole flake falls down at once. In other parts of the kingdom, chalk generally lies deeper, and they are forced to dig for it at considerable depths, and draw it up in buckets.

Chalk is of two kinds; hard, dry, and firm, or soft and unfertile; both of which are adapted to various purposes. The hard and dry kind is much the properest for burning into lime; but the soft and unfer­tile chalk is best for using as a manure for lands. Chalk whether burnt into lime or not, is in some cases an excellent manure. Its mode of operating on the soil is explained under the article AGRICULTURE, n° 20, 25, &c.

Pure chalk melts easily with alkali and flint into a transparent colourless glass. With alkaline fels it melts somewhat more difficulty, and with borax somewhat more easily, than with flint or sand. It requires mainly its weight of borax, and its whole weight of alkali, to fuse it. Sal mirabilis, and sandier, which do not vitrify at all with the crysolite earths, form with half their weight of chalk, the first a yellowish black, the latter a greenish, glass. Nitre, on the other hand, one of the most active fluxes for flint, does not perfectly vitrify with chalk. This earth notably promotes the vitrification of flint; a mixture of the two requiring less alkali than either of them separately. If glass made from flint and alkali is fur­
Chalk is a species of earth of which there are many sorts. It is employed in various ways, such as for painting, in glass-making, and in other industries. It is known in many parts of the world, and its properties are well studied by scientists.

**Black-Chalk**: A type of chalk that is used for drawing and painting. It is known for its smoothness and ease of use.

**Red-Chalk**: A type of chalk that is used for painting and writing. It is known for its red color.

**Chalk-Land**: The area where chalk is found. It is known for its white and clean properties.

**Chalk-Stones**: These are found in medicine and are used as a substitute for chalk.

**Chalk-Stone**: A type of stone that is similar to chalk but is harder and more durable.

**Chalk-Marks**: Marks made with chalk that are used for drawing and painting.

**Challenge**: A type of stone that is used for making marks and is known for its durability.
Challenges. 1. In civil cases challenges are of two sorts; challenges to the array, and challenges to the poll.

1. Challenges to the array are at once an exception to the whole panel, in which the jury are arrayed, or set in order by the sheriff in his return; and they may be made upon account of partiality or some defect in the sheriff or his under officer who arrayed the panel. Also, though there be no personal objection against the sheriff, yeft if he arranges the panel at the nomination, or under the direction of either party, this is good cause of challenge to the array. Formerly, if a lord of parliament had a cause to be tried, and no knight was returned upon the jury, it was a cause of challenge to the array: also by the policy of the ancient law, the jury was to come de vicinis, from the neighbourhood of the vill or place where the cause of action was laid in the declaration: and therefore some of the jury were obliged to be returned from the hundred in which such vill lay, and, if none were returned, the array might be challenged from defect of hundreders. For, living in the neighbourhood, these were supposed to know beforehand the characters of the parties and witnesses; and therefore they better knew what credit to give to the facts alleged in evidence. But this convenience was over-balanced by another very natural and almost unavoidable inconvenience; that jurors coming out of the immediate neighbourhood, would be apt to intermix their prejudices and partialities in the trial of right. And this the law was so sensible of, that it for a long time has been gradually relinquishing this practice; the number of necessary hundreders in the whole panel, which in the reign of Edward III. were constantly fixing, being in the time of Fortescue reduced to four; afterwards by statute 27 Eliz. c. 6. to two; and at length, by statute 4 and 5 Anne, c. 16. It was entirely abolished upon all civil actions, except upon penal statutes; and upon those also by the 24 Geo. II. c. 18. the jury being now only to come de corpore comitatus, from the body of the county at large, and not de vicinis, or from the particular neighbourhood. The array by the ancient law may also be challenged, if an alien be party to the suit, and, upon a rule obtained by his motion to the court for a jury de mediatate linguae, such a one be not returned by the sheriff pursuant to the statute 28 Edward III. c. 15. enforced by 18 Hen. VI. c. 29. which enacts, that where either party is an alien born, the jury shall be one-half denizens and the other aliens (if so many be forthcoming in the place), for the more impartial trial: A privilege indulged to strangers in no other country in the world; but which is as ancient in England as the time of King Ethelred, in whose statute de monticulis, Wallia (then aliens to the crown of England), c. 3. it is ordained, that "duodenali legales homines, quorum fex Walli et fex Angli erant, Anglis et Walliis jus dicunto."

2. Challenges to the polls, in capita, are exceptions to particular jurors; and seem to answer the recuratio judicii in the civil and canon laws; by the conceptions of which, a judge might be refused upon any suspicion of partiality. By the laws of England also, in the times of Barchon and Fleta, a judge might be refused for good cause; but now the law is otherwise, and it is held that judges or justices cannot be challenged. For the law will not suppose a possibility of bias or favour in a judge who is already sworn to administer impartial justice, and whose authority greatly depends on that presumption and idea. And should the fact at any time prove flagrantly such, as the delicacy of the law will not premise beforehand, there is no doubt but that such misbehaviour would draw down a heavy censure from those to whom the judge is accountable for his conduct. But challenges to the polls of the jury (who are judges of fact) are reduced to four heads by Sir Edward Coke: propter honos receptum; propter deficitum; propter affectum; and propter delictum. 1. Propter honos receptum; as, if a lord of parliament be impanelled on a jury, he may be challenged by either party, or he may challenge himself. 2. Propter deficitum; as, if a jurymen be an alien born, this is defect of birth; if he be a slave or bondman, this is defect of liberty, and he cannot be a liber et legali homo. Under the word homo also, though a name common to both sexes, the female is however excluded, propter deficitum sexus; except when a widow reigns herself with child in order to exclude the next heir, and a supposititious birth is suspected to be intended; then, upon the writ de ventre inficiendo, a jury of women is to be impanelled to try the question whether with child or not. But the principal deficiency is defect of estate sufficient to qualify him to be a juror, which depends upon a variety of statutes. 3. Jurors may be challenged propter affectum, for suspicion of fome's Comm. bias or partiality. This may be either a principal challenge, or to the favour. A principal challenge is such, where the cause affighted carries with it, prima facie, evident marks of suspicion either of malice or favour; as, if a juror is of kin to either party within the ninth degree; that he has an intereft in the cause; that there is an action depending between him and the party; that he has taken money for his verdict, &c. which, if true, cannot be over-ruled, for jurors must be omne exceptione maiores. Challenges to the favour, are where the party hath no principal challenge; but objects only some probable circumstances of suspicion, as acquaintance, and the like; the validity of which must be left to the determination of triors, whose office is to decide whether the juror be favourable or unfavorable. 4. Challenges propter delictum, are for some crime or misdemeanor that affects the juror's credit, and renders him infamous: As for a conviction of treason, felony, perjury, or conspiracy; or if, for some infamous offence, he hath received judgment of the pillory or the like.

II. In criminal cases, challenges may be made either on the part of the king, or on that of the prisoner; and either to the whole array, or to the separate polls, for the very same reasons that they may be in civil causes. For it is here at least as necessary as there, that the sheriff or returning officer be totally indifferent; that, where an alien is indicted, the jury should be de midietate, or half foreigners, if so many are found in the place (which does not indeed hold in treasons, aliens being very improper judges of the breach of allegiance; nor yet in the case of Egyptians under the statute 22 Hen. VIII. c. 10.) that on every panel there should be a competent number of hundreders; and that the particular jurors should be omne exceptions maiores, not liable to objections either propter honos or receptum.
Challenges on any of the foregoing accounts are styled challenges for cause; which may be without stint in both civil and criminal trials. But in criminal cases, or at least in capital ones, there is, in favor of wise, allowed to the prisoner an arbitrary and capricious species of challenge to a certain number of jurors, without showing any cause at all; which is called a peremptory challenge: a provision full of that tenderness and humanity to prisoners for which our laws are famous. This is grounded on two reasons: 1. As every one must be sensible what sudden impressions and unaccountable prejudices we are apt to conceive upon the bare looks and gestures of another; and how necessary it is, that a prisoner, when put to defend his life, should have a good opinion of his jury, the want of which might totally disconcert him; the law wills not that he should be tried by any one man against whom he has conceived a prejudice even without being able to allign a reason for such his dislike. 2. Because upon challenges for cause flown, if the reason alligned prove insufficient to set aside the juror, perhaps the bare questioning his indifference may sometimes provoke a resentment; to prevent all ill consequences from which, the prisoner is still at liberty, if he pleases, peremptorily to set him aside.

This privilege of peremptory challenges, though granted to the prisoner, is denied to the king by the statute 33 Edward I. Stat. 4. which enacted, that the king shall challenge no jurors without alligning a cause certain to be tried and approved by the court. However, it is held that the king need not allign his cause of challenge till all the panel is gone through, and unless there cannot be a full jury without the persons so challenged. And then, and not sooner the king's counsel must show the cause; otherwise the juror shall be sworn.

The peremptory challenges of the prisoner must, however, have some reasonable boundary; otherwise he might never be tried. This reasonable boundary is settled by the common law to the number of 35; that is, one under the number of three full juries. For the law judges, that 35 are fully sufficient to allow the most timorous man to challenge through mere caprice; and that he who peremptorily challenges a greater number, or three full juries, has no intention to be tried at all. And therefore it deals with one who peremptorily challenges above 35, and will not retract his challenge, as with one who stands mute or refuses his trial; by sentencing him to the peine forte et dure in felony, and by attainting him in treason. And so the law stands at this day with regard to treason of any kind. But by statute 22 Hen. VIII. c. 14. (which, with regard to felonies, stands unrepealed), no perdon arraigned for felony can be admitted to make more than 20 peremptory challenges.

Challon-sur-Saone, an ancient town of France, in Burgundy, and capital of the Chalonnais, with a citadel and bishop's see. It is seated on the river Saone, in E. Long. 5. 7. N. Lat. 46. 47.

Challons-sur-Marne, a large episcopal town of France, in Champagne. It carries on an considerable trade in balloons, and other woollen stuffs. It is seated between two fine meadows on the rivers Marne, Mau, and Nau, in E. Long. 4. 37. N. Lat. 48. 57.

Chaloner, (Sir Thomas) a statesman, soldier, and poet, descended from a good family in Denbigh in Wales, was born at London about the year 1515. Having been educated in both universities, but chiefly at Cambridge, he was introduced at the court of Henry VIII, who sent him abroad in the retinue of Sir Henry Knevet ambassador to Charles V, and he had the honour to attend that monarch on his fatal expedition against Algiers in 1541. Soon after the fleet left that place, he was shipwrecked on the coast of Barbary in a very dark night; and having exhausted his strength by swimming, he chanced to strike his head against a cable, which he had the presence of mind to catch hold of with his teeth; and, with the loss of several of them, was drawn up by it into the ship to which he belonged. Mr Chaloner returned soon after to England, and was appointed first clerk of the council, which office he held during the reign of that Engl. On the accession of Edward VI, he became a favourite of the Duke of Somerset, whom he attended to Scotland, and was knighted by that nobleman after the battle of Mulfelburgh, in 1547. The protector's fall put a stop to Sir Thomas Chaloner's expectations, and involved him in difficulties. During the reign of Queen Mary, being a determined procident, he was in some danger; but having many powerful friends, he had the good fortune to escape. On the accession of Elizabeth, he appeared again at court; and was so immediately distinguished by her Majesty, that she appointed him ambassador to the emperor Ferdinand I. being the first ambassador she nominated. His commission was of great importance; and the queen was so well satisfied with his conduct, that, soon after his return, she sent him in the same capacity to Spain; but Sir Thomas was by no means satisfied with this instance of her majesty's confidence: the courts of England and Spain being at this time extremely dishabridged with each other, he feared that his mission would be very hazardous; and so it proved; but Elizabeth must be obeyed. He embarked for Spain in 1561, and returned to London in 1564, in consequence of a request to his sovereign, in an elegy written in imitation of Ovid. After his return, he resided in a house built by himself in Clerkenwell-cloae, where he died in the year 1565, and was buried in St Paul's. Sir William Cecil succeeded as chief mourner at his funeral.

So various were the talents of Sir Thomas Chaloner, that he excelled in every thing to which he applied himself. He made a considerable figure as a poet. His poetical works were published by William Malins, master of St Paul's school. His capital work was that "Of restoring the English rebus, in ten books," which he wrote when he was ambassador in Spain. It is remarkable, that this great man, who knew how to transact as well as to write upon the most important affairs of states and kingdoms, could descend to compose a dictionary for children, and to translate from the Latin a book of the office of Servants, merely for the utility of the subjects.

Chaloner, (Sir Thomas) the younger, though inconsiderable as an author, deserves to be recorded as a skilful naturalist, in an age wherein natural history was...
very little understood in this or any other country; and particularly as the founder of the alum-works in Yorkshire, which have since proved so exceedingly advantageous to the commerce of Britain. He was the only son of Sir Thomas Chaloner mentioned in the last article, and was born in the year 1559. Being very young at the time of his father's death, the lord treasurer Burleigh taking charge of his education, sent him to St. Paul's school, and afterwards to Magdalen college in Oxford, where, like his father, he discovered extraordinary talents for Latin and English poetry. About the year 1580, he made the tour of Europe, and returned to England before 1584; for, in that year, we find him a frequent attendant in the court of queen Elizabeth. About this time he married the daughter of Sir William Fleetwood, recorder of London. In 1591 he was knighted: and, some time after, discovered the alum-mines on his estate at Giborough, near the river Tees in Yorkshire (A)

Towards the latter end of the queen's reign, Sir Thomas visited Scotland; and returning to England in the retinue of king James I. found such favour in the sight of his majesty, that he was immediately appointed governor to prince Henry, whom he well knew. About this time he married the wife, the daughter of Mr William Blount of London, by whom he had some children. He died in the year 1615, and was buried at Chiswick in Middlesex. His eldest son William was created a baronet in the 38th of James anno 1620. The title was extinct in 1681. He wrote, 1. Dedication to Lord Burleigh of his poetical works, dated 1579. 2. The virtue of nitre, wherein is declared the sundry cures by the fame effected. Lond. 1584, 4to.

CHALYBEAT, in medicine, an appellation given to any liquid, as wine or water, impregnated with particles of iron or steel. See MINERAL WATERS.

CHALYBES, (anc. geog.) an ancient people of the Illyrian Aia. Their situation is differently assigned; Strabo placing them in Paphlagonia, to the east of Syria; Apollonius Rhodius and Stephanus, on the east of the Thebmon, in Pontus; called Halizones by Homer. They either gave their name to, or took it from, their iron manufactures, (Xenophon, Val. Piacus,) their only support, their foil being barren and ungrateful, (Dionysius Periegetes.)

CHAM, or KHAN, the title given to the sovereign princes of Tartary.

The word, in the Persian, signifies mighty lord; in the Scalvonic, emperor. Sperlingius, in his Differeniation on the Danish term of Majesty, koning, king, thinks the Tartarian cham may be well derived from it; adding, that in the north they say kan, konnen, konung, konning, &c. The term cham is also applied, among the Perkans, to the great lords of the court, and the governs of provinces.

CHAM, in geography, a town of the Bavarian palatinate, situated on a river of the same name, about 25 miles north-east of Ratibon; E. Long. 13° N. Lat. 49° 15'.

CHAMA, in zoology, a genus of shell-fish belonging to the order of veneres tellaceae. The shell is thick, and has two valves; it is an animal of the oyster kind. Linnaeus enumerates 14 species, principally distinguished by the figure of their shells.

CHAMADE, in war, a certain beat of a drum, or sound of a trumpet, which is given the enemy as a signal to inform them of some proposition to be made to the commander, either to capitulate, to have leave to bury their dead, make a truce, or the like.—Menage derives the word from the Italian chiamate, of clamare to "cry."

CHAMEDRYS, in botany. See VERONICA.

CHAMÆLEON, in zoology, the trivial name of a species of LACERTA.

CHAMÆPITYS, in botany. See TREUCRIUM.

CHAMÆROPS, in botany: a genus of the family of palmæ. The hermaphrodite calyx is tripartite; the corolla tripetalous; there are fix flamina, three pistils, and three monoecorous plums. The male, in a distinct plant, the same as the hermaphrodite. There are two species, the most remarkable of which is the glabra, a native of the West-Indies, and warm parts of America, also of the corresponding latitudes of Asia and Africa. It never rises with a tall stem; but when the plants are old, their leaves are five or fix feet long, and upwards of two feet broad; they spread open like a fan, having many foldings, and at the top are deeply divided like the fingers of a hand. This plant the Americans call thatch, from the use to which the leaves are applied. Under the name of palmetto, however, Mr Adanson describes a species of palm which grows naturally at Senegal, whose trunk rises from 50 to 60 feet in height; from the upper end of the trunk issue a bundle of leaves, which, in turning off, form a round head; each leaf represents a fan of five or six feet in expansion, supported by a tail of the fame length. Of these trees, some produce male flowers, which are conseqently barren; other are female, and loaded with fruit, which succed each other uninterruptedly almost the whole year round. The fruit of the large palmettos, Mr Adanson affirms to be of the bignefs of an ordinary melon, but rounder: it is enveloped in two skins as tough as leather, and as thick as strong parchment; within the fruit is yellowish, and full of filaments fastened to three large kernels in the middle. The negroes are very fond of this fruit;
CHAMARIM, a word which, when baked under the ashes, is laid to table like a quince.

The little palmetto may be easily raised in Britain from seeds brought from America; but, as the plants are tender, they must be constantly kept in a warm-house.

CHAMARIM, in the Jewish antiquities, is the Hebrew name for that which the Greeks call Pyr.ia or Pyrateria; and St. Jerom in Leviticus has translated Singulatlas, Initiala, delubra. These chamari were, according to Rabbi Solomon, idols exposed to the sun, upon the tops of houses. Abenezra says they were portable chapels or temples made in the form of chariots, in honour of the Sun. What the Greeks call Pyraria, were temples consecrated to the sun and fire, riots, in honour of the gods, and were perpetually kept on fire. They were built upon eminences; and were large inclosures without covering, where the sun was worshipped. The Guebres, or worshippers of fire, in Peru and the East-Indies, have full these Pyrarias. The word chamari is derived from Chaman, which signifies to warm, or burn.

CHAMARIM, a word which occurs in several places of the Hebrew bible, and is generally translated the priests of the idols, or the priests clothed in black; because chamar signifies "black," or "blackness." St. Jerom, in the second book of Kings, renders it arufpices. In Hosea and Zephania, he translates it a·di·swi or church-wardens. But the best commentators are of opinion, that by this word we are to understand the priests of the false gods, and in particular the worshippers of fire; because they were, as they say, drest in black; or perhaps the Hebrews gave them this name in derision, because, as they were continually employed in taking care about the fuel, and keeping up the fire, they were always as black as smiths or colliers. We find priests, among those of Isis, called melanophori, that is to say, that wear black; but whether this may be by reason of their dresting in black, or whether it were because they wore a certain shining black veil in the processions of this goddess, is not certain. Cama. mar, in Arabic, signifies the "moon." Isis is the same deity. Grotius thinks the Roman priests, called camilli, came from the Hebrew chamari. Those among the heathens who sacrificed to the infernal gods were drested in black.

CHAMBER, in building, a member of a lodging, or piece of an apartment, ordinarily intended for sleeping in; and called by the Latins cubiculum. The word comes from the Latin camera; and that, according to Nisod, from the Greek σκουφος, vault or curve; the term chamber being originally confined to places arched over.

A complete apartment is to consist of a hall, antichamber, chamber, and cabinet.

Privy-Chamber, in England. Gentlemen of the privy-chamber are servants of the king, who are to wait and attend on him and the queen at court, in their diversions, &c. Their number is forty-eight, under the lord-chamberlain, twelve of whom are in quarterly waiting, and tw of thele lie in the privy-chamber.

In the absence of the lord-chamberlain, or vice-chamberlain, they execute the king's orders: at coronations, two of them perfume the dukes of Aquitain and Normandy; and six of them, appointed by the lord-chamberlain, attend ambassadors from crumpled Chamber heads to their audiences, and in public entries. The gentlemen of the privy chamber were instituted by Henry VII.

CHAMBER, in policy, the place where certain affairs are held, also the assemblies themselves. Of these some are established for the administration of justice, others for commercial affairs.

Of the first kind are, 1. Star-chamber, so called, because the roof was painted with stars; the authority, power, and jurisdiction of which, are absolutely abolished, by the statute 17 Car. I. 2. Imperial chamber of Spire, the supreme court of judicatory in the empire, erected by Maximilian I. This chamber has a right of judging by appeal; and is the last resort of all civil affairs of the states and subjects of the empire, in the same manner as the aulic council of Vienna.

Nevertheless it is restrained in several cases; it takes no notice of matrimonial causes, these being left to the pope; nor of criminal causes, which either belong to particular princes or towns in their respective territories, or are cognizable by all the states of the empire in a diet. By the treaty of Osnaburg, in 1648, fifty assessors were appointed for this chamber, whereof 24 were to be Protestants, and 26 Catholics; besides five presidents, two of them Protestants, and the rest Catholics. 3. Chamber of accounts, a sovereign court in France, where accounts are rendered of all the king's revenues, inventories, and avowals thereof registered; oaths of fidelity taken, and other things relating to the finances transacted. There are nine in France, that of Paris is the chief; it registers proclamations, treaties of peace, naturalizations, titles of nobility, &c. All the members wear long black gowns of velvet, of satin, or damask, according to their places. 4. Ecclesiastical chambers in France, which judge by appeal of differences about collecting the tythes. 5. Chamber of audience, or grand chamber, a jurisdiction in each parliament of France, the counsellors of which are called juges, or judges, as those of the chamber of inequities are called rapo­rteurs, reporters of processess by writing. 6. Chamber of the edict, or miparry, a court established by virtue of the edict of pacification in favour of those of the reformed religion. This chamber is now suppressed. 7. Apostolical chamber of Rome, that wherein affairs relating to the revenues of the church and the pope are transacted. This council consists of the cardinal-camerlengos, the governor of the rota, a treasurer, an auditor, a president, one advocate-general, a solicitor-general, a commissary, and 12 clerks. 8. Chamber of London, an apartment in Guildhall, where the city money is deposited.

Of the last fort are, the chambers of commerce; the chambers of assurance; and the royal or synodal chamber of booksellers in France.

1. The chamber of commerce is an assembly of merchants and traders, where the affairs relating to trade are treated of. There are several established in most of the chief cities of France; and in Britain there have lately been chambers of this kind erected, particularly in London, Edinburgh, and Glasgow.

2. Chamber of assurance in France, denotes a society of merchants and others for carrying on the business of insuring; but in Holland, it signifies a court of justice, where causes relating to insurance are tried.
Chamberlain. Chamber of bookfellers in Paris, an assembly consisting of a syndic and assistants, elected by four delegates from the printers, and twelve from the booksellers, to visit the books imported from abroad, and to search the houses and sellers of marble paper, printers, and dealers in printed paper for hangings, who are prohibited from keeping any letters proper for printing books. In the visitation of books, which ought to be performed by three persons at least from among the syndic and assistants, all libels against the honour of God and the welfare of the state, and all books printed either within or without the kingdom in breach of their regulations and privileges, are stop, even with the merchandizes which may happen to be in the bales with such libels or other prohibited books. The days appointed for this chamber to meet are Tuesdays and Fridays, at two o'clock in the afternoon.

CHAMBER, in military affairs. 1. Powder-chamber, or bomb-chamber; a place sunk under ground for holding the powder, or bombs, where they may be out of danger, and secured from the rain. 2. Chamber of a mine; the place most commonly of a cylindrical form, where the powder is confined. 3. Chamber of a mortar; that part of the chase, much narrower than the rest of the cylinder, where the powder lies. It is of different forms; sometimes like a reversed cone; sometimes globular, with a neck for its communication with the cylinder, whence it is called a bottled chamber; but most commonly cylindrical, that being the form which is found by experience to carry the ball to the greatest distance.

CHAMBERLAIN, an officer charged with the management and direction of a chamber. See Chamber, in policy.

There are almost as many kinds of chamberlains as chambers, the principal whereof are as follows.

Lord Chamberlain of Great-Britain, the sixth great officer of the crown, to whom belongs livery and lodging in the king's court; and there are certain fees due to him from each archbishop or bishop when they perform their homage to the king, and from all peers at their creation, or doing their homage. At the coronation of every king, he is to have forty ells of crimson velvet for his own robes. This office was granted heritably to the family of Steward, Duke of Lenox; and when their male line failed, King Charles II. conferred it in like manner upon his natural son, whom he created duke of Monmouth, and on his forfeiture it went to the duke of Lenox; but that family surrendered the office to the crown in 1703.

Lord Chamberlain of the Household, an officer who has the oversight and direction of all officers belonging to the king's chambers, except the precedent of the king's bed-chamber.

He has the oversight of the officers of the wardrobe at all his majesty's houses, and of the removing wardrobes, or of beds, tents, revels, and all the furniture, cooks, confectioners, &c. retained in the king's service. He moreover has the oversight and direction of the several officers of the king's chambers, and all the officers of the revenue of the crown, and he is al.so the chief officer of the court of exchequer, of North-Wales, and Chester, of the city of London, &c. in which cases this officer is generally the receiver of all rents and revenues belonging to the place whereof he is chamberlain.

In the exchequer there are two chamberlains, who keep a controlment of the pells of receipts and receipts, and have certain keys of the treasury, records, &c.

Chamberlain of London keeps the city money, which is laid up in the chamber of London: He also presides over the affairs of masters and apprentices, and makes free of the city, &c. His office lasts only one year; but the custom usually obtains to re-chuse the same person, unless charged with any misdemeanour in his office.

Chamberlayne, (Edward) descended from an ancient family, was born in Gloucestershire 1616, and made the tour of Europe during the distractions of the civil war. After the restoration he went as secretary with the earl of Carlisle, who carried the order of the Garter to the king of Sweden; was appointed tutor to the duke of Grafton, natural son of Charles II. and was afterwards pitched on to instruct prince George of Denmark in the English tongue. He died in 1703, and was buried in a vault in Chelsea church.
Chamberlayne, (John) son to the author of "The Present State of England," and continuator of that useful work, was admitted into Trinity College, Oxford, 1635; but it doth not appear that he took any degree. Before the Continuation was mentioned, he was author of "Discourses historical, critical, theological, and moral, on the most memorable events of the Old and New Testaments, with Chronological Tables;" one vol. folio; and translated a variety of works from the French, Dutch, and other languages. He likewise was F. R. S. and communicated some pieces, inserted in the Philosophical Transactions. It was said of him that he understood sixteen languages; but it is certain that he was master of the Greek, Latin, French, High and Low Dutch, Portuguese, and Italian. Though he was qualified for employment, he had none but that of Gentleman-Usher to George Prince of Denmark. After a useful and long, or short (as you please), he died in the year 1724. He was a very pious and good man, and earnest in promoting the advancement of religion, and the interest of true Christianity; for which purpose he kept a large correspondence abroad.

CHAMBERLAIN, a considerate and populous town of Italy, in Savoy, with a castle. It is capital of the duchy, and well built, but has no fortifications. It is watered by seven streams, which have their sources in St Martin's-hill, and run through several of the streets. There are piazzas under most part of the houses, where people may walk dry in the worst weather. It hath large and handsome suburbs; and in the centre of the town is the royal palace. The parliament meet here, which is composed of four presidents, and a pretty large number of senators, being the supreme tribunal of the whole duchy. The principal church is St Leger, and the Jesuits college is the most magnificent of all the monasteries. E. Long. 5. 50. N. Lat. 45. 35.

CHAMBERS, (David) a Scots historian, priest, and lawyer, was born in the shire of Rox's, about the year 1530, and educated in the university of Aberdeen. From thence he went to France and Italy, where he continued some time, particularly at Boulogne, where, in 1556, he was a pupil of Marianus Sozenus. After his return to Scotland, he was appointed, by queen Mary, parson of Sandy and chancellor of Rox's. He was soon after employed in digesting the laws of Scotland, and was principally concerned in publishing the acts of parliament of that kingdom by authority in 1566. He was also appointed one of the lords of seisin, and continued her majesty's faithful servant till her declining fortune obliged her adherents to seek for refuge in other kingdoms. Chambers went first to Spain, where he was graciously received by king Philip; and thence travelled to Paris, where he was no less kindly received by Charles IX. of that kingdom, to whom, in 1572, he presented his History of Scotland, &c. He died at Paris in the year 1592, much regretted (says MacKenzie) by all who knew him. His writings were chiefly calculated to assist Chambers his royal mistress, and to extol the wisdom of the Scots nation.

CHAMBERS, (Ephraim) author of the scientific Dictionary which goes under his name, was born at Milton, in the county of Wiltshire. His parents were dissenters of the Presbyterian persuasion; and his education was the same as that common one which is intended to qualify a youth for trade and commerce. When he became of a proper age, he was put apprentice to Mr Senex the globe-maker, a business which is connected with literature, and especially with astronomy and geography. It was during Mr Chambers's residence with this skilful mechanic, that he contracted that taste for science and learning which accompanied him through life, and directed all his pursuits. It was even at this time that he formed the design of his grand work, the "Cyclopaedia;" and some of the first articles of it were written behind the counter. Having conceived the idea of so great an undertaking, he justly concluded that the execution of it would not confit with the avocations of trade; and therefore he quitted Mr Senex, and took chambers at Gray's-Inn, where he chiefly resided during the rest of his days. The first edition of the Cyclopaedia, which was the result of many years intense application, appeared in 1728, in two vols. folio. It was published by subscription, the price being 4l. 4s. and the list of subscribers was very respectable. The dedication, which was to the king, is dated October 15, 1727. The reputation that Mr Chambers acquired by his execution of this undertaking, procured him the honour of being elected F. R. S. Nov. 6, 1729. In less than ten years time a second edition became necessary; which accordingly was printed, with corrections and additions, in 1738; and was followed by a third the very next year.

Although the Cyclopaedia was the grand business of Mr Chambers's life, and may be regarded as almost the sole foundation of his fame, his attention was not wholly confined to this undertaking. He was concerned in a periodical publication intitled, "The Literary Magazine," which was begun in 1735. In this work he wrote a variety of articles, and particularly a review of Morgan's "Moral Philosopher." He was engaged, likewise, in conjunction with Mr John Martyn, F. R. S. and professor of botany at Cambridge, in preparing for the press a translation and abridgement of the "Philosophical History and Memoirs of the Royal Academy of Sciences at Paris, or an Abrigation of all the Papers relating to Natural Philosophy which have been published by the Members of that illustrious Society." This undertaking, when completed, was compiled in five volumes 8vo, which did not appear till 1742, some time after our author's decease, when they were published in the joint names of Mr Martyn and Mr Chambers. Mr Martyn, in a subsequent publication, hath passed a severe cenure, upon the share which his fellow-labourer had in the abridgement of the Parisian papers. The only work besides, that we find ascribed to Mr Chambers, is a translation of the Jesuit's Perspective, from the French; which was printed in 4to, and hath gone through several editions. Mr Chambers's close and unremitting attention to his studies at length impaired his health.
health, and obliged him occasionally to take a lodge-
ing at Canonbury-house, Illington. This not having,
greatly contributed to his recovery, he made an excur-
sion to the south of France, but did not reap that be-
nefit from it which he had himself hoped, and his
friends wished. Returning to England, he died at
Canonbury-house, and was buried at Welfinminer;
where the following inscription, written by himself, is
placed on the north side of the cloysters of the Abbey:

Multis pervalgatus,
Pauci notus;
Qui vitam, inter lucem & umbram,
Nec eruditos, nec idiota,
Litteris deditos, transtigis; fed at homo
Qui homuni nihil a se alienum putat.
Vita simil, & laboribus funtus.
In requiem cœrere volueri,
EPHRAM CHAMBERS, R. S. S.
Obit xii Mai, mcccxxi.

After the author's death, two more editions of his
Cyclopædia were published. The proprietors after-
wards procured a supplement to be compiled, which
extended to two volumes more: And in the year 1778
began to be published in weekly numbers, an edition
of both, improved, and incorporated into one alphabet,
by Dr Rees, which has been lately completed in four
volumes folio, and forms a very valuable work.

CHAMBER, (Martin Cureau de la) physician in
ordinary to the French king, was distinguished by his
knowledge in medicine, philosophy, and polite learning.
He was born at Mons; and was received into the
French academy in 1635, and afterwards into the
academy of sciences. He wrote a great number of works,
the principal of which are, 1. The characters of the
passions. 2. The art of knowing men. 3. On the
knowledge of beasts, &c. He died at Paris in 1669.

CHAMELEON. See Lacerta.

CHAMFERING, in architecture, a phrase used
for cutting any thing above on the under side.

CHAMIER, (Daniel) an eminent protestant di-
vine born in Dauphine. He was many years preach-
er at Montbazon, from where he was called to
Montauon, to be professor of divinity in that city,
and was killed by a cannon-ball during the siege in
1621. The most considerable of his works is his Pan-
fratia Catholica, or “ Wars of the Lord,” in four vo-
olumes folio, in which he treats very learnedly of the
controversies between the Protetants and Roman Catholics.

CHAMOIS, or CHAMOIS-GOAT, in zoology. See
Capra.

CHAMOMILE. See Anthemis.

CHAMOS, or CHEMOS, the idol or god of the
Moabites.

The name of chamos comes from a root which, in
Arabic, signifies to make haste; for which reason many
believe chamos to be the sun, whose precipitate course
might well procure it the name of swift or speedy.
Others have confounded chamos with the god Hammon,
adored not only in Libya and Egypt, but also in A-
rabia, Ethiopia, and the Indies. Macrobius shows
that Hammon was the sun; and the horses, with which
he was represented, denoted his rays. Calmet is of
opinion, that the god Hammon, and Apollo Chomos,
mentioned by Strabo and Ammianus Marcellinus, was
the very same as chamos or the sun. These deities
were worshipped in many of the eastern provinces.

Some who go upon the resemblance of the Hebrew
term chamos, to that of the Greek comos, have believed
chamos to signify the god Bacchus the god of drunk-
enesses, according to the signification of the Greek
comos. St Jerome, and with him most other interpre-
ters, take Chamos and Peor for the same deity. But
it seems that Baal-Peor was the name of Tammuz or
Adonis; so that Chamos must be the god whom the
heathens call the Sun.

CHAMOUNI, one of the elevated valleys of the
Alps situated at the foot of Mount Blanc. See Alps
and Blanc.

The first strangers whom a curiosity to visit the glac-
ers drew to Chamouni (M. Suisse observes), certainly
considered this valley as a den of robbers; for they
came armed cap-a-pie, attended with a troop of dom-
estic multis armed in the same manner: they would not
venture into any house; they lived in tents which they
had brought along with them; fires were kept burning,
and sentinels on guard the whole night over. It was
in the year 1741 that the celebrated traveller Pocock,
and another English gentleman called Wyndham, un-
dertook this interesting journey. It is remembered by
the old men of Chamouni, and they tell laugh at the
fears of the travellers, and at their unnecessary precau-
tions. For 20 or 25 years after this period, the journey
was made but seldom, and then chiefly by English-
men, who lodged with the curate: for when I was
there in 1760, and even for four or five year after-
wards, there was no habitable house except one or two
miserable inns, like those in villages that are little fre-
cuented. But now that this expedition has gradually
become so fashionable, three large and good inns, which
have been successively built, are hardly sufficient to con-
tain the travellers that come during the summer from all
quarters.

This concourse of strangers, and the money they
leave behind them at Chamouni, have somewhat affect-
ed the ancient simplicity of the inhabitants, and even
the purity of their manners. Nobody, however, has
any thing to fear from them: the moral inviolability
is observed with respect to travellers; they are only
exposed to a few important solicitations, and some
small articles, dictated by the extreme eagerness with
which the inhabitants offer their services as guides.

The hope of obtaining this employment brings to-
gether round a traveller, almost all the men in every
village through which he passes, and makes him believe
that there are a great many in the valley; but there
are very few at Chamouni in summer. Curiosity, or
the hope of making money, draws many to Paris and
into Germany: besides, as the shepherds of Chamouni
have the reputation of excelling in the making of
cheeses, they are in great request in the Tartars, in
the valley of Aoste, and even at greater dilferences; and
they receive there, for four or five months in summer,
very considerable wages. Thus the labours of the field
devolve almost entirely on the women, even such as in
other countries fall solely on the men; as mowing,
cutting of wood and threshing; even the animals of
the same sex are not spared, for the cows there are yoked
in the plough.

The
The only labours that belong exclusively to the men are the seeking for rock crystal, and the chase. Happily they are now less employed than formerly in the first of these occupations. I say happily, for many of them perished in this pursuit. The hope of enriching themselves quickly by the discovery of a cavern filled with fine crystals, was so powerful a motive, that they exposed themselves in the search to the most alarming dangers; and hardly a year passed without one of them perishing in the snows, or among the precipices.

The principal indication of the grotos, or crystal ovens, as they are here called, are veins of quartz, which appear on the outside of the rocks of granite, or of the laminated rock. These white veins are seen at a distance, and often at great heights, on vertical indaccessible places. The adventurers endeavour to arrive at these, either by fabricating a road across the rocks, or by letting themselves down from above suspended by ropes. When they reach the place, they gently strike the rock; and if the stone returns a hollow sound, they endeavour to open it with a hammer, or to blow it up with powder. This is the principal method of searching: but young people, and even children, often go in quest of these crystals over the glaciers, where the rocks have lately fallen down. But whether they consider these mountains as nearly exhausted, or that the quantity of crystal found at Madagascar has too much lowered the price of this foil, there are now but few people that go in search of it, and perhaps there is not a single person at Chamouni that makes it his only occupation. They go however occasionally, as to a party of pleasure.

But the chase of the Chamois goat, as dangerous, and perhaps more so than the seeking for crystal, still occupies many inhabitants of the mountains, and carries off, in the flower of their age, many men whose lives are most valuable to their families. And when we are informed how this chase is carried on, we will be astonished that a course of life, at once so laborious and perilous, should have irresistible attractions for those who have been accustomed to it.

The Chamois hunter generally sets out in the night, that he may reach by break of day the most elevated pastures where the goats come to feed, before they arrive. As soon as he discovers the place where he hopes to find them, he surveys it with his glass. If he finds some of them there, he proceeds always ascending: whenever he defaries any, he endeavours to get above them, either by stealing along some gully, or getting behind some rock or eminence. When he is near enough to distinguish their horns, which is the mark by which he judges of the distance, he redds his piece on a rock, takes his aim with great composure, and rarely miffes. This piece is a rifle-barrelled carabine, into which the ball is thrust, and these carabines often contain two charges, though they have but one barrel; the charges are put one above another, and are fired in succession. If he has wounded the chamois, he runs to his prey, and for security he hamtrings it; then he considers his way home: if the road is difficult, he skims the chamois, and leaves the carcass: but, if it is practicable, he throws the animal on his shoulders, and bears him to his village, though at a great distance, and often over frightful precipices: he feeds his family with the flesh, which is excellent, especially when the creature is young, and he dries the skins for Chamouni sale.

But if, as is the most common case, the vigilant chamois perceives the approach of the hunter, he immediately takes flight among the glaciers, through the snows, and over the most precipitous rocks. It is particularly difficult to get near these animals when there are several together; for then one of them, while the rest are feeding, stands as a sentinel on the point of some rock that commands a view of the avenues leading to the pasture; and as soon as he perceives any object of alarm, he utters a fort of his, at which the others instantly gather round him to judge for themselves of the nature of the danger: if it is a wild beast, or a hunter, the most experienced puts himself at the head of the flock; and away they fly, ranged in a line, to the most inaccessible retreats.

It is here that the fatigues of the hunter begin; intrigued by his passion for the chase, he is insensible to danger; he passes over snows, without thinking of the horrid precipices they conceal; he entangles himself among the most dangerous paths, and bounds from rock to rock, without knowing how he is to return. Night often surprises him in the midst of his pursuit; but he does not for that reason abandon it; he hopes that the fame cause will arrest the flight of the chamois, and that he will next morning overtake them. Thus he passes the night, not at the foot of a tree, like the hunter of the plain; not in a grotto, softly reclined on a bed of moss, but at the foot of a rock, and often on the bare points of shattered fragments, without the smallest shelter. There, all alone, without fire, without light, he draws from his bag a bit of cheese, with a morcel of oatens bread, which make his common food: bread so dry, that he is sometimes obliged to break it between two stones, or with the hatchet he carries with him to cut out steps in the ice. Having thus made his solitary and frugal repast, he puts a stone below his head for a pillow, and goes to sleep, dreaming on the road which the chamois may have taken. But soon he is awakened by the freshness of the morning; he gets up, beeminded with cold; surveys the precipices which he must traverse in order to overtake his game: drinks a little brandy, of which he always provides himself with a small portion, and sets out to encounter new dangers. Hunters sometimes remain in these solitudes for several days together, during which time their families, their unhappy wives in particular, experience a state of the most dreadful anxiety: they dare not go to rest for fear of seeing their husbands appear to them in a dream; for it is a received opinion in the country, that when a man has perished, either in the snow, or on some unknown rock, he appears by night to the person he held dearest, describes the place that proved fatal to him, and requests the performance of the last duties to his corpse.

"After this picture of the life which the chamois hunters lead, could one imagine that this chase dans les Alpes, par Mr de Favre..."
Chamonix will have no other; yet if you should offer to make my fortune on condition of abandoning the chase of the chamois, I could not consent. I made some excursions on the Alps with this man: his strength and address were astonishing: but his temerity was greater than his strength; and I have heard, that, two years afterwards, he missed a step on the brink of a precipice, and met with the fate he had expected.

"The few who have grown old in this employment bear upon their faces the marks of the life they have led. A savage look, something in it haggard and wild, makes them be known in the midst of a crowd, even when they are not in their hunting drees. And undoubtedly it is this ill look which makes some superstitious peasants believe that they are forcers, that they have dealings with the devil in their solitudes, and that it is he who throws them down the rocks. What then can be the passions the indulgence to this course of life? It is not avarice, at least it is not an avarice composed with reason: the most beautiful chamois is never worth more to the perfon that kills it than a dozen of francs, even including the value of its flesh; and now that the number is so much diminished, the time lost before one can be taken is much more than its value. But it is the very dangers that attend the pursuit, those alternations of hope and fear, the continual agitation and exercise which these emotions produce in the mind, that infligate the hunter: they animate him as they do the gambler, the warrior, the fiator, and even to a certain degree, the naturalist of the Alps: whose life, in some measure, pretty much resembles that of the hunter whose manners we have described."

But there is another kind of hunting, which is neither dangerous nor laborious, nor fatal to any one but to the poor animals that are the objects of it.—These are the marmots, animals that inhabit the high mountains; where in summer they scoop out holes, which they line with hay, and retire to at the beginning of autumn: here they grow torpid with the cold, and remain in a sort of lethargy, till the warmth of the spring returns to quicken their languid blood, and to recall them to life. When it is supposed that they have reposed in their winter abode, and before the snow has covered the high pahuses where their holes are made, people go to unharbour them. They are found from 10 to 12 in the same hole, heaped upon one another, and buried in the hay. Their sleep is so profound, that the hunter often puts them into his bag, and carries them home without their awaking. The flesh of the young is good, though it tastes of oil, and smells somewhat of muck; the fat is used in the cure of rheumatisms and pains, being rubbed on the parts affected; but the skin is of little value, and is sold for no more than five or six sols. Notwithstanding the little benefit they reap from it, the people of Chamonix go in quest of this animal with great eagerness, and its numbers accordingly diminish very sensibly.

It has been said, that marmots, in order to transport the hay into their holes, use one of their number laid on his back as a cart; but this is fabulous, for they are seen carrying the hay in their mouths. Nor is it for food that they gather it, but for a bed, and in order to thrust out the cold, and to guard the avenues of their retreat from enemies. When they are taken in autumn, their bowels are quite empty, and even as clean as if they had been washed with water; which proves that their torpidity is preceded by a fast, and even by an evacuation; a wife contrivance of Nature for preventing their accumulated feces from growing putrid, or too dry, in the long lethargy they are exposed to. They also continue a few days after their revival without eating, probably to allow the circulation and digressive power to recover their activity. At first, leaving their holes, they appear stupid and dazzled with the light: they are at this time killed with fists, as they do not endeavour to fly; and their bowels are then also quite empty. They are not very lean when they awake, but grow more so for a few days after they first come abroad. Their blood is never congealed, however profound their sleep may be; for at the time that it is deepest, if they are bled, the blood flows as if they were awake.

In these countries the period is so short between the dissolution of the snow and its return, that grain has hardly time to come to maturity. Mr. Saffire mentions a very useful and ingenious practice, invented by mountaineers of the Argentiere, for enlarging this period. "I observed (says he), in the middle of the valley, several large spaces where the surface of the snow exhibited a singular appearance, somewhat resembling a piece of white cloth spotted with black. While I was endeavouring to divine the cause of this phenomenon, I discovered several women walking with measured pace, and sowing something in handfuls that was black; and which being scattered, regularly diverging, on the surface of the snow, formed that spotted appearance that I had been admiring. I could not conceive what seed should be sown on snow fix feet deep; but my guide, astonished at my ignorance, informed me, that it was black earth spread on the snow to accelerate its melting; and thus to anticipate, by a fortnight or three weeks, the time of labouring the fields and sowing. I was struck with the elegant simplicity of a practice so useful, the effects of which I already saw very evidently in places which had not been thus treated above three months."

"As to the inhabitants of Chamouni, the men, like those of most high valleys, are neither well-made nor tall: but they are nervous and strong, as are also the women. They do not attain to a great age: men of 80 are very rare. Inflammatorv diseases are the most fatal to them; proceeding, no doubt, from obstructed perspiration, to which the inconstant temperature of the climate exposes them."

"They are in general honest, faithful, and diligent in the practice of religious duties. It would, for instance, be in vain to persuade them to go any where on a holiday before hearing mass. They are economical, but charitable. There are among them neither hospitals nor foundations for the poor: but orphans and old people, who have no means of subsistence, are entertained by every inhabitant of a parish in his turn. If a man is prevented by age or infirmities from taking charge of his affairs, his neighbours join among themselves and do it for him."

"Their mind is active and lively, their temper gay, with an inclination to raillery: they observe, with singular acuteness, the ridiculous in strangers, and turn
CHAMPAGNE, a considerable province of France, about 162 miles in width, and 122 in breadth, bounded on the north by Hainault and Luxemburg, on the east by Lorrain and the Franche-Comté, on the south by Burgundy, and on the west by the isle of France and Soissons. It has a great number of rivers, the principal of which are the Meuse, the Seine, the Marne, and Seine-Main. "Abomineable, in excellent wine, all sorts of corn, linen cloth, woollen stuffs, cattle, and sheep. It is also divided into the higher and lower, and Troyes is the capital town. Its sub-divisions are Champagne Proper, and Rheimois, the Retzels, the Pernois, the Vallerage, Baugy, the Sennois, and the Brie Champenois.

CHAMPAGNE Proper, is one of the eight parts of Champagne, which comprehends the towns of Troyes, Chalons, St. Menehould, Epernay, and Verzy.

CHAMPAIN, or Point Champain, in heraldry, a mark of dishonour in the coat of arms of him who kills a prisoner of war after he has cried quarter.

CHAMPERTRY, in law, a species of maintenance, and punished in the same manner; being a bargain with the plaintiff or defendant campum paritire, "to divide the land," or other matter sued for between them, if they prevail at law; whereupon the champertror is to carry on the party's suit at his own expense. Thus Champart, in the French law, signifies a familiar division of profits, being a part of the crop annually due to the landlord by bargain or custom. In our fene of the word, it signifies the purchasing of a suit, or right of suing; a practice so much abhorred by our law, that it is one main reason why a champion in action, or thing of which one hath the right but not the possession, is not assignable in common law; because no man should purchase any pretence to sue in another's right. These pests of civil society, that are perpetually endeavouring to disturb the repose of their neighbours, and officiously interfering in other men's quarrels, even at the hazard of their own fortunes, were severely animadverted on by the Roman law; and were punished by the forfeiture of a third part of their goods and perpetual infamy. Hitherto also must be referred the provision of the statute 32 Henry VIII. c. 9. that no one shall sell or purchase any pretended right or title to land, unless the vendor hath received the profits thereof for one whole year before such grant, or hath been in actual possession of the land, or of the reversion or remainder; on pain that both purchaser and vendor shall each forfeit the value of such land to the king and the protector.

CHAMPION, a person who undertakes a combat in the place or quarrel of another; and sometimes the word is used for him who fights in his own cause.

It appears that champions, in the just fenfe of the word, were persons who fought instead of those that, by custom, were obliged to accept the blow; but had a just excuse for dispensing with it, as being too old, infirm, or being ecclesiastics, and the like. Such causes as could not be decided by the course of com-

ion law, were often tried by single combat; and he who had the good fortune to conquer, was always reputed to have justice on his side. See the article BATTLE.

CHAMPION of the King, (campio regis), is an ancient officer, whose office is, at the coronation of British kings, when the king is at dinner, to ride armed cap-a-pie, into Westminster-Hall, and by the proclamation of an herald make a challenge, "That if any man shall deny the king's title to the crown, he is there ready to defend it in single combat, &c." which being done, the king drinks to him, and sends him a gilt cup with a cover full of wine, which the champion drinks, and hath the cup for his fee. This office, at the coronation of king Richard II. when Baldwin Freville exhibited his petition for it, was adjudged from him to his competitor Sir John Dymoke (both claiming from Marmon), and hath continued ever since in the family of the Dymockes; who hold the manor of Sinvelby in Lincolnshire, hereditary from the Marmons by grand serjeantry, viz. that the lord thereof shall be the king's champion as aforesaid. Accordingly Sir Edward Dymoke performed this office at the coronation of king Charles II. a person of the name of Dymoke performed at the coronation of his present majesty George the third.

CHAMPLAIN, (Samuel de) a celebrated French navigator, the founder of the colony of New France, or Canada. He built Quebec; and was the first governor of the colony in 1603. Died after 1649. See QUEBEC.

CHANANAEI, (anc. geog.) the name of the ancient inhabitants of Canaan in general, descendants of Canaan; but peculiarly appropriated to some one branch, though uncertain which branch or son of Canaan it was, or how it happened that they preferred the common gentiligious name to one more appropriated as descendants of one of the sons of Canaan: unleas from their course of life, as being in the mercantile way, the import of the name Canaan; and for which their situation was greatly adapted, they living on the sea and about Jordan, and thus occupying the greater part of the Land of Promise.

CHANCE, a term we apply to events, to denote that they happen without any necessary or foreknown cause. See CAUSE.

Our aim is, to ascribe those things to chance, which are not necessarily produced as the natural effects of any proper cause; but our ignorance and precipitancy lead us to attribute effects to chance, which have a necessary and determinate cause.

When we say a thing happens by chance, we really mean no more than that its cause is unknown to us: not, as some vainly imagine, that chance itself can be the cause of any thing.

The case of the painter, who, unable to exprefs the foam at the mouth of a horse he had painted, threw his sponge in despair at the piece, and, by chance, did that which he could not before do by design, is an eminent instance of the force of chance; yet, it is obvious, all we here mean by chance, is, the painter was unaware of the effect that in him he did not throw the sponge with such a view: not but that he actually did every thing necessary to produce the effect; infomuch, that, considering the direction wherein
wherein he threw his sponge, together with its form, specific gravity, the colours wherewith it was smeared, and the distance of the hand from the piece, it was impossible, on the present system of things, the effect should not follow.

Chance is frequently personified, and cast into a critical being, whom we conceive as acting arbitrarily, and producing all the effects whose real causes do not appear to us in which fende the word coincides with the τυχη, fortune, of the ancients.

Chance is also used for the manner of deciding things, the conduct or direction whereof is left at large, and not reducible to any determinate rules or measures; or where there is no ground for preference: as at cards, dice, lotteries, &c.

For the Laws of Chance, or the proportion of Hazard in Gaming, see GAME.

The ancient sortilege, or chance, M. Placette observes, was instituted by God himself; and in the Old Testament we find several flanding laws and express commands which prescribed its use on certain occasions. Hence it is that the Scripturje says, "The lot or chance fell on Matthias," when it was in question who should fill Judas's place in the apostolate.

Hence also arose the sortes fataepeum; or method of determining things, among the ancient Christians, by opening some of the sacred books, and pitching on the first verse they cast their eye on, as a sure prognostic of what was to befal them. The sortes Homericæ, Virgiliane, Prancetina, &c. used by the heathens, were with the same view, and in the same manner. See Sortes.

St. Augustine seems to approve of this method of determining things future, and owns that he had practised it himself: grounded on this supposition, that God presides over chance; and on Prov. xvi. 33.

Many among the modern divines hold chance to be conducted in a particular manner by Providence; and esteem it an extraordinary way which God ufes to declare his will, and a kind of immediate revelation.

Chance-Medley, in law, is where one is doing a lawful act, and a person is killed by chance thereby; for if the act be unlawful, it is felony. If a person casts, not intending harm, a stone, which happens to hit one, whereas he dies; or shoots an arrow in a highway, and another that passeth by is killed therewith; or if a workman, in throwing down rubbish from a house after warning to take care, kills a person; or a schoolmaster in correcting his scholar, a matter his servant, or an officer in whipping a criminal in a reasonable manner, happens to occasion his death; it is chance-medley and mischief. But if a man throw stones in a highway where persons usually pass; or shoot an arrow, &c. in a market-place among a great many people; or if a workman cast down rubbish from a house in cities and towns where people are continually passing; or a schoolmaster, &c. correct his servant or scholar, &c. exceeding the bounds of moderation; it is manslaughter; and if with an improper instrument of correction, as with a sword or iron bar, or by kicking, flaming, &c. in a cruel manner, it is murder. If a man whips his horse in a street to make him gallop, and the horse runs over a child and kills it, it is manslaughter; but if another whips the horse, it is manslaughter in him, and chance-medley in the rider. And if two are fighting, and a third person coming to part them is killed by one of them without any evil intent, yet this is murder in him, and not manslaughter by chance-medley or mischief. In chance-medley, the offender forfeits his goods; but in a pardon of course.

Chancel, is properly that part of the choir of a church, between the altar or communion-table and the balustrade or railing that incloses it, where the minister is placed at the celebration of the communion. The word comes from the Latin cancellus, which in the lower Latin is used in the same sense, from cancelli, "lattices or cross bars," therewith the chancels were anciently encompassed, as they now are with rails. The right of a feast and a benefice in the chancels is one of the privileges of founders.

Chancellor, was at first only a chief notary or scribe under the emperors; and was called cancellarius, because he sat behind a lattice (in Latin cancellus) to avoid being crowded by the people; though some derive the word from cancellare, to cancel. (See Chancery.) This office was afterwards invested with several judicial powers, and a general superintendency over the rest of the officers of the prince. From the Roman empire it passed to the Roman church, ever emulous of imperial state: and hence every bishop has to this day his chancellor, the principal judge of his curtiory. And when the modern kingdoms of Europe were established upon the ruins of the empire, almost every state preferred its chancellor with different jurisdictions and dignities, according to their different constitutions. But in all of them he seems to have had the superintendence of all charters, letters, and each other public instruments of the crown as were authenticated in the most solemn manner; and therefore, when feals came in use, he had always the custody of the king's great seal.

Lord High Chancellor of Great Britain, or Lord Keeper of the Great Seal, is the highest honour of the long robe, being created by the mere delivery of the king's great seal into his custody; whereby he becomes, without write or patent, an officer of the greatest weight and power of any now subsisting in that kingdom. He is a privy counsellor by his office; and, according to Lord Chancellor Elfremente, proctor of the house of lords by prebension. To him belongs the appointment of all the justices of the peace throughout the kingdom. Being in former times commonly an ecclesiastic (for none else were then capable of an office so convefant in writing), and presiding over the royal chapel, he became keeper of the king's conscience; victor, in right of the king, of all hospitals and colleges of the king's foundation; and patron of all the king's livings under the value of £20 per annum in the king's books. He is the general guardian of all infants, ideots, and lunatics; and has the general supervision and interference of all charitable uses in the kingdom. And all this over and above the vast extensive jurisdiction which he exercises in his judicial capacity in the court of chancery. He takes precedence of every temporal lord except the royal family, and of all others except the archbishop of Canterbury. See Chancery.

Chancellor, in Scotland, was the chief in matters of justice. In the laws of King Malcolm II. he is placed
The chancellor of Oxford is usually one of the prime nobility, chosen by the students themselves in convocation. He is their chief magistrate; his office is, during vita, to govern the university, preserve and defend its rights and privileges, convene assemblies, and do justice among the members under his jurisdiction.

Under the chancellor is the vice-chancellor, who is chosen annually, being nominated by the chancellor, and elected by the university in convocation. He is always the head of some college, and in holy orders. His proper office is to execute the chancellor's power, to govern the university according to her statutes, to see that officers and students do their duty, that courts be duly called, &c. When he enters upon his office, he chooses four pro-vice-chancellors out of the heads of the colleges, to execute his power in his absence.

The chancellor of Cambridge is also usually one of the prime nobility, and in most respects the same as that in Oxford; only he does not hold his office during vita, but may be elected every three years. Under the chancellor there is a commissary, who holds a court of record for all privileged persons and scholars under the degree of master of arts, where all causes are tried and determined by the civil and statute law, and by the custom of the university.

The vice-chancellor of Cambridge is chosen annually by the faculty, out of two persons nominated by the heads of the several colleges and halls.

**Chancellor's Court.** See University Courts.

**Chanceron,** in natural history, a name given by the French writers to the small caterpillar that eats the corn, and does vast mischief in their granaries. See the article Corn-Butterfly.

**Chancery,** the highest court of justice in Britain next to the parliament, and of very ancient institution. It has its name chancery (cancellaria) from the judge who presides here, the lord chancellor, or cancellarius; who, according to Sir Edward Coke, is so termed a cancellandi, from cancelling the king's letters patent when granted contrary to law, which is the highest point of his jurisdiction. In chancery there are two distinct tribunals; the ordinary, being a court of common law; the other extraordinary, being a court of equity.

1. The ordinary legal court holds pleas of recognizances acknowledged in the chancery, writs of habeas corpus, for release of prisoners, writs of partition, &c. and also of all personal actions by or against any officer of the court. Sometimes a supersedeas, or writ in ai is, of privilege, hath been here granted to discharge a person out of prison; one from hence may have a habeas corpus prohibition, &c. in the vacation; and here a scire facias may be had to force winnles to appear in other courts, when they have no power to call them, &c. in prosecuting causes, if the parties elect to abide this court cannot try it by jury, but the lord chancellor delivers the record into the king's bench to be tried there; and after trial had, it is to be remanded into the chancery, and there judgment given: thus if there be a demurrer in this court, it shall be argued in this court.

In this court is also kept the officina justitiae; out of which all original writs that pass under the great seal, all commissions of charitable uses, severs, bankruptcy, &c. given in the university.

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idiotic, lunacy, and the like, do issue; and for which it is always open to the subject, who may there at any time demand and have, ex debito jussitiae, any writ that his occasions may call for. These writs, relating to the business of the subject, and the returns of them, were, according to the simplicity of ancient times, originally kept in a hamper, in hanaperio; and the others (relating to such matters wherein the crown is mediately or immediately concerned) where preferred in a little sack or bag, in parra baga: and hence hath arisen the distinction of the hanaper office, and the petty-bag office, which both belong to the common law-court in chancery.

2. The extraordinary court, or court of equity, proceeds by the rules of equity and confidence; and moderates the rigour of the common law, considering the intention rather than the words of the law. It gives relief for and against infants notwithstanding their minority, and for and against married women notwithstanding their coverture. All frauds and deceits for which there is no redress at common law; all breaches of trust and confidence; and accidents, as to relieve obligors, mortgagees, and against penalties and forfeitures, where the intent was to pay the debt, are here remedied: for in chancery, a forfeiture, &c. shall not bind, where a thing may be done after or compensation made for it. Also this court will give relief against the extremity of unreasonable engagements entered into without consideration; oblige creditors that are unreasonable to compound with an unfortunate debtor; and make executors, &c. give security and pay interest for money that is to lie long in their hands. This court may confirm title to lands, though one hath lost his writings; and render conveyances, defective through mistake, &c. good and perfect. In chancery, copy-holders may be relieved against the ill usage of their lords; inclosures of lands that are common be decreed; and this court may decree money or lands given to charitable uses, oblige men to account with each other, &c. But in all cases where the plaintiff can have his remedy at law, he ought not to be relieved in chancery; and a thing which may be tried by a jury is not triable in this court.

The proceedings in chancery are, first to file the bill of complaint, signed by some counsel, setting forth the fraud or injury done, or wrong sustained, and praying relief; after the bill is filed, process of subpoe nas is to compel the defendant to appear; and when the defendant appears, he puts in his answer to the bill of complaint, if there be no cause for the plea to the jurisdiction of the court, in difability of the person, or bar, &c. Then the plaintiff brings his replication, unless he files exceptions against the answer as insufficient, referring it to a master to report whether it be sufficient or not; to which report exceptions may also be made. The answer, replication, rejoinder, &c. being framed, and the parties come to issue, witnesses are to be examined upon interrogatories, either in court, or by commission in the country, wherein the parties usually join; and when the plaintiff and defendant have examined their witnesses, publication is to be made of the depositions, and the cause is to be set down for hearing; after which follows the decree. But it is now usual to appeal to the house of lords; which appeals are to be signed by two noted counsel, and exhibited by way of petition; the petition or appeal is lodged with the Chanceller clerk of the house of lords, and read in the house, wherein the appeal is ordered to put in his answer, and a day fixed for hearing the cause; and after counsel heard, and evidence given on both sides, the lords will affirm or reverse the decree of the chancery, and finally determine the cause by a majority of votes, &c.

CHANDLER, in fortification, a kind of moveable parapet, consisting of a wooden frame, made of two upright flakes, about six feet high, with crofs planks between them; serving to support falvines to cover the pioners.

CHANDERNAGORE, a French settlement in the kingdom of Bengal in the East-Indies. It lies on the river Ganges, two leagues and a half above Calcutta. The district is hardly a league in circumference, and has the disadvantage of being somewhat exposed on the western side; but its harbour is excellent, and the air is as pure as it can be on the banks of the Ganges. When any building is undertaken that requires strength, it must here, as well as in all other parts of Bengal, be built upon piles; it being impossible to dig three or four feet without coming at water.

CHANDLER, (Mary) distinguished by her talent for poetry, was the daughter of a dissenting minister at Bath; and was born at Malmesbury in Wilts, in 1687. She was bred a milliner; but from her childhood had a turn for poetry, and in her riper years applied herself to the study of the poets. Her poems, for which she was complimented by Mr Pope, breathed the spirit of piety and philosophy. She had the misfortune to be deformed, which determined her to live single; though she had great sweetness of countenance, and was solicited to marry. She died in 1745, aged 58.

CHANDLER, (Dr Samuel) a learned and respectable dissenting minister, descended from ancestors heartily engaged in the cause of religious liberty, and sufferers for the sake of conscience and nonconformity; was born at Hungerford in Berks, where his father was a minister of considerable worth and abilities. Being by his literary turn deftined to the ministry, he was at first placed at an academy at Bridgewater, and from thence removed to Gloucester under Mr Samuel Jones. Among the pupils of Mr Jones were Mr Joseph Butler, afterwards bishop of Durham, and Mr Thomas Secker, afterwards archbishop of Canterbury. With these eminent persons he contracted a friendship that continued to the end of their lives, notwithstanding the different views by which their conduct was afterwards directed, and the different situations in which they were placed.

Mr Chandler having finished his academical studies, began to preach about July 1714; and being soon distinguished by his talents in the pulpit, he was chosen in 1716 minister of the Presbyterian congregation at Peckham near London, in which station he continued some years. Here he entered in the matrimonial state, and began to have an increasing family, when, by the fatal South-sea scheme of 1720, he unfortunately lost the whole fortune which he had received with his wife. His circumstances being thereby embarrassed, and his income as a minister being inadequate to his expences, he engaged in the trade of a bookeller, and kept a shop in the Poultry, London, for about two or three
Chandler, years, still continuing to discharge the duties of the pastoral office. He also officiated as joint preacher with the learned Dr Lardner of a winter weekly evening lecure at the meeting-house in the Old Jewry, London: in which meeting he was established assistant preacher about the year 1725, and then as the pastor. Here he ministered to the religious improvement of a very respectable congregation for 40 years with the greatest applause; and with what diligence and application he improved the vacancies of time from his pastoral duties, apparent to the religious improvement of a very respectable congregation for 40 years with the greatest applause; and with what diligence and application he improved the vacancies of time from his pastoral duties, improved the vacancies of time from his pastoral duties, improving himself and benefiting the world, will appear from his many writings on a variety of important subjects. While he was thus laboriously employed, not only the universities of Edinburgh and Aberdeen gave him, without any application, testimonies of their esteem in diplomas, conferring on him the degree of D. D. but he also received offers of preferment from some of the governors of the established church, which he nobly declined. He had likewise the honour of being afterwards elected F. R. and A. SS.

On the death of George II. in 1760, Dr Chandler published a sermon on that event, in which he compared that prince to King David. This gave rise to a pamphlet, which was printed in the year 1761, intitled "The History of the Man after God’s own Heart;" wherein the author ventured to exhibit King David as an example of perfidy, luft, and cruelty; fit only to be ranked with a Nero or a Caligula; and complained of the infult that had been offered to the memory of the late British monarch by Dr Chandler’s parallel between him and the king of Israel. This attack occasioned Dr Chandler to publish in the following year "A Review of the History of the Man after God’s own Heart; in which the Falsehoods and Misrepresentations of the Historian are exposed and corrected." He also prepared the press a more elaborate work, which was afterwards published in two volumes 8vo, under the following title: "A Critical History of the Life of David: in which the principal Events are ranged in Order of time; the chief Objections of Mr Bayle and others against the Character of this Prince, and the Scripture Account of him, and the Occurrences of his Reign, are examined and refuted; and the Psalms which refer to him explained." As this was the last, it was likewise one of the best, of Dr Chandler’s productions.

The greatest part of this work was printed off at the time of our author’s death, which happened May 8th 1766, aged 72. During the last year of his life, he was visited with frequent returns of a very painful disorder, which he endured with great resignation and Christian fortitude. He was interred in the burying-ground at Bunhill-fields on the 16th of the month; and his funeral was very honourably attended by ministers and other gentlemen. He expressly desired, by his last will, that no delineation of his character might be given in his funeral sermon, which was preached by Dr Amory. He had several children; two sons and a daughter who died before him, and three daughters who survived him; two of whom are yet living, and both married, one of them to the Rev. Dr Harwood.

Dr Chandler was a man of very extensive learning and eminent abilities; his apprehension was quick and his judgment penetrating; he had a warm and vigorous imagination; he was a very instructive and animated preacher; and histalents in the pulpit and as a writer procured him very great and general esteem, not only among the dissenters, but among large numbers of the established church. He was principally instrumental in the establishment of the fund for relieving the widows and orphans of poor Protestant dissenting ministers: the plan of it was first formed by him; and it was by his interest and application to his friends that many of the subscriptions for its support were procured.

In 1768, four volumes of our author’s sermons were published by Dr Amory, according to his own directions in his last will; to which was prefixed a neat engraving of him, from an excellent portrait by Mr Chamberlin. He also expressed a desire to have some of his principal pieces reprinted in four volumes 8vo: proposals were accordingly published for that purpose, but did not meet with sufficient encouragement. But in 1777, another work of our author was published in one volume 4to, under the following title: "A paraphrase and Notes on the Epistles of St Paul to the Galatians and Ephesians, with doctrinal and practical Observations: together with a critical and practical Commentary on the two Epistles of St Paul to the Thessalonians." Dr Chandler also left, in his interleaved Bible, a large number of critical notes, chiefly in Latin, which are now the property of Dr Hippius, Mr Farmer, Dr Price, and Dr Savage, and which have been intended to be published; but the design has not yet been executed. A complete list of Dr Chandler’s works is given in the Biographia Britannica, vol. III. p. 435.

CHANG-TONG, a province of China, bounded on the east by Petcheli and part of Honan, on the south by Kiang-nan, on the east by the sea, and on the north by the sea and part of Petcheli. The country is well watered by lakes, streams, and rivers; but is nevertheless liable to suffer from drought, as rain falls here but seldom. The locusts also sometimes make great devastation. However, it abounds greatly in game; and there is perhaps no country where quails, partridges, and pheasants, are sold cheaper, the inhabitants of this province being reckoned the keenest sportsmen in the empire. The province is greatly enriched by the river Yen, called the Grand Imperial Canal, through which all the canals bound to Pekin must pass in their way thither. The duties on this canal alone amount to more than L. 450,000 annually. The canal itself is greatly admired by European travellers on account of its strong and long dikes, the banks decorated with cut stone, the ingenious mechanism of its locks, and the great number of natural obstacles which have been overcome in the execution of the work.—The province produces silk of the ordinary kind; and, besides this, another from a sort of insect resembling our caterpillar. It is coarser than the ordinary silk, but much stronger and more durable; so that the stuffs made from it have a very extensive sale throughout the empire.

Chang-tong is remarkable for being the birth-place of the celebrated philosopher and lawgiver Confucius. His native city is called K’o-feii, where there are several monuments erected in honour of this great man. The province is divided into six districts, which contain six cities of the first class, and 114 of the second.
and third. Along the coast, also, are 15 or 16 villages of considerable importance on account of their commerce; there are likewise a number of small islands, most of which have harbors very convenient for the Chinefe junk trade that passes from thence to Corea or Laos.

The most remarkable cities are 1. Tu-nan-fou, the capital, which stands on the river Tungbo or T6. It is large and populous; but chiefly celebrated for having been the residence of a long series of kings, whose tombs, rising on the neighbouring mountains, afford a beautiful prospect. 2. Yen-chen-fou, the second city of the province, situated between two rivers, and in a mild and temperate climate. Great quantities of gold are said to have been formerly collected in its neighborhood. 3. Lin-teu-fu, situated on the great canal, is much frequented by ships, and may be called a general magazine for every kind of交换, there are likewise a number of small islands, most of which have harbors very convenient for the Chinefe junk trade that passes from thence to Corea or Laos.

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CHANGES, in arithmetic, &c. the permutations or variations of any number of quantities; with regard to their position, order, &c. See COMBINATION.

To find all the possible Changes of any Number of Quantities, or how oft their order may be varied.] Suppose two quantities a and b. Since they may be either abc or cab, it is evident their changes are 2 = 2!. Suppose three quantities abc: their changes will be as in the margin; as is evident by combining a first with a b, then with b a; and hence they are the number of changes ares 3. 2. 1 = 6. If the quantities be 4, each may be combined four

changes with each order of the other three; and hence the number of changes ares 6. 4 = 6. b c a 3. 2. 1 = 24. Whereof, if the number of b c a quantities be supposed n, the number of changes will be n. n-1. n-2. n-3. n-4. &c. If the same quantity occurs twice, the changes of two will be found 5. 6 = 30, of four, 6. 5. 4 = 120, &c. And thus the number of changes in the first case will be = (2. 1) = 2. 1; in the second, 3 = (3. 2. 1) = 2. 1. In the third, 4 = (3. 2. 1) = 2. 1.

If a fifth letter be added, in each series of four quantities, it will beget five changes, whence the number of all the changes will be = (5. 4. 3. 2. 1) = 2. 1. Hence if the number of quantities be n, the number of changes will be = (n. n-1. n-2. n-3. n-4. &c.) = (n-1).
Continental and an island. Such are the British channel, St George's channel, the channel of Constantinople, &c.

Channel of a Ship. See Chain-Wall.

CHANT or SONG. The first is the Ambrosian, established by St Ambrose. The second, the Gregorian chant, introduced by Pope Gregory the great, who established schools of chanters, and corrected the church-song. This is still retained in the church under the name of plain song: at first it was called the Roman song. The plain or Gregorian chant, is where the choir and people sing in unison, or all together in the same manner.

CHANTILLY, a village in France, about seven leagues from Paris, where there is a magnificent palace and fine forest belonging to the duke of Bourbon.

CHANTOR, a singer of a choir in a cathedral. The words are almost grown obsolete, chorister or singing-man being commonly used instead of it. All great chappels have chantors and chaplains to afflict the canons, and officiate in their absence.

CHANTER is used by way of excellence for the preceptor matter of the choir, which is one of the first dignities of the chapter. At St David's in Wales, there is no dean, he is next in dignity to the bishop. The ancients called the chantor primicerius cantorum. To him belonged the direction of the deacons and other inferior officers.

Chantors, in the temple of Jerusalem, were a number of Levites employed in singing the prayers of God, and playing upon instruments before his altar. They had no habits distinct from the rest of the people; yet in the ceremony of removing the ark to Solomon's temple, the chantors appeared drest in tunics of byllis or fine linen. 2 Chron. v. 12.

CHANTRY, or CHAUNTRY, was anciently a church or chapel endowed with lands, or other yearly revenue, for the maintenance of one or more priests, daily saying or singing Mass for the souls of the donors, and such others as they appointed. Hence chantry-rents are rents paid to the crown by the tenants or purchasers of chantry lands.

CHAUNTRY, a village in France, about seven leagues from Paris, where there is a magnificent palace and fine forest belonging to the duke of Bourbon.

CHAUNTRY-rents are rents paid to the crown by the tenants or purchasers of chantry lands.

CHAOLOGY the history or description of the chaos.

See CHAOS.

Orpheus, in his chaology, sets forth the different alterations, secretions, and divers forms which matter went through till it became habitable, which amounts to the same with what we otherwise call cosmogony. Dr Burnet, in his theory of the earth represents the chaos as it was at first, entire, undivided, and universally rude and deformed: or the teha baha; then shews how it came to be divided into its respective regions; how the homogeneous matter gathered itself apart from all of a contrary principle; and lastly, how it hardened and became a solid habitable globe. See EARTH.

CHAOS, that confusion in which matter lay when newly produced out of nothing at the beginning of the world, before God, by his almighty word, had put it into the order and condition wherein it was after the six days creation. See EARTH.

Chaos is represented by the ancients as the first principle, ovum, or seed of nature and the world. All philosophers, sages, naturalists, philosophers, theologues, and poets, held that chaos was the eldest and first principle, as Epius was to Homer, the Barbarians, Phcenicians, Egyptians, Persians, &c. all refer the origin of the world to a rude, mixed, confused mass of matter. The Greeks, Orpheus, Hesiod, Menander, Aristophanes, Euripides, and the writers of the Cyclic Poems, all speak
CHAPEL, a place of divine worship, so called. The word is derived from the Latin *capella*. In former times when the kings of France were engaged in war they always carried St. Martin's hat into the field, which was kept in a tent as a precious relic from whence the place was called *capella*; and the prieux, who had the custody of the tent, *capellani*. Afterwards the word *capella* became applied to private oratories.

In Britain there are several sorts of chapels. 1. Parochial chapels: these differ from parish-churches only in name; they are generally small, and the inhabitants within the district few. If there be a presentation *ad ecclesiam*, instead of *capellam*, and an admission and institution upon it, it is no longer a chapel, but a church. 2. Chapels, which adjoin to, and are part of the church; such were formerly built by honourable persons, as burying-places for themselves and their families. 3. Chapels of ease; there are usually built in very large parishes, where all the people do not conveniently repair to the mother-church. 4. Free chapels; such as were founded by kings of England. They are free from all episcopal jurisdiction, and only to be visited by the founder and his successors; which is done by the lord chancellor; yet the king may license any subject to build and endow a chapel, and by letters patent exempt it from the visitation of the ordinary. 5. Chapels in the universities, belonging to particular colleges. 6. Domestic chapels, built by noblemen or gentlemen for the private service of God in their families.

See CHAPLAIN.

CHAPEL is also a name given to a printer's workshop; because, according to some authors, printing was first actually performed in chapels or churches, or, according to others, because Caxton, an early printer, exercised the art in one of the chapels at Westminster Abbey. In this sense they say, *the orders or laws of the chapel, the secrets of the chapel*, &c.

Knights of the CHAPEL, called also *Poor knights of Windsor*, were instituted by Henry VIII. in his testament. Their number was at first thirteen, but has been since augmented to twenty-six. They afflict in the funeral services of the kings of England: they are subject to the office of the canons of Windsor, and live on pensions assigned them by the order of the garter. They bear a blue or red cloak, with the arms of St. George on the left shoulder.

CHAPLAIN, (James) an eminent French poet born at Paris in 1595, and often mentioned in the works of Balzac, Menage, and other learned men. He wrote several works, and at length dittified himself by a heroic poem called *La Pucelle*, *ou France Délivrée*, which employed him several years; and which, raising the expectation of the public, was as much desired by some as extolled by others. He was one of the king's counsellors; and died in 1674, very rich, but was very covetous and forlorn.

CHAPELET, in the manage, a couple of flurrup-leathers, mounted each of them with a flurrup, and joined at top in a fort of leather buckle, called the *head of the chapletia*, by which they are made fast to the pummel of the saddle, after being adjusted to the rider's length and bore. They are used both to avoid the trouble of taking up or letting down the flurrups every time that the gentleman mounts on a different horse and
Chapelle,... vicei,... ancienly worn both by men and women, the nobles... horses with their other... doctors,... parliament.-According for... mouths, and all others that are not... delivered by the mouth of the... devices, placed on the foreheads of the horses that... devices were originally fastened on the... chaperonnes, or... coverings... were originally faftened on the... Chaperon, Chaperonne, or Chaperoon, properly signifies a sort of hood or covering of the head... men and women, the nobles and the populace, and afterwards appropriated to the doctors, and licentiates in colleges, &c. Hence the name passed to certain little helmets, and other funeral devices, placed on the foreheads of the horses that drew the hearses in pompous funerals, and which are still called chaperons, or houppons; because such devices... wore by those horses with their other coverings of state.

Chaperon of a bit-mouth, in the manege, is only used for catch-months, and all others that are not cannon-months, signifying the end of the bit that joins to the branch just by the banquet. In catch-months the chaperon is round, but in others it is oval: and the same part that in catch and other mouths is called chaperon, is in cannon-months called froncou.

Chapiters, in architecture, the same with capitals.

Chapters, in law, formerly signified a summary of such matters as were inquired of, or presented before justices in eyre, justices of assize, &c. Hence the priets that had the care of them, were... and licentiates in colleges, &c. Hence the... chaplets, &c.

In England there are 43 chaplains to the king, who wait four each month, preach in the chapel, read the service to the family, and to the king in his private oratory, and say grace in the absence of the clerk of the cloister. While in waiting they have a table, and attendance, but no salary. In Scotland the king has six chaplains, with a salary of £. 50 each, three of them having in addition the deanship of the chapel-royal divided between them, making up above £. 100 to each. Their only duty at present is to say prayers at the elevation of preachers for Scotland to sit in parliament. According to a statute of Henry VIII. the persons vested with a power of retaining chaplains, together with the number each is allowed to qualify, is as follows: An archbishop, eight; a duke or bishop, six; marquis or earl, five; viscount, four; baron, knight of the garter, or lord chancellor three; a duchess, marchioness, countess, baroness, the treasurer and comptroller of the king's houfe, clerk of the cloister, the king's secretary, dean of the chapel, almoner, and master of the rolls, each of them two; chief justice of the kings bench, and warden of the cinqueparts, each one. All these chaplains may purchase a... deferences, and take two benefits with... care of fools. A chaplain must be retained by... testimonial nut hand and seal; for it is not sufficient that he served as chaplain in the family.

The first chaplains are said to have been those instituted by the ancient kings of France, for preferring the chape, or cape, with the other relics of St Martin, which the kings kept in their palace, and carried out with them to the war. The first chaplain is said to have been Gul. de Mefmes, chaplain to St Louis.

Chaplain in the order of Malta, is used for the second rank, or class, in that order; otherwise called diano. The knights make the first class, and the chaplains the second.

Chaplains of the Pope, are the auditors, or judges of causes in the sacred palace; so called, because the pope... cases sent from the several parts of Christendom. He hither summoned as affessors the most learned lawyers of his time; and they hence acquired the appellation of capellani, chaplains. It is from the decrees formerly given by thefe, that the body of decreals is composed: their number pope Sixtus IV. reduced to twelve.

Some say, the shrines of relics were covered with a kind of... cape, or capella, i.e. little cape; and that hence the priets that had the care of them, were called chaplains. In time these reliefs where reposed in a little church, either contiguous to a larger, or separate from it; and the same name, capella, which was given to the cover, was also given to the place where it was lodged: and hence the priest who superintended it came to be called chaplain.

Chaplet, an ancient ornament for the head, like a garland or wreath; but this word is frequently used to signify the circle of a crown. There are infufcences of its being borne in a coat of arms, as well as for crests; the paternal arms for Lascelles are argent, three chaplets, gules.

Chaplet also denotes a string of beads used by the Roman Catholics, to count the number of their prayers. The invention of it is ascribed to Peter the hermit, who probably learned it of the Turks, as they owe it to the East-Indians.

Chaplets are sometimes called pater-nocters; and are made of coral, of diamonds, of wood, &c. The common chaplet contains fifty ave-marias, and five pater-nocters. There is also a chaplet of our Saviour, consisting of 33 beads, in honour of his 33 years living on earth, instituted by father Michael the Camaldulian.

The Orientals have a kind of chaplets which they call chains, and which they use in their prayers, rehearsing one of the perfections of God on each link or head. The great Mogul is said to have 18 of these chains, all precious stones; some diamonds, others rubies, pearls, &c. The Turks have likewise chaplets, which they bear in the hand, or hang it at the girdle; but father Dandini observes, they differ from those used by the Romanists, in that they are all of the same insigns, and have not that distinction into decades: though they consist of six decades, or 60 beads. He adds, that the muflimans run over the chaplet almoft in an instant, the prayers being extremely short, as containing only these words, "praise to God," or "glory..."
Chapter

“glory to God,” for each bead. Besides the common chaplet they have likewise a larger one consisting of 100 beads, where there is some distinction, as being divided by little threads into three parts; on one of which they repeat 30 times: “soubban Allah, i.e. “God is worthy to be praised;” on another, “elamuth Allah, “glory be to God;” and on the third, “Allah ebeer, “God is great.” These 33 times making only 99; to complete the number 100, they add other prayers for the beginning of the chaplet.—He adds, that the Mahometan chaplet appears to have had its rise from the monastic divination, which we find in their prayer-books; the Jews are obliged to repeat 90; the Christians to 30 times; while the Moslems repeat 30 thrice thirty times; and as the number 100 is neither male calyx nor corolla; and the androecium is placed under the germin, the female calyx is tetraphyllous; no corolla; the stigma quinquefid, with one roundish seed.

CHARABON, a sea-port town on the northern coast of the island of Java in the East-Indies; E. Long. 10° 30. S. Lat. 6°

CHARACENE, the most southern part of Susiana, a province of Persia, lying on the Persian gulf, between the Tigris and the Eulœbus. It was so named from the city of Chorax, called first Alexandria, from its founder Alexander the Great; afterwards Antioch, from Antiochus V. king of Syria, who repaired and beautified it; and lastly, Charax Spasinus, or Panemone, that is the Mole of the Spaniards, an Arabian king of that name having secured it against the overflowing of the Tigris, by a high bank or mole extending three miles, which served as a fence to all that country. Dionysius Periegetes, and Idibus, author of the Parthian Manusones, were both natives of this city. The small district of Characene was feized by Panines, the son of Sogdones, king of the neighbouring Arabs, during the troubles of Syria, and erected into a kingdom. Lucian calls him Hypapanes, and adds, that he ruled over the Charseneni and the neighbouring people; he died in the 85th year of his age. The other kings of this country we find mentioned by the ancients, as Turans, who died in the 92d year of his age, and after him Arababazus the seventh, as Lucian informs us, who was driven from the throne by his own subjects, but restored by the Parthians. And this is all we find in the ancients relating to the kings of Characene.

CHARACTER, in a general sense, signifies a mark or figure, drawn on paper, metals, stones, or other matter, with a pen, graver, chisel, or other instrument, to signify or denote any thing. The word is Greek, charaktēr, formed from the verb, charaktis, insculptus, “to engrave, impress,” &c. The various kinds of characters may be reduced to three heads, viz. Literal Characters, Numerical Characters, and Abbreviations.

1. Literal Character is a letter of the alphabet, serving to indicate some articulate sound, expressive of some idea or conception of the mind. See Alphabet.

2. Literal Characters may be again divided, with regard to their nature and use, into Nominal Characters, or those we properly call letters; which serve to express the names of things: See Letter. Real Characters: those that instead of names express things and ideas: See Idea, &c. Emblematical or Symbolical Characters: which have this in common with real ones, that they express the things themselves; but have this further, that they in some measure personate them, and exhibit their form; such are the hieroglyphics of the ancient Egyptians. See Hieroglyphic, Symbol, &c.
Characters, regard to their invention and use, into particular and general or universal.

Particular characters, are those peculiar to this or that nation. Such are the Roman, Italic, Greek, Hebrew, Arabic, Gothic, Chinese, &c. characters. See Hebrew, Gothic, Chinese, &c.

Universal characters, are also real characters, and make what some authors call a philosophical language.

That diversity of characters used by the several nations to express the same idea, is found the chief obstacle to the advancement of learning: to remove this, several authors have taken occasion to propose plans of characters that should be universal, and which each people should read in their own language. The character here is to be real, not nominal; to express things and notions; not as the common ones, letters or sounds: yet to be mute like letters, and arbitrary; not emblematical like hieroglyphics.

Thus, every nation should retain its own language, yet every one understand that of each other, without learning it; only by seeing a real or universal character, which should signify the same things to all people, by what sounds forever each expresses in their particular idiom. For instance, by seeing the character defined to signify to drink, an Englishman should read to drink: a Frenchman, boire; a Latin, bibere; a Greek, μια; a Jew, ט; a German trinken; and so of the rest: in the same manner as seeing a horse, each people expresses it after their own manner; but all mean the same animal.

This real character is no chimera: the Chinese and Japoneses have already something like it. They have a common character which each of these nations understand alike in their several languages; though they pronounce them with such different sounds, that they do not understand one another in speaking.

The first and most considerable attempts for a real character, or philosophical language, in Europe, are those of bishop Wilkins and Dalgarme: but these, with how much art ever they were contrived, have yet failed.

M. Leibnitz had some thoughts the same way: he thinks those great men did not hit the right method. It was probable, indeed, that by their means, people, who do not understand one another, might easily have a commerce together; but they have not hit on true real characters.

According to him, the characters should resemble those used in Algebra: which, in effect, are very simple, yet very expressive, without any thing superfluous or equivocal; and contain all the varieties required.

The real character of bishop Wilkins has its just applause: Dr Hook recommends it on his own knowledge and experience as a most excellent scheme; and to engage the world to the study thereof, publishes some fine inventions of his own therein.

M. Leibnitz tells us, he had under consideration an alphabet of human thoughts; in order to a new philosophical language, on his own scheme; but his death prevented its being brought to maturity.

M. Łódwie, in the English philosophical transactions, gives us a plan of an universal alphabet or character of another kind: this was to contain an enumeration of all such single sounds, or letters, as are used in any language: characters by means whereof, people should be enabled to pronounce truly and readily any language: to describe the pronunciation of any language that shall be pronounced in their hearing, so as others accustomed to this language, though they had never heard the language pronounced, shall at first be able truly to pronounce it: and, lastly, this character to serve as a standard to perpetuate the sounds of any language.

In the Journal Litterature, an. 1720, we have a very ingenious project for an universal character. The author, after obviating the objections that might be made against the feasibleness of such schemes in the general, proposes his own: his characters are to be the common Arabic, or numeral figures. The combinations of these nine are sufficient to express distinctly an incredible quantity of numbers, much more than we shall need terms to signify our actions, goods, evils, duties, passions, &c. Thus is all the trouble of framing and learning any new character at once saved; the Arabic figures having already all the universality required.

The advantages are immense. For, 100, We have here a fitable, faithful interpreter; never to be corrupted or changed, as the popular languages continually are. 200, Whereas the difficulty of pronouncing a foreign language is such as usually gives the learner the greatest trouble, and there are even some founds which foreigners never attain to; in the character here proposed, this difficulty has no place: every nation is to pronounce them according to the particular pronunciation that already obtains among them. All the difficulty is, the accustomed the pen and the eye to affix certain notions to characters that do not, at first sight, exhibit them. But this trouble is no more than we find in the study of any language whatever.

The inflections of words are here to be expressed by the common letters. For instance the same character shall express a silly or a colt, a horse or a mare, an old horse or an old mare, as accompanied with this or that distinctive letter, which shall show the sex, youth, maturity, or old age: a letter also to express the bigness or smallness of things; thus, &c., a man with this or that letter, to signify a great or a little, &c.

The use of these letters belongs to the grammar; which, once well understood, would abridge the vocabulary exceedingly. An advantage of this grammar is, that it would only have one declension and one conjugation: those numerous anomalies of grammarians are exceeding troublesome; and arise hence, that the common languages are governed by the populace, who never reason on what is best: but in the character here proposed, men of sense having the introduction of it, would have a new ground whereon to build regularly.

But the difficulty is not in inventing the most simple, easy, and commodious character, but in engaging the several nations to use it; there being nothing they agree less in, than the understanding and purposing their common interest.

3. Literal characters may again be divided, with respect to the nations among whom they have been invented, into Greek characters, Roman characters, Hebrew characters, &c. The Latin character now used through all Europe, was formed from the Greek, as the Greek was from the Phoenician; and the Phoenician, as
Characters as well as the Chaldee, Syriac, and Arabic characters, were formed from the ancient Hebrew, which suffered till the Babylonish captivity; for after that event the character of the Assyrians, which is the square Hebrew now in use, prevailed, the ancient being only found on some Hebrew medals, commonly called Samaritan medals. It was in 1601, that the Gothic characters, invented by Ulfilas, were abolished, and the Latin ones established in their room.

Medallists observe, that the Greek character, consisting only of majuscule letters, has preserved its uniformity on all medals, as low as the time of Gallienus, from which time it appears somewhat weaker and rounder; from the time of Constantine to Michael we find only Latin characters; after Michael, the Greek characters recommence; but from that time they began to alter with the language, which was a mixture of Greek and Latin. The Latin medals preserve both their character and language as low as the translation of the feast of the empire to Constantinople; towards the time of Decius the character began to lose its majuscule form; some time after it reappeared, and finished tolerably till the time of Julius, when it degenerated gradually into the Gothic. The rounder, then, and better formed a character is upon a medal, the fairer pretence it has to antiquity.

II. Numerical Characters, are characters used to express numbers, are either letters or figures.

The Arabic character, called also the common one, because it is used almost throughout Europe in all sorts of calculations, consists of these ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

The Roman numeral character consists of seven majuscule letters of the Roman alphabet, viz. I, V, X, L, C, D, M. The I denotes one, V five, X ten, L fifty, C a hundred, D five hundred, and M a thousand. The I repeated twice makes two, or M diminishes each by a hundred. The number LX denotes forty, XC ninety, and LX fifty. The C before D or M diminishes each by a hundred. The number five hundred is sometimes expressed by an I before a C inverted thus, CI, and instead of M, which signifies a thousand, an I is sometimes used between two C's, the one direct, and the other inverted, thus CI. The addition of C and I before or after raises CI by tens, thus, CCCCI expresses ten thousand. CCCXCI a hundred thousand. The Romans also expressed any number of thousands by a line drawn over any number of letters or a thousand; thus V denotes five thousand, IX, sixty thousand: if likewise M is one million, MM is two millions, &c.

The Greeks had three ways of expressing numbers: 1. Every letter, according to its place in the alphabet, denoted a number, from a, one, to o, twenty-four. 2. The alphabet was divided into eight units, one, two, three, &c.; into eight tens, a ten, a twenty, a thirty, &c.; and eight hundreds, one hundred, two hundred, three hundred, &c. 3. 1 stood for one, II five, A ten, H a hundred, X a thousand, M ten thousand; and when the letter II enclosed any of these, except I, it showed the enclosed letter to be five times greater.

The French Character is used in the chamber of accounts, and by persons concerned in the management of the revenue, is, properly speaking, nothing else than the Roman numerals, in letters that are not majuscule; thus, instead of expressing fifty-six by LVI, they denote it by smaller characters lv.

III. Characters of Abbreviations, &c. In several of the arts, are symbols contrived for the more concise and immediate conveyance of the knowledge of things. For the

Characters used in Algebra. See Algebra, Introduction.

Characters used in Astronomy, viz.

Of the Planets. See Plate LXII. fig. 19.

Of the Signs. Plate LXXXVI. fig. 158. & LXXXV. fig. 204.

Of the Signs.

\[ \begin{align*}
\theta & = \text{Trine} \\
\Sigma & = \text{Biquinule} \\
\chi & = \text{V} \\
\Psi & = \text{Quincuncx} \\
\eta & = \text{Opposition} \\
\Xi & = \text{Dragon's head} \\
\tau & = \text{Draco's tail}
\end{align*} \]

Of time.

A. M. ante meridiem, before the sun comes upon the meridian.

O. or N. noon.

P. M. post meridiem, when the sun is past the meridian.

Characters in Commerce.

\[ \begin{align*}
\text{D} & = \text{ditto, the same} \\
\text{N} & = \text{numeros, or number} \\
\text{F} & = \text{folio, or page}
\end{align*} \]

Characters in Chemistry.

See Pl. CXXXII. & CXXXIII.

Characters in Geometry and Trigonometry.

1. The character of or is equiangular, or similar rallellim.

\[ \begin{align*}
\triangle & = \text{equilateral} \\
\square & = \text{angle} \\
\text{rectangle} & = \text{right angle} \\
\text{circle} & = \text{perpendicular} \\
\text{degree} & = \text{45 degrees} \\
\text{minute} & = 15 minutes \\
\text{second} & = 30 minutes \\
\text{quadrant} & = \text{90 degrees} \\
\text{circle} & = \text{360 degrees}
\end{align*} \]

Characters in Grammar, Rhetoric, Poetry, &c.

( ) parenthesis. D. D. doctor in divinity.

\[ \text{The French Character} \]

\[ \text{hyphen} \]

V. D. Min. of the word of God.

\[ \text{apostrophe} \]

L. L. D. Doctor of Laws.

\[ \text{emphas or accent} \]

J. V. D. Doctor of Civil and Canon Law.

\[ \text{breve} \]

\[ \text{diaeresis} \]

\[ \text{caret and circumflex} \]

M. D. Doctor in physic.
CHARACTERS among the ancient Lawyers, and in ancient Inscriptions.

§ paragraphs, P. P. pater patriæ
§ digests, C. code
Sco. fenatus consulto, C. C. confules
E. extra, T. titulos
P. P. D. D. propria, peculia deductit
S. P. O. R. senatus popolulque Romanus

Characters in Medicine and Pharmacy.

R, recipe, M. manipulus, a hand
a, a, or ana, of each, P. a pugil
b a pound, or a pint, P. Æ. equal quantities
³ an ounce, S. A. according to art
½ a drachm, q. s. a sufficient quantity
ò a scruple or ½ of a half of any thing
cong. congius, a gallon, puleas
coch. cochlearia, a P. P. pulvis patrum, the spoonful
Tefuit’s bark.

Characters upon Tomb-stones.

S. V. Sille viator, i. e. Stop traveller.
M. S. Memorize factum, i. e. Sacred to the memory.

D. M. Dies manibus.

J. H. S. Jesu.

X. P. a character found in the catacombs, about the meaning of which authors are not agreed.

Characters used in Music, and of Musical Notes with their proportions, are as follows.

H character of a large crotchet
⅛ a long quaver
⅛ a breve semiquaver
⅛ a femibreve demisemiquaver
⅛ a minim

* character of a sharp note: this character at the beginning of a line or space, denotes that all the notes in that line are to be taken a semitone higher than in the natural series; and the same affects all the divas above and below, though not marked: but when prefixed to any particular note it shows that note alone to be taken a semitone higher than it would be without such character.

b or † character of a flat note: this is the contrary to the other above; that is, a semitone lower.

⅛ character of a natural note: when in a line or series of artificial notes, marked at the beginning b or †, the natural note happens to be required, it is denoted by this character

⅛ character of a treble cliff.
⅛ character of the mean cliff.
⅛ bass cliff.
⅛ or ⅛ characters of common duple time, signifying the measure of two croquettes to be equal to two notes, of which four make a semibreve.

C C D, characters that distinguish the movements of common time, the first implying flow, the second character quick, and the third very quick.

⅛, ⅛, ⅛, ⅛ characters of simple triple time, the measure of which is equal to three semibreves, or to three minims.

⅛, ⅛, ⅛, ⅛ or ⅛, characters of a mixed triple time, where the measure is equal to six croquettes, or six quavers.

⅛, ⅛, ⅛, ⅛ or ⅛, characters of that species of triple time called the measure of twelve times.

Character, in human life, that which is peculiar in the manners of any person, and distinguishes him from all others.

Good Character is particularly applied to that conduct which is regulated by virtue and religion; in an inferior but very common sense, it is understood of mere honesty of dealing between man and man. The importance of a good character in the commerce of life seems to be universally acknowledged. To those who are to make their own way either to wealth or honours, a good character is usually not less necessary than address and abilities. To transform the observation of an elegant morality: Though human nature is degenerate, and corrupts itself still more by its own inventions; yet it usually retains to the last an effect for excellence. But even if we are arrived at such an extreme degree of depravity as to have lost our native reverence for virtue; yet a regard to our own interest and safety, which we seldom lose, will lead us to apply for aid, in all important transactions, to men whose integrity is unimpeached. When we choose an alumnus, a partner, a servant, or first enquiry is concerning his character. When we have occasion for a counsellor or attorney, a physician or apothecary, whatever we may be ourselves, we always choose to trust our property and per sons to men of the best character. When we fix on the tradesmen who are to supply us with necessaries, we are not determined by the sign of the lamb, or the wolf, or the fox; nor by a shop fitted up in the most elegant taste, but by the fairest reputation. Look into a daily newspaper, and you will see, from the highest to the lowest rank, how important the characters of the employed appear to the employers. After the advertisement has enumerated the qualities required in the person wanted, there commonly follows, that none need apply who cannot bring an undeniable character. Offer yourself as a candidate for a seat in the legislature, be promoted to honour and emolument, or in any respect attract the attention of mankind upon yourself, and, if you are vulnerable in your character, you will be deeply wounded. This is a general testimony in favour of honesty, which no writings and no practices can possibly refute.

Young men, therefore, whose characters are yet unfixed, and who, consequentely, may render them just such as they will, ought to pay great attention to the first steps which they take on entrance into life. They are usually careless and inattentive to this object. They pursue their own plans with ardour, and neglect the opinions which others entertain of them. By some thoughtless action or expression, they suffer a mark to be impressed upon them, which scarcely any subsequent merit can entirely erase. Every man will find some person,
Character, fons, who, though they are not professed enemies, yet view him with an envious or a jealous eye, and who will gladly revive any tale to which truth has given the slightest foundation.

In this turbulent and confused scene, where our words and actions are often misunderstood, and too often misrepresented, it is indeed difficult even for innocence and integrity to avoid reproach, abuse, contempt, and hatred. These not only hurt our interest and impede our advancement in life, but also affect the feelings of a tender and delicate mind. It is then the part of wisdom first to do every thing in our power to preserve an irreproachable character, and then to let our happiness depend chiefly on the approbation of our own conceptions, and on the advancement of our interest in a world where liars shall not be believed, and where slanderers shall receive countenance from none but him who, in Greece, is called, by way of eminence, Diadoumén, or the calumniator.

Character, in poetry, particularly the epos and drama, is the result of the manners or peculiarities by which each person is distinguished from others.

The poetical character, says Mr. Boso, is not properly any particular virtue or quality, but a composition of several which are mixed together, in a different degree, according to the necessity of the tale and the unity of the action: there must be one, however, to reign over all the parts; and this must be found, in some degree, in every part. The first quality in Achilles, is valour; in Ulysses, dissimulation; and in Aeneas, mildness: but as these characters cannot be alone, they must be accompanied with others to embellish them, as far as they are capable, either by hiding their defects, as in the anger of Achilles, which is palliated by extraordinary valor; or by making them centre in some solid virtue, as in Ulysses, whose dissimulation makes a part of his prudence; and in Aeneas, whose mildness is employed in a submission to the will of the gods. In the making up of which union, it is to be observed, the poets have joined together such qualities as are by nature the most contrary to one another, valor with anger, prudence with dissimulation. The fable required prudence in Ulysses, and piety in Aeneas; in this, therefore, the poets were not left to their choice: but Homer might have made Achilles a coward without abating any thing from the justness of his fable: so that it was the necessity of adorning his character that obliged him to make him valiant: the character, then, of a hero in the epic poem, is compounded of three sorts of qualities; the first essential to the fable; the second, embellishments of the first; and valor, which supports the other two, makes the third.

Unity of character is as necessary as the unity of the fable. For this purpose a person should be the same from the beginning to the end: not that he is always to betray the fame sentiments, or one passion; but that he should never speak nor act inconsistently with his fundamental character. For instance, the weak may sometimes fall into a warmth, and the breath of the passionate be calm, a change which often introduces in the drama a very affecting variety; but if the natural disposition of the former was to be represented as boisterous, and that of the latter mild and soft, they would both act out of character, and contradict their persons.

True characters are such as we truly and really see in men, or may exist without any contradiction to nature: no man questions but there have been men as generous and as good as Aeneas, as passionate and as violent as Achilles, as prudent and wise as Ulysses, as impious and atheistical as Mezentius, and as amorous and passionate as Dido; all these characters, therefore, are true, and nothing but just imitations of nature. On the contrary, a character is false when an author so feigns it, that one can see nothing like it in the order of nature wherein he designs it shall stand: these characters should be wholly excluded from a poem, because transcending the bounds of probability and reason, they meet with no belief from the readers; they are fictions of the poet's brain, not imitations of nature; and yet all poetry consists in an imitation of nature.

Character is also used for certain visible qualities, which claim respect or reverence to those vested therewith.—The majesty of kings gives them a character which procures respect from the people. A bishop should sustain his character by learning and solid piety, rather than by worldly lustre, &c. The law of nations secures the character of an ambassador from all insult.

Character, among naturalists, is synonymous with the definition of the genera of animals, plants, &c.

Characteristic, in the general, is that which characterizes a thing or person, i.e. constitutes its character, whereby it is distinguished. See Character.

Characteristic is peculiarly used in grammar, for the principal letter of a word: which is preferred in most of its tenses and moods, its derivatives and compounds.

Characteristic of a Logarithm, is its index or exponent. See Logarithm.

Characteristic Triangle of a Curve, in the higher geometry, is a rectilinear right-angled triangle, whose hypotenuse makes a part of the curve, not feemingly different from a right-line. It is so called, because curve lines are used to be distinguished hereby. See Curve.

Charade, the name of a new species of composition or literary amusement. It owes its name to the idler who invented it. Its subject must be a word of two syllables, each forming a distinct word; and these two syllables are to be concealed in an enigmatical description, first separately, and then together. The exercise of charades, if not greatly instructive, is at least innocent and amusing. At all events, as it has made its way into every fashionable circle, and has employed even Garrick, it will scarcely be deemed unworthy of attention. The fillinies indeed of most that have appeared in the papers under this title, are not only delitute of all pleasantery in the stating, but are formed in general of words utterly unfit for the purpose. They have therefore been treated with the contempt they deserved. In trifles of this nature, inaccuracy is without excuse. The following examples therefore are at least free from this blemish.

I.

My first, however here abused,
Delights the sex alone;
In Cambria, such is cumb’s pow’r,
’Tis Jenkin, John, or Joan.
frequent our shores in the summer, but are not numerous. They lay four eggs, of a dull whitish colour, sparingly sprinkled with black: at the approach of winter they disappear.

2. The Alexandrinus, or Alexandrian Dotterel, is of a brownish colour, with the forehead, collar, and belly white; the prime tail-feathers on both sides are white; and the legs are black. It is about the size of a lark, and lives upon insects.

3. The Vociferous, or Noisy Plover of Cateby, has black streaks on the breast, neck, forehead, and cheeks; and the feet are yellow. It is a native of North America.

4. The Egypcia, has a black streak on the breast, white eye-brows, the prime tail-feathers streaked with black at the points, and bluish legs. It is found in the plains of Egypt, and feeds on insects.

5. The Morinellus has an iron-coloured breast, a small white streak on the breast and eye-brows, and black legs. It is the Dotterel of Ray, and a native of Europe. They are found in Cambridge-shire, Lincolnshire, and Derbyshire; on Lincoln-heath, and on the moors of Derbyshire, they are migratory; appearing there in small flocks of eight or ten only in the latter end of April, and stay there all May and part of June, during which time they are very fat, and much esteemed for their delicate flavour. In the months of April and September, they are taken on the Wiltshire and Berkshire downs; they are also found in the beginning of the former month on the sea-side at Measles in Lancashire, and continue there about three weeks, attending the barley fallows: from thence they remove northward to a place called Leyton Haws, and stay there about a fortnight; but where they breed, or where they refuse during the winter, we have not been able to discover. They are reckoned very foolish birds, so that a dull fellow is proverbially flyled a dotterel. They were also believed to mimic the action of theowler, stretching out a wing when he stretches out an arm, &c., continuing their imitation, regardless of the net that is spreading for them.

6. The Apriarius has a black belly; the body is brown, and variegated with white and yellow spots; and the legs are ash-coloured. It is the spotted Plover of Edwards, and a native of Canada.

7. The Pluvialis is black above, with green spots, white underneath, and the feet are ash-coloured. It is the green plover of Ray, and is a native of Europe. They lay four eggs, sharply pointed at the shorter end, of a dirty white colour, and irregularly marked, especially at the thicker end, with blotches and spots. It breeds on several unfrequented mountains of Scotland; and is very common on these of the Isle of Rum, and others of the loftier Hebrides. They make a thrilling whistling noise; and may be enticed within a shot by a skilful imitator of the note.

8. The Torquatus has a black breast, and a white front; the top of the head and the collar is black; and the beak and feet are bluish. It is a native of St Domingo.

9. The Calidris has black feet, and a black bill; the rump is greyish; and the body is pure white below. It frequents the shores of Europe.

10. The Oedicmenus or Stone-curlew of Ray, is of a grey-colour, with two of the prime wing-feathers black, but white in the middle: it has a sharp bill, and
and as the other Jews are remarkable for their eyes, so are those for their large noses, which run through all the families of this feet. These are the ancient Ephenes. They strictly observe the five books of Moses, according to the letter; and receive no written traditions. It is said that the other Jews would join the Charaimis; but those not having obeyed the exact rules of the law with regard to divorcements, these think they live in adultery.

CHARANTIA, in botany. See MOMORDICA.

CHARBON, in the manage, that little black spot or mark which remains after a large spot in the cavity of the corner teeth of a horse; about the seventh or eighth year, when the cavity fills up, the tooth being smooth and equal, it is said to be rafed.

CHARCAS, the southern division of Peru in South America, remarkable for the silver mines of Potosi.

CHARCOAL, a sort of artificial coal, or fuel, consisting of wood half burnt; chiefly used where a clear strong fire, without smoke, is required; the humidity of the wood being here moistly dissipated, and exhaled in the fire wherein it is prepared.

The microscope discovers a surprising number of pores in charcoal; they are disposed in order, and traverse it lengthwise; so that there is no piece of charcoal, how long forever, but may be easily blown through. If a piece be broken pretty short, it may be seen through with a microscope. In a range the 18th part of an inch long, Dr Hook reckoned 150 pores; whence he concludes, that in a charcoal of an inch diameter, there are no less than 5,724,000 pores. It is to this prodigious number of pores, that the blackness of charcoal is owing; for the rays of light striking on the charcoal, are received and absorbed in its pores, instead of being reflected; whence the body must of necessity appear black, blackness in a body being no more than a want of reflection. Charcoal was anciently used to distinguish the bounds of estates and inheritances; as being incorruptible, when let very deep within ground. In effect, it preserves itself so long, that there are many pieces found entire in the ancient tombs of the northern nations. M. Dodart says, there is charcoal made of corn, probably as old as the days of Cæsar: he adds, that it has kept so well, that the wheat may be still distinguished from the rye; which he looks on as proof of its incorruptibility.

The operation of charring wood, is performed in the following manner: The wood intended for this purpose is cut into proper lengths, and piled up in heaps near the place where the charcoal is intended to be made: when a sufficient quantity of wood is thus prepared, they begin constructing their stacks, for which there are three methods. The first is this: They level a proper spot of ground, of about twelve or fifteen feet in diameter, near the piles of wood; in the centre of this area a large billet of wood, split across at one end and pointed at the other, is fixed with its pointed extremity in the earth, and two pieces of wood inserted through the clefts of the other end, forming four right angles; against these crofs pieces four other billets of wood are placed, one end on the ground, and the other leaning against the angles. This being finished, a number of large and straight billets
Charcoal. billets are laid on the ground to form a floor, each being as it were the radius of the circular area; on this floor a proper quantity of bruish or small wood is strewn, in order to fill up the interstices, when the floor will be complete; and in order to keep the billets in the same order and position in which they were first arranged, pegs or slumps are driven into the ground in the circumference of the circle, about a foot distant from one another: upon this floor a flage is built with billets set upon one end, but something inclining towards the central billet; and on the tops of these another floor is laid in a horizontal direction, but of shorter billets, as the whole is, when finished, to form a cone.

The second method of building the stacks for making charcoal is performed in this manner: A long pole is erected in the centre of the area above described, and several small billets ranged round the pole on their ends: the interstices between these billets and the pole is filled with dry bruish-wood, then a floor is laid, on that a flage in a reclining position, and on that a fourth floor, &c. in the same manner as described above; but in the lower floor there is a billet larger and longer than the rest, extending from the central pole to some distance beyond the circumference of the circle.

The third method is this: A chimney, or aperture of a square form, is built with billets in the centre, from the bottom to the top; and round these, floors and inclined stages are erected, in the same manner as in the stacks above described, except that the base of this instead of being circular like the others, is square; and the whole stack, when completed, forms a pyramid.

The stack of either form being thus finished, is coated over with turf, and the surface plastered with a mixture of earth and charcoal-dust, well tempered together.

The next operation is the setting the stack on fire. In order to this, if it be formed according to the first construction, the central billet in the upper stage is drawn out, and some pieces of very dry and combustible wood are placed in the void space, called, by workmen, the chimney, and fire set to these pieces. If the stack be built according to the second construction, the central pole is drawn out, together with the large horizontal billet above described; and the void space occupied by the latter being filled with pieces of very dry combustible wood, the fire is applied to it at the base of the stack. With regard to the third construction, the square aperture or chimney is filled with small pieces of very dry wood, and the fire applied to it at the top or apex of the pyramidal stack. When the stack is set on fire, either at the top or bottom, the greatest attention is necessary in the workman; for in the proper management of the fire the chief difficulty attending the art of making good charcoal consists. In order to this, care is taken, as soon as the flame begins to issue some height above the chimney, that the aperture be covered with a piece of turf, but not so close as to hinder the smoke from passing out; and when the fire in a reclining position first appears to rise up out of the interstices that are formed at any part of the pile, the aperture must be covered with a mixture of earth and charcoal dust. At the same time, as it is necessary that every part of the stack should be equally burnt, it will be requisite for the workman to open vents in one part and shut them in another. In this manner the fire must be kept up till the charcoal be sufficiently burnt, which will happen in about two days and a half, if the wood be dry; but if green the operation will not be finished in less than three days. When the charcoal is thought to be sufficiently burnt, which is easily known from the appearance of the smoke, and the flames no longer issuing with impetuosity through the vents; all the apertures are to be closed up very carefully with a mixture of earth and charcoal-dust, which by excluding all access of the external air, prevents the coals from being any further consumed, and the fire goes out of itself. In this condition it is suffered to remain, till the whole is sufficiently cooled; when the cover is removed and the charcoal is taken away. If the whole process is skilfully managed, the coals will exactly retain the figure of the pieces of wood: some are said to have been so dexterous as to char an arrow without altering even the figure of the fletching.

There are considerable differences in the coals of different vegetables, in regard to their habit to fire: the very light coals of linen, cotton, some fungi, &c. readily catch fire from a spark, and soon burn out; but of the dene ones of woods and roots are set on fire more difficulty, and burn more slowly: the coals of the black berry-bearing alder, of the hazel, the willow, and the lime-tree, are said to answer best for the making of gunpowder and other pyrotechnical compositions, perhaps from their being easily inflammable: for the reduction of metallic calces those of the heavier woods, as the oak and the beech, are preferable, these seeming to contain a larger proportion of the phlogistic principle, and that perhaps, in more fixed states: considered as common fuel, those of the heavy woods give the greatest heat, and require the most plentiful supply of air to keep them burning; those of the light woods preserve a glowing heat, without much draught of air, till the coals themselves are consumed; the bark commonly crackles and flies about in burning, which the coal of the wood itself very seldom does.

Mathematical instrument makers, engravers, &c. find charcoal of great use to polish their brass and copper-plates after they have been rubbed clean with powdered pumice-stone. Plates of horn are polished in the same way, and a gloss may be afterwards given with tripoli.

The coals of different substances are also used as pigments; hence the bone-black, ivory-black, &c. of the floups. Most of the paints of this kind, besides their incorruptibility, have the advantage of a full colour, and work freely in all the forms in which powdery pigments are applied; provided they have been carefully prepared, by thoroughly burning the subject in a close vessel, and afterwards grinding the coal into a powder of due fineness. Pieces of charcoal are used also in their entire state for tracing the outlines of drawing &c. in which intention they have an excellence, that their mark is easily wiped out. For these purposes, either the finer pieces of common charcoal are picked out and cut to a proper shape; or the pencils are formed of wood, and afterwards burnt into charcoal in a proper vessel well covered. The artists commonly make choice of the smaller branches of the tree freed from the bark and pitch; and the willow and vine
Charcoal. 

vines are preferred to all others. This choice is confirmed by the experiments of Dr Lewis who has found that the wood of the trunks of trees produces charcoal of a harder nature than their small twigs or branches; and the hard woods, such as box and guaiacum, produced coals very feebly harder than the softer woods. Willow he prefers to all others. The shells and bones of fruits yielded coals so hard that they would scarce mark on paper at all; while the coals of the kernels of fruits were quite soft and mellow. The several coals produced by the doctor's experiments were levigated into fine powder, mixed both with gum-water and oil, and applied as paints both thin and thick, and diluted with different degrees of white. All of them, when laid on thick, appeared of a strong full black, nor could it be judged that one was of a finer colour than another; diluted with white, or when spread thin, they had all somewhat of a bluish cast.

Horns and the bones both of fishes and land-animals, gave coals rather glossier and deeper-coloured than vegetables; and which, in general were very hard, so as difficulty, or not at all, to stain paper. Here also the hardness of the coal seemed to depend on that of the subject from whence it was prepared; for silky, woolen, leather, blood, and the flesh parts of animals, yielded soft coals, some of these differed from others very feebly in colour; that of ivory is superior to all the rest, and indubitably the finest of all the charcoal blacks. The animal coals had much less of the bluish cast in them than the vegetable, many of them inclining rather to a brown. Charred pit-coal, on the other hand, seemed to have this blueness in a greater degree.

Charcoal is not soluble in any of the acids; but may be dissolved in considerable quantities by a solution of *hepar fulphuris*, to which it communicates a green colour. Melted with colourless fruits or glases, it gives a pale yellow, dark yellow, reddish, brownish, or blackish colour, according as the inflammable matter is in greater or less proportion; the phlogiston, or inflammable matter of the coal seeming to be the direct tinging substance. When the phlogistic matter is thus diffused through glases, it is no more affected by continued strong fire than charcoal is when excluded from the air.

The vapour of burning charcoal is found to be highly noxious, being no other than fixd air. How this affects the animal system is explained under the article Blood.

From some late experiments it appears, that charcoal poisons many extraordinary properties altogether unsupected by former chemists. It has particularly a great attraction for what is called the phlogiston, or rather for any kind of oily matter with which other substances may be allied; so that it now promises to be very useful in the arts in various ways never thought of before. M. Lowitz has found that it is useful in preparing crystals of tartar of a very white colour; and that the marine and nitrous acids are decomposed by being distilled upon it; the red juices of vegetable fruits are discoloured, without losing any of their acidity; brown rancid oils are rendered sweet and clear by agitating them for some days with charcoal in powder; it changes the smell of putrid vegetables to that of a pure volatile alkali, and it produces the same effect on fresh meat. On boiling in powder with honey, the pure saccharine parts of the latter are laid to be separated, and the honey to become a well-tasted sugar; the purification of real sugar is also laid to be facilitated by the same method. Thus also the mother-water of the Protian alkali and of the tartaraceous acid are made to crystallize easily; terra folia tartari may be made white without calcination, by previously diffusing the vinegar from coals. Vinegar concentrated by freezing, and diffused from a large proportion of powdered coal, is extremely strong, pure, and fragrant. Corn spirit merely shaken with coal loses its bad flavour; and if honey is added, it becomes a sweet and pleasant liquor. Even when ardent spirits are impregnated with any vegetable oils, the flavour is destroyed in this way; and if the spirit be distilled the residuum is said not to be brown; so that if the distillation is carried too far, no inconvenience ensues. With Peruvian bark, a clear decoction was formed, and the residuum was a salt, in taste like digestive salt. These effects were produced by every kind of coal, whether fol­filed or charred vegetable substances.

Charcoal has lately been separated from the pure spirit of wine in the process for making ether*, and by M. Lavoisier is supposed to be of the confi­tulent parts or elements of that very volatile liquid. But the most extraordinary modern discovery concerning this substance is that of Dr Priestley, who has found that several of the metals may be converted into charcoal by passing the steam of spirit of wine over them when red-hot; and this, by way of distillation, he calls the charcoal of metals.

This surprising discovery was made accidentally, while the Doctor was repeating the experiments by which Mr Lavoisier imagined water might be converted into air. Having transmitted the steam of water through a copper tube, on which it had no effect, he was willing to try the effects of that of other fluids; and for this purpose made choice of spirit of wine, having before procured inflammable air by sending the same steam through a red-hot tobacco-pipe. No sooner had the vapour of this fluid, however, touched the red-hot copper, than he was astonished at the rapid production of air from it, which resembled the blowing of a pair of bellows; and before four ounces of the spirit were expended, the tube was found to be perforated in two or three places. In a moment afterwards it was so far destroyed, that it fell to pieces on attempting to remove it from the fire; the inside being filled with a black matter resembling lamp-black. Having now recourse to earthen tubes, the Doctor found that, by melting copper and other metals in them, and transmitting the vapour of spirit of wine in contact with them while in a state of ignition, different substances were formed according to the metals employed. On sending three ounce-measures of spirit of wine over two ounces of copper, the metal lost 28 grains of its weight, and 446 grains of charcoal were procured, chiefly in the form of powder, though some of it was in large flakes several inches long; having separated at once from the surface of the melted metal. These pieces were almost quite black, and bore handling without any danger of being broken. In another experiment 138 grains of charcoal were obtained from 10 grains of copper; but here the metal had been previously re­duced
Charcoal was indisputable by any other means than burning in an open fire, though of late it is found totally dissilable and convertible into inflammable air, by the heat of a burning lens in vacuo, at least with the sufficiency of a small quantity of water. By burning in dephlogisticated air, it is found to convert almost the whole of it into fixed air. See *Aerology*, p. 110—113, 129, 131. From the experiments there related, it is now evident, that charcoal as such, and without any decomposition, is an ingredient in both those aerial fluids, and is indeed the phlogiston of Stahl so long sought in vain. This discovery, however, has not by any means put an end to the disputes between the Phlogistians and Antiphlogistians, though it certainly ought to have done so, and must assuredly do so in a short time. The experiments of Dr Priestley are not doubted; and charcoal, the gravitating matter of light inflammable air, and phlogiston, are allowed to be the same by the Antiphlogistians as well as by the opposite party. "The present controversy (says Mr Higgins) among the philosophers depends upon the following questions: 1. Whether water be or be not composed of dephlogisticated and light inflammable phlogiston? 2. Whether or no the condensation of dephlogisticated air, or its union to different bodies, does not depend upon one principle, common to all combustible bodies? or, in other words, whether or no all bodies which burn or calcine, such as sulphur, phosphorus, charcoal, oils, metals, phlogisticated air, &c. contain the matter of light inflammable air as one of their constituent principles? One should suppose, if these substances were composed of two principles, namely a peculiar basis, and the matter of light inflammable air or phlogiston, that it would be possible to resolve them into these principles; more especially when we consider the great attraction of the matter of light inflammable air to fire; but the maintainers of phlogiston have not as yet been able to do this," &c.

The limits of this work will not allow us to enter on a full discussion of this controversy, nor can we pretend to be able to settle the disputes on the subject. It nevertheless seems somewhat unnatural to call iron, lead, copper, sulphur, phosphorus, &c. simple and unchangeable bodies, or if we please elements; as thus the number of elementary bodies might be increased without number, and water, which has generally been reckoned a simple one, supposed to be almost the only compound body in nature. It is also certain, that Dr Priestley has made some very striking and apparently decisive experiments on the subject of metals, to which no proper reply has ever been made. In order to see the force of these experiments, however, we must still observe, that, according to the Phlogistians, the calces of metals are reduced, on the addition of charcoal, not only by emitting the dephlogisticated air which adheres to them when in the form of calces, but by the admission of a quantity of the charcoal itself into their substance. This the Antiphlogistians deny; and though they admit the necessity of charcoal in the operation, yet they affirm that it acts only by attracting the dephlogisticated air contained in the calx, with which it forms fixed air; and hence they must say, that in all metallic reductions a quantity of fixed air is produced, equivalent not only to the weight of the charcoal employed, but also to that of the dephlogisticated air.
Charcoal, contained in the calx. The decisive experiment therefore would be, to expel from a metallic calx all the air it contained, to weigh it exactly in that state, and then observe whether it gained any thing in weight by being reduced to a metal. This, however, has not been done; and the Antiphlogistians complain that their adverse faction has not been able to produce a metallic calx free from all kind of aerial vapour. But though it is not pretended that any such calx has yet been produced, if the Phlogistians can show the possibility of reducing a calx without the production of fixed air, it would seem to be equally destructive of the antiphlogistic doctrine. This appears to have been done by Dr Priestley in the experiments above alluded to; and it is even doubtful whether he did not obtain the so much defir’d calx, viz. one perfectly free from air altogether. I put (says he) upon a piece of broken crucible, which could yield no air, a quantity of minium, out of which all air had been extricated; and placing it upon a convenient stand, introduced it into a large receiver filled with inflammable air confined by water. As soon as the minium was dry, by means of the heat thrown upon it, I observed that it became black, and then ran in the form of flame, which I began the production of minium, all the more directly. To judge of its degree of inflammability, I converted into fixable air by the electric spark. Hence we may conclude, that not a particle of charcoal entered into the constitution of the revived lead, but must have been wholly converted into fixable air.

To this experiment, however, the Phlogistians will reply, that so far from being decisive on the subject, no conclusion whatever can be drawn from it, on account of its enormous inaccuracy. The quantity of matter put into the retort was 7680 or 7200 grains, and the whole produce was 3883 + 384 + 8.704 + 0.911 = 4330.615 grains: a deficiency therefore of no less than 346.385 grains is to be accounted for; and of this we hear not one word; so that we are at liberty to suppose that the vitrified litharge had perforated the retort in such a manner as to admit the fresh and phlogisiticated air to without, as Dr Priestley found earthen retorts pervious to air from without; and this, though coated, might by a corrosion of the glass (if it was a glass one) be reduced to a similar fitation.

We do not mean that this should be reckoned a formal answer to Dr Higgins’s experiment; all we intend here, is to state the arguments fairly on both sides, so that the reader who has not an opportunity of making experiments himself, may be able to judge on which side the truth lies. Dr Priestley informs us, that in his experiment, the calx of lead absorbed a quantity of inflammable air without the extrication of fixed air, or any thing else that could be perceived. Whether or not we have reason to conclude from thence, that
that the gravitating, solid, or coaly, part of the inflammable air was received into the calx, and became part of the revived metal? In Dr Higgins's experiment a quantity of elastic fluid was produced, and a quantity of lead revived; but we neither know how much of the calx went to this lead, how much the li- 

charge had originally attracted from the air, nor whether the elastic fluids were certainly produced; or indeed whether any of them, the small quantity of dephlogi- 
ficited air alone excepted, came from the materials or not. From such a state of the cafe, then, have we

reason to "conclude, that not a particle of charcoal entered into the constitution of the lead?"

We shall next consider an experiment made by Mr Higgins himself, and which he likewise considers as decisive against the Phlogistians. I introduced (says he) some iron nails, free from rust, into strong volatile vitriolic acid; when it stood for a few minutes, it acquired a milky appearance, and the solution went on without ebullition or extraction of air. On standing for a few hours, the solution acquired a darkish colour, and a black powder was precipitated. This powder, when collected and washed, put on red hot iron, burned partly like sulphur and partly like charcoal dust, and the incombustible residuum was of a purplish colour. The filtered solution was perfectly neutralized, and free from the leaf sulphureous pun- 
gency. Its taste was strongly chalybeate, but not so disagreeable as that of the solution of iron in the perfect vitriolic acid, or in any of the mineral acids. Nitrous acid dropped into the solution instantly produced a cloud, which immediately disappeared without e-
bullition, though volatile sulphureous acid was exi-

ticated in its ursuof degree of pungency. The vitri-
olic, marine, and acetic acids, decomposed this solu-
tion, but caufed no turbidnefs, nor was any inflammable air produced.

In order to know whether the sulphur was dis-
engaged from the volatile sulphureous acid or the iron, I poured marine acid on the fame nails, when light inflammable air and hepatic air were copiously produ-
ced, and likewise sulphur was produced in its crude flate. When I used vitriolic or the nitrous acid, no sulphur was produced. I tried different nails, and likewise in its fliings, with the fame reftult. These facts convinced me that the sulphur came from the iron; but that all forts of iron contain sulphur is what I cannot pretend to know, as I have not tried fteel, or va-

rieties enough of malleable iron. However, I have 

strong reasons to fuppofe, that sulphur has more to do in the different properties of iron than we are aware of. That iron should contain sulphur, notwithstanding the different proceedes it muft necessarily undergo before it acquires malleability, confidering the volatility of sul-
phur, points out the force of their attraction to one another; and the separation of this again by volatile sulphureous acid, shows likewise the greater attraction of iron to sulphur and dephlogi- 
ficited air jointly. That volatile sulphureous acid fhould diflolve iron without the extraction of inflammable air or phlogi-

fion, is a very strong inftance of the falsity of the phlogiftic doctrine. A small quantity of inflammable air is produced, but it is fo trifling comparatively to what should be produced from the quantity of iron dif- 

olved, that it is hardly worth noticing; and in my opinion proceeds from a portion of perfect vitriolic acid, which is generally infeeparable from the volatile acid. If volatile vitriolic acid were a compound of phlogifon, a certain basis, and dephlogi- 

cificated air, a greater quantity of inflammable air fhould have been difengaged during the folution of iron in this acid than when the perfect vitriolic acid is used. Let us even fuppofe volatile sulphureous acid to be compofed of the basis of sulphur, phlogifon, and dephlogi-
cificated air, which is the opinion of all the phlogiftians, though they differ with refpect to the modification of the fteer three principles; and likewise iron to be compofed of a certain basis and phlogifon; I would ask the Phlo-

giftians, What becomes of the phlogifon of the iron during its folution?"

But however much Mr Higgins may be convinced, from this experiment, of the fallacy of the phlogiftic doctrine, his adversaries instead of being fcelenized, will urge his own experiment againft him. He owns, that during the folution something was feparated of a black colour, and which burned like charcoal dust. Unless therefore Mr Higgins fhall prove the contrary, they will fay that this was the real phlogifon or charcoal which entered into the fubfance of the metal; and that it appeared in its native form, because the volatile vitriolic acid had not specific or latent heat fufficient to convert it into inflammable air. At any rate, it was incumbent on Mr Higgins to have accounted for the coaly part of his residue as well as the sulphureous one; yet he has been at considerable pains to deduce the latter from the iron, without speaking a word about the former. Indeed whether he deduced this from the iron or the vitriolic acid, it will make equally againft him; for his principles do not allow that the volatile vitriolic acid contains any charcoal. That the latter really does so, however, appears from an experiment of Dr Priestley, in which he reduced a calx of lead by means of vitriolic acid air, the fame with the vitriolic or volatile sulphureous acid. It is true, that only a small quantity of metal was then procured; but however small this was, the Antiphlogiftians do not pretend that metals can be reduced to their metallic flate in any quantity, except by the mediation of char-
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coal. Thus it appears, that with regard to metals the dif-

pute is as yet far enough from being decided in fa-

vour of the Antiphlogiftians. Their caufe is equally doubtfull with regard to sulphur and phosphorus, both of which Dr Priestley has produced by heating vitri-
olic and phlogifonic acid in inflammable air. Indeed, by two experiments one of which I gave more particular attention, fix ounce-meafures and an half of the dephlogi- 
ficated air were reduced to about two ounce-meafures, and one-fifth of this was fixed air." Now, though the Doctor inferred from this, that fixed air was compofed of phlogifon and dephlogi-
cificated air, on the supposition of sulphur containing phlogifon; yet admitting from other proofs, that fixed air is compofed of these two principles, the experi-

ment
In the Chemie of Mr. Cavendish, charcoal, in a certain extent of the veifel, which he found, after expounding them, that the product of water fell far short of the weight of both airs, and he observed a dense vapour after every explosion, which soon condensed, and adhered in a solid flat to the sides of the vessel, which he found afterwards to be the nitrous acid. To this Mr Higgins adds, that the airs ought to have been accurately weighed after abstracting the water from them, when (he supposes) the weight of water produced would have equalled them. This indeed ought to have been done; but Mr Higgins, or some Antiphlogiſt, ought to have done it before he decided positively in favour of the opposite doctrine. At any rate, it cannot be pretended, that in any experiment, let the circumstances of it be what they would, the quantity of water produced ever equalled that of the two airs. It is evident, therefore, that till this shall have some how or other be cleared up, the matter must remain uncertain. That the pureft water we can obtain always contains phlogiſtion, is what no Phlogiſt denies; that it essentially belongs to it is doubtful, though indeed it must be probable, that it does fo until experiments shew the contrary. Mr Cavendish supposes that dephlogiſicated air and dephlogiſicated water may be the fame; and indeed this would seem to be almoſt certain, were it not for a circumstance taken notice of by Mr Higgins, viz. that in the firing of iron in dephlogiſicated air the latter appears to be totally absorbed; though it is certain, that a quantity of undecompoſed water enters into its composition.

How far this circumstance throws any obfcurity on the matter the reader muft determine. For a more full investigation of the subject, however, we muft refer to the article Water; and in the mean time we fhall difmit the article with a few obervations on the composition of charcoal.

From the days of Stahl till very lately, the component parts of this Subftance have been reckoned a certain kind of earth combined with what was called phlogiſtion. The late experiments of Dr Prieflley have shown, that this doctrine is erroneous, and that charcoal is wholly difpofable into vapour. "On the whole, says the translator of Wiegľeb's Chemie, charcoal appears from the experiments of Lavoifier and Barhollet, to be an oil depraved of its inflammable gas. But coal of wood (or common charcoal) likewife contains fixed alkali, which the foot (or the coal of oil) does not, but instead of this exhibits volatile alkali. The fixed alkali of the former proceeds from the plant itself, and this, in the cafe of foot, is joined with inflammable gas, and forms volatile alkali, the earthly part being left behind, as happens when this latter is prepared from fixed alkali. Genuine charcoal, therefore, consists of this vegetable principle, united with a little fixed alkali and part of the phlogiſtion that constituted the oil of the plant of which it is made; for some of this principle is carried off, together with the hydrophlogie (a), in the form of inflammable gas, if diftilled in clofe veifels; but if burned in the open air, the hydrophlogie unites with the pure part of the air, and forms water. From these obervations, as well as from the experiments and obervations of M. Berthollet, in the Mem. de l'Acad. des Sciences pour 1780, p. 33. et seq. it appears, that common charcoal consists of the vegetable principle, some phlogiſtion, fixed alkali, and no inflammable gas."

Comparative Phier., P. 3.

On this article AEROLOGY, n° 81., we have quoted Dr Prieflley as favouring the doctrine of the decomposition of water; and in Mr Higgins's work we find him quoted as opposing it. "Dr Prieflley (says he) supposes that the water produced by the condensation of inflammable and dephlogiſicated air, is only what was suspended and attached to them in their effufion, which foon condenſed, and adhered in a folid flat to the sides of the veifel, which he found afterwards to be the nitrous acid. To this Mr Higgins adds, that the airs ought to have been accurately weighed after abstracting the water from them, when (he supposes) the weight of water produced would have equalled them. This indeed ought to have been done; but Mr Higgins, or some Antiphlogiſt, ought to have done it before he decided positively in favour of the opposite doctrine. At any rate, it cannot be pretended, that in any experiment, let the circumstances of it be what they would, the quantity of water produced ever equalled that of the two airs. It is evident, therefore, that till this shall have some how or other be cleared up, the matter must remain uncertain. That the pureft water we can obtain always contains phlogiſtion, is what no Phlogiſt denies; that it essentially belongs to it is doubtful, though indeed it must be probable, that it does fo until experiments shew the contrary. Mr Cavendish supposes that dephlogiſicated air and dephlogiſicated water may be the fame; and indeed this would seem to be almoſt certain, were it not for a circumstance taken notice of by Mr Higgins, viz. that in the firing of iron in dephlogiſicated air the latter appears to be totally absorbed; though it is certain, that a quantity of undecompoſed water enters into its composition.

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How far this circumstance throws any obscurity on the matter the reader must determine. For a more full investigation of the subject, however, we must refer to the article Water; and in the mean time we shall dismiss the article with a few observations on the composition of charcoal.

From the days of Stahl till very lately, the component parts of this substance have been reckoned a certain kind of earth combined with what was called phlogiſtion. The late experiments of Dr Prieflley have shown, that this doctrine is erroneous, and that charcoal is wholly dispoſable into vapour. "On the whole, says the translator of Wiegľeb's Chemie, charcoal appears from the experiments of Lavoifier and Barhollet, to be an oil deprived of its inflammable gas. But coal of wood (or common charcoal) likewise contains fixed alkali, which the foot (or the coal of oil) does not, but instead of this exhibits volatile alkali. The fixed alkali of the former proceeds from the plant itself, and this, in the case of foot, is joined with inflammable gas, and forms volatile alkali, the earthly part being left behind, as happens when this latter is prepared from fixed alkali. Genuine charcoal, therefore, consists of this vegetable principle, united with a little fixed alkali and part of the phlogiſtion that constituted the oil of the plant of which it is made; for some of this principle is carried off, together with the hydrophlogie (a), in the form of inflammable gas, if distilled in close vessels; but if burned in the open air, the hydrophlogie unites with the pure part of the air, and forms water. From these considerations, as well as from the experiments and observations of M. Berthollet, in the Mem. de l'Acad. des Sciences pour 1780, p. 33. et seq. it appears, that common charcoal consists of the vegetable principle, some phlogiſtion, fixed alkali, and no inflammable gas."

On this occasion indeed he acknowledges, that some very minute particles of ashes were observed, which could not have amounted to a single grain from many pounds of wood. Even these, according to what he observes in the same place, may be supposed to have come from the small quantity of air in the receiver; and it is to be wished that the Doctor would repeat the experiment in one of those perfect vacuums through which the electric fluid cannot be made to pass. From undisputed experiments, however, it appears, that charcoal cannot be decomposed by mere heat; as in vacuo it is dispoſed into inflammable air; and

(a) See Engel. Vol. I. p. 160, col. 1. where, in lines 18, 19, from the top, read precipitate for charcoal.

(b) A word used by Mr Wiegľeb, as far as we can comprehend the author's meaning, for one of the component parts of water. See his General System of Chemie, translated by Hopfon, p. 59.
Charcoal, and this, on presenting a proper substance to attract the gild part again discover itself, by its blackness, to be real charcoal. As little does it appear destructible by burning in the open air; for though some ashes are left, it appears probable that those differ from the coal itself in nothing but having a quantity of air attached to them. By far the greatest part of it, even in the common way of burning, is converted into fixed air; and from that it may again be separated by taking the electric spark in that fluid, when it is resolved into very pure dephlogisticated and inflammable air. The same separation may be effected by merely heating iron in fixed air; in which case the dephlogisticated part will unite to the iron, and the coal part, together with part of the phlogiston of the metal, are converted into inflammable air. From all these, and other considerations, a suspicion is induced, that the matter of charcoal is not different from the element of earth itself; and that, according to the different modifications of this substance, it either appears as coal, ashes, earth of various kinds, or even metals. This receives some confirmation from the following experiments of Mr Watt, related in the 74th volume of the Philosophical Transactions: "I dissolved (says he) magnesia alba, calcareous earth, and minimum, in nitrous acid dephlogisticated by boiling, and diluted with proper proportions of water. I made use of glass retorts coated with clay; and I received the air in glass vessels, whose mouths wereimmered in a glazed earthen bason containing the smallest quantity of water that could be used for the purpose. As soon as the retort was heated a little above the degree of boiling water, the solutions began to distil watery vapours containing nitrous acid. Soon after these vapours ceased, yellow fumes, and, in some of the cafes, dark red fumes, began to appear in the neck of the retort; and, at the same time, there was a production of dephlogisticated air, which was greater in quantity from some of these mixtures than from others, but continued in all of them until the substances were reduced to dryness. I found in the receiving water, &c. very near the whole of the nitrous acid used for their solution, but highly dephlogisticated, so as to emit nitrous air by the application of heat; and there is reason to believe, that with more precaution the whole might have been obtained. As the quantity of dephlogisticated air produced by these procedures did not form a sufficient part of the whole weight to enable me to judge whether any of the real acid entered into the composition of the air I obtained, I ceased to pursue them further, having learned from them the fact, that however much the acid and the earths were dephlogisticated before the solution, the acid always became highly dephlogisticated in the process.

In order to examine whether this phlogiston was furnished by the earths, some dephlogisticated nitrous acid was distilled from minimum till no more air or acid came over. More of the same acid was added to the minimum as soon as it was cold, and the distillation repeated, which produced the same appearances of red fumes and dephlogisticated air. This operation was repeated a third time on the same minimum, without any sensible variation in the phenomena. The process should have been still farther repeated, but the retort broke about the end of the third distillation; the quantity of minimum used was 120 grains, and the quantity of nitrous acid added each time was 240 grains, of such strength that it could dissolve half its weight of mercury by means of heat. It appears from this experiment, that unless minimum be fopposed principally to consist of phlogiston, the source of the phlogiston thus obtained, was either the nitrous acid itself, or the water with which it was diluted; or else that it came through the retort with the light; for the retort was in this case red hot before any air was produced. Yet this latter conclusion does not appear very satisfactory, when it is considered, that in the process wherein the earth made use of was magnesia, the retort was not red hot, or very obscurely so, in any part of the process, and by no means luminous when the yellow and red fumes first made their appearance."

To these experiments, however, the Antiphlogistians will not doubt reply, that there was no phlogiston in the cafe, and that the nitrous acid was only decomposed; and indeed the decisive experiment here would be, the entire disintegration of a quantity of earth into some kind of air, as may be done with charcoal; but to do this in the way of distillation must be attended with incredible labour, though, as finally deciding this point, it seems to be well worth pursuing.

A pretty strong proof of the identity of metallic calces with charcoal, is their conversion into it in the manner already related. Experiments, however, are yet wanting on the subject; though it seems probable from what Dr Price has already done, that they may thus be entirely disintegrated into air as well as common charcoal.

CHARDIN, (Sir John) a celebrated traveller, was born at Paris, 1643. His father, who was a jeweller, had him educated in the Protestant religion; after which he travelled into Persia and India. He traded in jewels, and died at London in 1713. The account he wrote of his travels is much esteemed.

CHARENTON, the name of two towns of France, the one upon the Marmaude in the Bourbonnais; the other in the ile of France, near the confluence of the Marne with the Seine.

CHARES the Lydian, a celebrated famiary, was the disciple of Lyippos; and made the famous Colossus of the sun in the city of Rhodes. Flourished 288 years before Christ.

CHARGE, in gunnery, the quantity of powder and ball whereby a gun is loaded for execution.

The rules for charging large pieces in warfare, that the piece be first cleaned or scourd withinide: that the proper quantity of powder be next driven in and ramméd down; care, however, being taken, that the powder, in ramming, be not bruised, because that weakens its effect: that a little quantity of paper, hay, lint, or the like, be rammed over it; and that the ball or shot be intruded. If the ball be red hot, a topHon, or treoucher of green wood, is to be driven in before it. The common allowance for a charge of powder of a piece of ordnance is half the weight of the ball. In the British Navy, the allowance for 32 pounders is but seven-sixteenths of the weight of the ball. But a Robin's, Proc. late author is of opinion, that if the powder in all ships had been reduced to one-third weight of the ball, or even less, it would be of considerabe ad. vantage, not only by saving ammunition, but by keep.
Every chariot carried two men, who were probably the warrior and the charioteer; and we read of several men of note and valor employed in driving the chariot. When the warriors came to encounter in close flight; they alighted out of the chariot, and fought on foot; but when they were weary, which often happened by reason of their armour, they retired into their chariot, and thence annoyed their enemies with darts and missile weapons. These chariots were made so strong, that they lasted for several generations.

Besides this fort, we find frequent mention of the currus falcati, or those chariots armed with hooks, or fists, with which whole ranks of soldiers were cut off together, if they had not the art of avoiding the danger; these were not only used by the Persians, Syrians, Egyptians, &c. but we find them among the ancient Britons; and notwithstanding the imperfect state of some of the most necessary arts among that nation before the invasion of the Romans, it is certain that they had war-chariots in great abundance. By the Greek and Roman historians, these chariots are described by the six following names; viz Benna, Petoritum, Carrus or Carrus Covinus, Efedum, and Rheda. The benna seems to have been a chariot designed rather for traveling than war. It contained two persons, who were called con vehemens, from their sitting together in the same machine. The petoritum seems to have derived its name from the British word petoritum, signifying four; this kind of carriage having four wheels. The carrus or carrus was the common cart or wagon. This kind of chariot was used by the ancient Britons, in times of peace, for the purposes of agriculture and merchandise; and in times of war, for carrying their baggage, and wives and children, who commonly followed the armies of all the Celtic nations. The covinus was a war-chariot, and a very terrible instrument of destruction; being armed with sharp fists and hooks for cutting and tearing all who were so unhappy as to come within its reach. This kind of chariot was made very light, and had few or no men in it besides the charioteer; being designed to drive with great force and rapidity, and to do execution chiefly with its hooks and fists. The esedum and rheda were also war-chariots, probably of a larger size, and stronger made than the covinus, designed for containing a charioteer for driving it, and one or two warriors for fighting. The far greatest number of the British war-chariots seem to have been of this kind. These chariots, as already observed, were to be found in great numbers among the Britons; infomuch that Caesar relates that Cassibelanus, after dismiling all his other forces, retained no fewer than 4000 of these war-chariots about his person. The same author relates, that, by continual experience, they had at last arrived at such perfection, in the management of these chariots, that "in the most steep and difficult places they could throw their horses upon full stretch, turn them which way they pleased, whatever might be the narrowness of the road, and throw themselves back into their chariots, with incredible dexterity."
CHARITY, among divines, one of the three grand theological virtues, consisting in the love of God and of our neighbour, or the habit and disposition of loving God with all our heart, and our neighbour as ourselves.

Charity is also used for the effect of a moral virtue, which consists in supplying the necessities of others, whether with money, counsel, assistance, or the like.

As pecuniary relief is generally the most efficacious, Charity and at the same time that from which we are most apt to excuse ourselves, this branch of the duty merits particular illustration; and a better cannot be offered than what is contained in the following extract (if we may be permitted to make them) from the elegant Moral System of Archdeacon Paley.

Whether pity be an infirmity or a habit, it is in fact a property of our nature, which God appointed; and the final cause for which it was appointed, is to afford to the miserable, in the compulsion of their fellow creatures, a remedy for those inequalities and diftresses which God foreknew that many must be exposed to, under every general rule for the distribution of property.

The Christian scriptures are more copious and explicit upon this duty than almost any other. The description which Christ has left us of the proceedings of the last day, establishes the obligation of bounty beyond controversy. When the Son of Man shall come in his glory, and all the holy angels with him, then shall he sit upon the throne of his glory, and before him shall be gathered all nations; and he shall separate them one from another. Then shall the king say unto them on his right hand, Come ye blessed of my father, inherit the kingdom prepared for you from the foundation of the world: For I was an hungered, and ye gave me meat; I was a stranger, and ye took me in; naked, and ye clothed me; I was sick, and ye visited me; I was in prison, and ye came unto me. And as much as ye have done it to one of the least of these my brethren, ye have done it unto me.” It is not necessary to understand this passage as a literal account of what will actually pass on that day. Supposing it only a fictitious description of the rules and principles by which the Supreme Arbiter of our destiny will regulate his decisions, it conveys the same lesson to us; it equally demonstrates how great value and importance these duties in the sight of God are, and what effects will be laid upon them. The apostles also describe this virtue as propitious to the divine favour in an eminent degree. And these recommendations have produced their effect. It does not appear that before the times of Christiandom, an infirmary, hospital, or public charity of any kind, existed in the world; whereas most countries in Christendom have long been bounded with these institutions. To which may be added, that a spirit of private liberality seems to flourish amidst the decay of many other virtues: not to mention the legal provision for the poor, which obtains in some countries, and which was unknown and unthought of by the most polished nations of antiquity.

St Paul adds upon the subject an excellent direction: and which is practicable by all who have any thing to give. “Upon the first day of the week (or any other fasted time) let every one of you lay by in store, as God hath prospered him.” By which the apostle may be understood to recommend what is the very thing wanting with most men, the being charitable upon a plan; that is, from a deliberate comparison of our fortunes with the reasonable expenses and expectations of our families, to compute what we can spare, and to lay by so much for charitable purposes, in some mode or other. The mode will be a consideration afterwards.

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Charity. The effect, which Christianity produced upon some of its converts, was such as might be looked for from a divine religion coming with full force and miraculous evidence upon the confinences of mankind. It overwhelmed all worldly considerations in the expectation of a more important existence. "And the multitude of them that believed were of one heart and of one soul; neither said any of them that ought of the things which he possessed, was his own; but they had all things in common.—Neither was there any among them that lacked; for as many as were possessors of lands or houses sold them, and brought the prices of the things that were sold, and laid them down at the apostle's feet; and distribution was made unto every man, according as he had need." Acts iv. 32.

Nevertheless, this community of goods, however it manifested the sincere zeal of the primitive Christians, is no precedent for our imitation. It was confined to the church at Jerusalem; continued not long there; was never enjoined upon any (Acts v. 4); and, although it might suit with the particular circumstances of a small and select society, is altogether impracticable in a large and mixed community.

The conduct of the apostles upon the occasion deserves to be noticed. Their followers laid down their fortunes at their feet: but so far were they from taking advantage of this unlimited confidence to enrich themselves or establish their authority, that they soon after got rid of this business as inconsistent with the main object of their mission, and transferred the custody and management of the public funds to deacons, elected to that office by the people at large. (Acts vi.)

There are three kinds of charity, our author observes, which prefer a claim to attention.

1. The first, and apparently one of the best, is to give stated and considerable sums, by way of pension or annuity to individuals or families, with whose behaviour and distresses ourselves are acquainted. In speaking of considerable sums, it is meant only, that five pounds, or any other sum, given at once, or divided amongst five or fewer families, will do more good than the same sum distributed amongst a greater number in shillings or half crowns; and that, because it is more likely to be properly applied by the persons who receive it. A poor fellow, who can find no better use for a shilling than to drink his benefactor's health, and purchase half an hour's recreation for himself, would hardly break into a guinea for any such purpose, or be so provident as not to lay it by for an occasion of importance, for his rent, his clothing, fuel, or flock of winter's provision. It is a still greater recommendation of this kind of charity, that pensions and annuities, which are paid regularly, and can be expected at the time, are the only way by which we can prevent one part of a poor man's sufferings, the dread of which may pervert by such a conduct. Men are sometimes overtaken by distresses, for which all other relief would come too late. Besides which, resolutions of this kind compel us to offer such violence to our humanity, as may go near, in a little while, to suffocate the principle itself; which is a very serious consideration. A good man, if he do not surrender himself to his feelings without reserve, will at least lend an ear to importunities which come accompanied with outward attestations of distress; and after a patient hearing of the complaint, will direct himself by the circumstances and credibility of the account that he receives.

There are other species of charity well contrived to make the money expended go far, such as keeping down the price of fuel or provision in case of a monopoly or temporary scarcity, by purchasing the articles at the best market, and retailing them at prime cost, or at a small loss; or the adding a bounty to a particular species of labour, when the price is accidentally depressed.

The proprietors of large estates have it in their power to facilitate the maintenance, and thereby encourage the establishment of families (which is one of the noblest purposes to which the rich and great can convert their endeavours), by building cottages, splitting farms, erecting manufactories, cultivating waifs, embanking the sea, draining marshes, and other expedients, which the situation of each estate points out. If the profits of these undertakings do not repay the expense, let the authors of them place the difference to the account of charity. It is true of almost all such projects, that the public is a gainer by them, whatever the owner be. And where the loss can be spared, this consideration is sufficient.

It is become a question of some importance. Under what circumstances works of charity ought to be done in private, and when they may be made public without detracting from the merit of the action; if indeed they ever may, the Author of our religion having delivered a rule upon this subject, which seems to enjoin universal observance. "When thou doest alms, let not thy left hand know what thy right hand doth; that thy alms may be in secret, and thy Father which seeth in secret, himself shall reward thee openly." (Matt. vi. 3, 4.) From the preamble to this prohibition, it is plain that our Saviour's sole design was to forbid ostentation, and all publishing of good works which proceeds from that motive. Take heed that ye do not your alms before men, to be seen of them; otherwise ye have no reward of your Father, which is in heaven: therefore, when thou doest thy alms, do not look upon a trumpet before thee, as the hypocrites do in the synagogues and in the streets, that they may have glory of men.
There are motives for the doing our duties in public beside those of ostentation: with which therefore our Saviour's rule has no concern; such as to testify our approbation of some particular species of charity, and to recommend it to others; to take off the prejudice which the want, or, which is the same thing, the inflammation of our name in the list of contributors, might excite against the charity or against ourselves. And, so long as these motives are free from any mixture of vanity, they are in no danger of invading our Saviour's prohibition: they rather seem to comply with another direction which he has left us: "Let your light shine before men, that they may see your good works, and glorify your father which is in heaven."

If it be necessary to propose a precise distinction upon the subject, there can be none better than the following: When our bounty is beyond our fortune or station, that is, when it is more than could be expected from us, our charity should be private, if privacy be practicable; when it is not more than might be expected, it may be public: for we cannot hope to influence others to the imitation of extraordinary generosity, if we want, in the former case, the only justifiable reason for making it public.

The pretences by which men excuse themselves from giving to the poor, are various; as,

1. "That they have nothing to spare;" i.e. nothing, for which they have not some other use; nothing which their plan of expence, together with the savings they have resolved to lay by, will not exhaust; never reflecting whether it be in their power, or that it is their duty, to retrench their expences, and correct their plan, "that they may have to give to them that need;" or rather that this ought to have been part of their plan originally.

2. "That they have families of their own, and that charity begins at home." A father is no doubt bound to adjust his economy with a view to the reasonable demands of his family upon his fortune; and until a sufficiency for these is acquired, or in due time probably will be acquired (for in human affairs probability is enough), he is justified in declining expensive liberality; for to take from those who want, in order to give to those who want, adds nothing to the stock of public happiness. Thus far, therefore, and no farther, the plea in question, is an excuse for parsimony, and an answer to those who solicit our bounty.

3. "That charity does not consist in giving money, but in benevolence, philanthropy, love to all mankind, goodwill of hearts," &c. Hear St. James: "If a brother or sister be naked, and destitute of daily food, and one of you say unto them, depart in peace, be ye warmed and filled, notwithstanding ye give them not those things which are needful to the body, what doth it profit?" (James ii. 15, 16.)

4. "That giving to the poor is not mentioned in St. Paul's description of charity, in the 13th chapter of his first epistle to the Corinthians." This is not a description of charity, but of good nature; and it is not necessary that every duty be mentioned in every place.

5. "That they pay the poor-rates." They might as well allege that they pay their debts; for the poor have the same right to that proportion of a man's property, which the laws assign them, that the man himself has to the remainder.

6. "That they employ many poor persons;"—for their own sake, not the poor's—otherwise it is a good pick.

7. "That the poor do not suffer so much as we imagine; that education and habit have reconciled them to the evils of their condition, and made them easy under it." Habit can never reconcile human nature to the extremities of cold, hunger, and thirst, any more than it can reconcile the hand to the touch of a red-hot iron; besides, the question is not, how unhappy any one is, but how much more happy we can make him.

8. "That these people, give them what you will, will never thank you, or think of you for it." In the first place, this is not true: in the second place, it was not for the sake of their thanks that you relieved them.

9. "That we are so liable to be imposed upon." If a due enquiry be made, our motive and merit is the fame: besides that, the diffidence is generally real, whatever has been the cause of it.

10. "That they should apply to their parishes." This is not always practicable; to which we may add, that there are many requisites to a comfortable subsistence, which parish-relief does not always supply; and that there are some who would suffer almost as much from receiving parish-relief as by the want of it: and lastly, that there are many modes of charity, to which this answer does not relate at all.

11. "That giving money encourages idleness and vagrancy." This is true only of injudicious and indiscriminate generosity.

12. "That we have too many objects of charity at home to bestow any thing upon strangers; so that there are other charities which are more useful, or stand in greater need." The value of this excuse depends entirely upon the fault, whether we actually relieve those neighbouring objects, and contribute to those other charities.

Besides all these excuses, pride, or prudery, or delicacy, or love of ease, keep one half of the world from doing good to the other half of it.

Charity Schools, are schools erected and maintained in various parishes by the voluntary contributions of the inhabitants, for teaching poor children to read, write, and other necessary parts of education. See School.

Brothers of Charity, a sort of religious hospitalizers, founded about the year 1297, since denominated Billetists. They took the third order of St Francis, and the capuchin, making three usual vows, but without begging.

Brothers of Charity, also denote an order of hospitalizers still subsisting in Romish countries, whose business it is to attend the sick poor, and minister to them both spiritual and temporal succour.

They are all laymen, except a few priests, for administering the sacraments to the sick in their hospitals. The brothers of charity usually cultivate botany, pharmacy, surgery, and chemistry, which they practise with success.

They were first founded at Granada, by St John de Y y Dieu;
Dieu; and a second establishment was made at Madrid in the year 1553: the order was confirmed by Gregory XIII. in 1572; Gregory XIV. forbade them to take holy orders; but by leave of Paul V. in 1609, a few of the brothers might be admitted to orders. In 1619 they were exempted from the jurisdiction of the bishop. Those of Spain are separated from the rest; and they, as well as the brothers of France, Germany, Poland, and Italy, have their distinct generals, who reside at Rome. They were first introduced into France by Mary of Medicis in 1601, and have since built a fine hospital in the Faubourg St. Germain.

Charity of St. Hippolytus, a religious congregation founded about the end of the 14th century, by one Bernardin Alvarez, a Mexican, in honour of St. Hippolytus the martyr, patron of the city of Mexico; and approved by Pope Gregory XIII.

Charity of our Lady, in church-history, a religious order in France, which though charity was the principal motive of their union, grew in length of time to disorderly and irregular, that their order dwindled, and at last became extinct.

There is still at Paris a religious order of women, called nun[s] hospitaliers of the charity of our lady. The religious of this hospital are by vow obliged to administer to the necessities of the poor and the sick, but those only women.

Charlatan, or Charleton, signifies an empiric or quack, who retails his medicines on a public stage, and draws people about him with his buffooneries, feats of activity, &c. The word according to Calpinus, comes from the Italian ceretano; or Cretum, a town near Spoleto in Italy, where these impitors are said to have first riven. Menage derives it from carlatano, and that from circularorius, of circulator, a quack.

Charlemagne, or Charles the Great, king of France by succession, and emperor of the west by conquest in 800, which laid the foundation of the dynasty of the western Franks, who ruled the empire 472 years till the time of Rudolphus Auspurgenlis, the founder of the house of Austria). Charlemagne was as illustrious in the cabinet as in the field; and though he could not write his name, was the patron of men of letters, the restorer of learning, and a wise legislator: he wanted only the virtue of humanity to render him the most accomplished of men; but when we read of his beheading 4500 Saxons, solely for their loyalty to their prince, in opposing his conquests, we cannot think he merits the extravagant encomiums bestowed on him by some historians. He died in 814, in the 74th year of his age, and 47th of his reign.

France had nine sovereigns of his name, of whom Charles V. merited the title of the wife (crowned in 1564, died in 1580): and Charles VIII. signalized himself in the field by rapid victories in Italy; crowned 1483, died in 1498. The rest do not deserve particular mention in this place. See (History of) France.

Charlemont, a town of the province of Namur in the Austrian Netherlands, about 18 miles south of Namur. E. Long. 4° 40′ N. Lat. 15° 10′.

Charlemont is also the name of a town of Ireland, situated on the river Blackwater, in the county of Armagh, and province of Ulster, about six miles south-east of Dungannon. W. Long. 6° 50′ N. Lat. 50° 16′.

Charleroy, a strong town in the province of Namur, in the Austrian Netherlands, situated on the river Sambre, about 19 miles west of Namur. E. Long. 4° 20′ N. Lat. 50° 30′.

Charles Martel, a renowned conqueror in the early annals of France. He deposed and restored Chilperic king of France; and had the entire government of the kingdom, once with the title of mayor of the palace and afterwards as duke of France; but he would not accept the crown. He died, regretted, in 741.

Charles le Gros, emperor of the west in 881, king of Italy and Suabia, memorable for his reverence of fortune, being dethroned at a diet held near Mentz, by the French, the Italians, and the Germans, in 887: after which he was obliged to fubmit on the bounty of the archbishop of Mentz. He died in 888.

Charles V. (emperor and king of Spain), was son of Philip I. archduke of Austria, and of Janye queen of Castile. He was born at Ghent, February 24, 1500, and succeeded to the crown of Spain in 1517. Two years afterwards he was chosen emperor at Frankfort after the death of Maximilian his grandfather. He was a great warrior and politician; and his ambition was not satisfied with the many kingdoms and provinces he possessed; for he is supposed, with reason, to have aspired at universal empire. He is said to have fought 60 battles in most of which he was victorious.

He took the king of France (Francis I.) prisoner, and sold him his liberty on very hard terms; yet afterwards, when the people of Ghent revolted, he asked leave to pass through his dominions; and though the generous king thus had him in his power, and had an opportunity of revenging his ill-treatment, yet he received and attended him with all pomp and magnificence. He sacked Rome, and took the Pope prisoner; and the cruelties which his army exercised there are said to have exceeded those of the northern barbarians.

Yet the pious emperor went into mourning on account of this conquest: forbade the ringing of bells; commanded proceedings to be made, and prayers to be offered up for the deliverance of the Pope his prisoner; yet did not inflict the least punishment on those who treated the holy father and the holy see with such inhumanity. He is accused by some Romish writers of favouring the Lutheran principles, which he might easily have extinguished. But the truth is, he found his account in the divisions which that sect occasioned; and he for ever denied his advantage of them, sometimes against the Pope, sometimes against France, and at other times against the empire itself. He was a great traveller, and made 50 different journeys into Germany, Spain, Italy, Flanders, France, England, and Africa. Though he had been successful in many unjust enterprises, yet his last attempt on Metz, which he besieged with an army of 100,000 men, was very just and very unsuccessful.

Vexed at the reverse of fortune which seemed to attend his latter days, and oppressed by fickness, which unforced him any longer from holding the reins of government with steadiness, or to guide them with ad-
drew, he resigned his dominions to his brother Ferdinand and his son Philip; and retired to the monastery of St. Justus near Placentia in Estramadura.

When Charles entered this retreat, he formed such a plan of life for himself as would have suited a private gentleman of moderate fortune. His table was neat, but plain; his domestics few; his intercourse with them familiar; all the ceremonious forms of attendance on his person were entirely abolished, as destructive of that social ease and tranquillity which he courted in order to root the remainder of his days. As the mists of the climate, together with his deliverance from the burdens and cares of government procured him at first a considerable remission from the acute pains of the gout, with which he had been long tormented, he enjoyed perhaps more complete satisfaction in this humble solitude than all his grandeur had ever yielded him. The ambitious thoughts and projects which had so long engaged and disquieted him, were quite effaced from his mind.

He relieved his mind at first by studying mechanical principles, and in fashioning puppets, which, by the means of internal springs, mimicked the actions of men, to the admiration of the monks, who, beholding movements which such a man perfectly disengaged from the affairs of this present life, and standing on the confines of a four-square world, either in innocent amusements which soothed his pains, and relieved a mind worn out with exiguous application to business; or in devout occupations, which he deemed necessary in preparing for another state.

But, about six months before his death, the gout, after a longer intermission than usual, returned with a proportionate increase of violence. His shattered constitution had not strength enough remaining to withstand such a shock. It enfeebled his mind as much as his body; and from this period we hardly discern any traces of that sound and masculine understanding which distinguished Charles among his contemporaries. An illiberal and timid superstitious depressed his spirit. He had no relish for amusements of any kind. He endeavored to conform, in his manner of living, to all the rigour of monastic austerity. He defined no other society than that of monks, and was almost continually employed in chanting with them the hymns of the misfàl. As an expiation for his sins, he gave himself the discipline in secret with such severity, that the whip of cords which he employed as the instrument of his punishment, was found, after his decease, tinged with his blood. Nor was he satisfied with these acts of mortification, which, however severe, were not unexampled. The timorous and distrustful solicitude which always accompanies superstition, still continued to disquiet him, and depreciating all that he had done, prompted him to aim at something extraordinary, at some new and singular act of piety, that would display his zeal, and merit the favour of heaven. The act on which he fixed was as wild and uncommon as any that superstition ever suggested to a disordered fancy. He resolved to celebrate his own obsequies before his death. He ordered his tomb to be erected in the chapel of the monastery. His domestics marched thither in funeral procession, with black tapers in their hands. He himself followed in his shroud. He was laid in his coffin with much solemnity: The service for the dead was chanted; and the attendants shed, as if they had been celebrating a real funeral. The ceremony closed with sprinkling holy water on the coffin in the usual form, and, all the assistants retiring, the doors of the chapel were shut. Then Charles rose out of the coffin, and withdrew to his apartment, full of those awful sentiments which such a singular solemnity was calculated to inspire. But either the fatiguing length of the ceremony,
Charles. remonstrance, or the impression which this image of death left on his mind, affected him so much, that next day he was seized with a fever. His feeble frame could not long resist the violence; and he expired on the 21st of September, after a life of 58 years, six months and 21 days.

Charles I. Kings of Britain. See Britain.

Charles XII. king of Sweden, was born in 1682. By his father's will, the administration was lodged in the hands of the queen-dowager Eleonora with five senators till the young prince was 18; but he was declared major at 15, by the states convened at Stockholm. The beginning of his administration raised no favourable ideas of him, as he was thought both by Swedes and foreigners to be a perfon of mean capacity. But the difficulties that gathered round him soon afforded him an opportunity to display his real character. Three powerful princes, Frederic king of Denmark, Augustus king of Poland, and Peter the Great czar of Muscovy, premising on his youth, conferred his ruin almost at the same instant. Their measures alarming the council, they were for diverting the storm by negotiations; but Charles, with a grave resolution that "defection war," resolved to make his letter, that Narva, where Count Horne was governor, was lost. When this haughty answer was brought to Peter, he said, "My brother Charles still affects at the Alexander, but I flatter myself, felf he will not in me find a Darins." The event justified him: for the Muscovites, already beaten into discipline, and under a prince of such talents as Peter, entirely destroyed the Swedifh army at the memorable battle of Pultowa, July 8, 1709, on which decisive day, Charles lost the fruits of nine years labour, and of almost 100 battles! The king, with a small troop, pursued by the Muscovites, passed the Borifhenes to Oczakow in the Turkish territories: and from thence through desart countries, arrived at Bender; where the Sultan, when informed of his arrival, sent orders for accommodating him in the best manner, and appointed him a guard. Near Bender Charles built a house, and intrenched himself; and had with him 1,800 men, who were all clothed and fed, with their horses, at the expense of the Grand Signior. Here he formed a design of turning the Ottoman arms upon his enemies; and is said to have had a promise from the Vizir of being sent into Muscovy with 200,000 men. While he remained here, he infeftively acquired a taste for books: he read the tragedies of Corneille and Racine, with the works of Delfpreaux, whose fairies he relished, but did not much admire his other works. When he read that passage in which the author represents Alexander as a fool and a madman, he tore out the leaf. He would sometimes play at chefs: but when he recovered of his wounds, he renewed his fatigue in exercising his men; he tired three horses a day; and those who courted his favour were all day in their boots. To dissipe the Ottoman Porte to this war, he detached about 800 Poles and Cofques of his retinue, with orders to pass the Neifer, that runs by Bender, and to observe what passed on the frontiers of Poland. The Muscovite troops, dispersed in those quarters, fell immediately upon this little company, and pursued them even to the territories of the Grand Signior. This was what the king expected. His ministers at the Porte excited the Turks to vengeance; but the Czar's money removed all difficulties, and Charles found himself in a manner prisoner among the Tartars. He imagined the Sultan was ignorant of the intrigues of his Grand Vizir. Poniatofky undertook to make his complaints to the Grand Signior. The Sultan, in answer, some days after, sent Charles five Arabian horses, one of which was covered with a saddle and housings of great riches; with an obliging letter, but couched in such general terms, as gave reason to suppose that the minister had done nothing without the Sultan's consent: Charles therefore refuted them. Poniatofky had the courage to form a design of deposing the Grand Vizir; who
who accordingly was deprived of his dignity and wealth, and banished. The seal of the empire was given to Noonan Cnapoughly; who persuaded his master, that the law forbid him to invade the Czar, who had done him no injury; but to succour the king of Sweden as an unfortunate prince in his dominions. He sent his majesty 800 purses, every one of which amounted to 500 crowns, and advised him to return peaceably to his own dominions. Charles rejected this advice, threatening to hang up the bailiffs, and shave the beards of any Janissaries who brought him such messages; and sent word that he should depend upon the Grand Signior's promise, and hoped to re-enter Poland as a conqueror with an army of Turks. After various intrigues at the Porte, an order was sent to attack this head of iron, as he was called, and to take him either alive or dead. He fixed a siege in his house, with forty domestics, against the Turkish army; killed no less than 20 Janissaries with his own hand; and performed prodigies of valor on a very unnecessary and unwarrantable occasion. But the house being set on fire, and himself wounded, he was at last taken prisoner, and sent to Adrianople; where the Grand Signior gave him audience, and promised to make good all the damages he had sustained. At last, after a stay of about five years, he left Turkey; and, having disguised himself, traversed Wallachia, Transylvania, Hungary, and Germany, attended only by one person; and in 16 days riding, during which time he never went to bed, came to Stralsund at midnight, November 21, 1714. His boots were cut from his swollen legs, and he was put to bed; where, when he had slept some hours, the first thing he did was to review his troops, and examine the state of the fortifications. He sent out orders that very day, to renew the war with more vigour than ever. But affairs were now much changed: Augustus had recovered the throne of Poland; Sweden had lost many of its provinces, and was without money, trade, credit, or troops. The kings of Denmark and Prussia feized the island of Rugen; and besieged him in Stralsund, which surrendered; but Charles escaped to Carlshroom. When his country was threatened with invasion by so many princes, he, to the surprise of all Europe, marched into Norway with 20,000 men. A very few Danes might have stopped the Swedish army; but such a quick invasion they could not foresee. Europe was yet more at a loss to find the Czar so quiet, and not making a descent upon Sweden, as he had before agreed with his allies. This inaction was the consequence of one of the greatest designs, and at the same time the most difficult of any that were ever formed by the imagination of man. In short, a scheme was set on foot for a reconciliation with the Czar; for replacing Stanislaus on the throne of Poland; and setting James the second's son upon that of England, besides restoring the duke of Holstein to his dominions. Charles was pleased with these grand ideas, though without building much upon them, and gave his minister leave to act at large. In the mean time, Charles was going to make a second attempt upon Norway in 1718; and he flattered himself with being master of that kingdom in six months; but while he was examining the works at Frederikshall, a place of great strength and importance, which is reckoned to be the key of that kingdom, he was killed by a shot from the enemy, as has been generally believed; though it has been also reported that he fell by the treachery of one of his own officers, who had been bribed for that purpose. This prince experienced the extremes of prosperity and of adversity, without being softened by the one, or disturbed for a moment at the other; but was a man rather extraordinary than great, and fitter to be admired than imitated. He was honoured by the Turks for his rigid abstinence from wine, and his regularity in attending public devotion. As to his person, he was tall and of a noble mien, had a fine open forehead, large blue eyes, flaxen hair, fair complexion, an handsome nose, but little beard, and a laugh not agreeable. His manners were harsh and sbufere, not to say savage; and as to his religion, he was indiffident towards all, though externally a Lutheran, and a strong believer in predestination. A few anecdotes will illustrate his character. No dangers, however great, made the least impression upon him. When a horfe or two were killed under him at the battle of Narva in 1700, he leaped nimbly upon fresh ones, saying, "these people find me exerciseful." One day, when he was dictating letters to a secretary, a bomb fell through the roof into the next room of the house, where they were sitting. The secretary, terrified at the house should come down upon them, let his pen drop out of his hand; "What is the matter," says the king calmly. The secretary could only reply, "Ah, Sir, the bomb." "The bomb (says the king) what has the bomb to do with what I am dictating to you? Go on." He preferred more humanity than is usually found among conquerors. Once, in the middle of an action, finding a young Swedish officer wounded and unable to march, he obliged the officer to take his horse, and continued to command his infantry on foot. The prince Lubomirski, who was very much in the interest of good graces of Augustus, falling by accident into the hands of one of his officers, he ordered her to be set at liberty; saying, "that he did not make war with women." One day, near Leipzig, a peasant threw himself at his feet, with a complaint against a grenadier, that he had robbed him of certain estable provision for himself and his family. "Is it true," (said Charles sternly), that you have robbed this man?" The soldier replied, "Sir, I have not done so much harm to this man as your majesty has done to his matter; for you have taken from Augustus a kingdom, whereas I have only taken from this poor fellow a dinner." Charles made the peasant amends, and pardoned the soldier for his firmness: "However, my friend (says he to him), you will do well to recollect, that if I took a kingdom from Augustus, I did not take it for myself." Though Charles lived hardly himself, a soldier did not fear to remonstrate to him against some bread, which was very black and mouldy, and which yet was the only provision the troops had. Charles called for a piece of it, and calmly eat it up; saying, "that it was indeed not good, but that it might be eaten." From the danger he was in in Poland, when he beat
the Saxon troops in 1702, a comedy was exhibited at Marlenburg, where the combat was represented to the disadvantage of the Swedes. "Oh! (says Charles, hearing of it), I am far from envying them in this pleasure. Let them beat me upon the theatres as long as they will, provided I do but beat them in the field." He wrote some observations on war, and on his own campaigns from 1700 to 1709; but the MS. was lost at the unfortunate battle of Pultowa.

CHARLES'S-CAP, a promontory of Virginia, in North-America, forming the northern head-land of the strait that enters the bay of Chesapeake.

CHARLES'S-Fort, a fortress in the county of Cork, and province of Munster, in Ireland, situated at the mouth of Kinville harbour. W. Long. 8° 20', and N. Lat. 51° 21'.

CHARLESTON, the capital of the state of South-Carolina, is the only considerable town in that state. It is situated on the tongue of land which is formed by the confluence of Ashley and Cooper rivers, which are large and navigable. These rivers mingle their waters immediately below the town, and form a spacious and convenient harbour, which communicates with the ocean at Sullivan's island, seven miles south-east of the town. In these rivers the tide rises, in common, about five feet. The continued agitation which this occasions in the waters which almost surround Charleston, and the refreshing sea breezes which are regularly felt, render Charleston more healthy than any part of the low country in the southern states. On this account: it is the resort of great numbers of gentle- men, invalids from the Weft-India islands, and of the rich planters from the country, who come here to spend the sickly months, as they are called, in quest of health and of the social enjoyments which the city affords. And in no part of America are the social blemishes enjoyed more rationally and liberally than in Charleston. Unaffected hospitality—affability—care in manners and address—and a disposition to make their guests welcome, easy and pleasant to themselves, are characterstics of the respectable people in Charleston.

The land on which the town is built is flat and low, and the water brackish and unwholesome. The inha.bitants are obliged to raise banks of earth as barriers to defend themselves against the higher floods of the sea. The streets from east to west extend from river to river, and running in a straight line, not only open beautiful prospectts each way, but afford excellent opportunities, by means of subterranean drains, for removing all nuisances and keeping the city clean and healthy. These streets are intersected by others, nearly at right angles, and throw the town into a number of squares, with dwelling houses in front, and office houses and little gardens behind. Some of the streets are conveniently wide, but most of them are much too narrow, especially for a populous a city, in so warm a climate. From their confined situation, they have been found extremely inconvenient in case of fires, the destructive effects of which have been frequently felt in this city. The houses, which have been lately built, are brick, with tiled roofs. Some of the buildings in Charleston are elegant, and most of them are neat, airy, and well furnished. The public buildings are an exchange, state-house, armoury, poor-house, two large churches for Episcopallians, two for Congregationalists or Independents, one for Scotch Presbyterians, two for Baptists, one for the German Lutherans, one for the Methodists, one for French Protestants—besides a meeting house for Quakers, and two Jewish synagogues, one for the Portuguese, the other for the German Jews. There are upwards of a thousand Roman Catholics in Charleston, but they have no public building for worship.

In 1787, there were 1,600 houses in this city, and 9,600 white inhabitants, and 5,400 negroes: and what evinces the healthiness of the place, upwards of 200 of the white inhabitants were above sixty years of age.

Charleston was incorporated in 1782, and divided into 13 wards, who choose as many wardens, who, from among themselves, elect an intendant of the city. The intendant and wardens form the city council, who have power to make and enforce bye-laws for the regulation of the city. W. Long. 79° o. and N. Lat. 32° 30'.

CHARLES'S-Wain, in astronomy, seven flars in the constellation called ura major, or the Great Bear.

CHARLETON, an island at the bottom of Hodson's-bay, in North-America, subject to Great-Britain. W. Long. 80° o. and N. Lat. 32° 30'.

CHARLETON, (Walter) a learned English physician born in 1679, was physician in ordinary to Charles I. and Charles II. one of the first members of the royal society, and president of the college of physicians. He wrote on various subjects; but at last his narrow circumstances obliged him to retire to the island of Jersey, where he died in 1707.

CHARLOCK, the English name of the Raphanus; it is a very troublesome weed among corn, being more frequent than almost any other. There are two principal kinds of it; the one with a yellow flower, the other with a white. Some fields are particularly subject to be over-run with it, especially those which have been manured with cow-dung only, that being a manure very favourable to the growth of it. The farmers in some places are so sensible of this, that they always mix horse-dung with their cow-dung, when they use it for arable land. When barley, as is often the case, is infested with this weed to such a degree as to endanger the crop, it is a very good method to mow down the charlock in May, when it is in flower, cutting it so low as just to take off the tops of the leaves of barley with it: by this means the barley will get up above the weed; and people have got four quarters of grain from an acre of such land as would have scarce yielded anything without this expedient. Where any land is particularly subject to this weed, the best method is to sow it with grass seed, and make a pasture of it; for then the plant will not be troublesome, it never growing where there is a coat of grass upon the ground.

Queen CHARLOTTE'S ISLAND, an island in the South Sea, first discovered by captain Wallis in the Dolphin, in 1767, who took possession of it in the name of King George III. Here is good water, and plenty of cocoa-nuts, palm-nuts, and invariably-grasf. The inhabitants are of a middle stature, and dark complexion, with long hair hanging over their shoulders; the
the men are well made, and the women handsome; their clothing is a kind of coarse cloth, or matting, which they fallen about their middle.

Queen Charlotte's Islands, a cluster of South-sea islands discovered in 1767 by captain Carteret. He counted seven, and there were supposed to be many more. The inhabitants of these islands are described as extremely nimble and vigorous, and almost as well qualified to live in the water as upon land: they are very warlike; and, on a quarrel with some of captain Carteret's people, they attacked them with great resolution; mortally wounded the master and three of the sailors; were not at all intimidated by the arms; and at last, notwithstanding the averton of captain Carteret to shed blood, he was obliged to secure the watering places by firing grape-shot into the woods, which destroyed many of the inhabitants. These islands lie in S. Lat. 11°. E. Long. 164°. They are supposed to be the Santa Cruz of Mandana, who lived there in 1595.

Charm, a term derived from the Latin carmen, a "verse;" and used to denote a magic power, or spell, by which, with the assistance of the devil, forcerers and witches, were supposed to do wonderful things, far surpassing the power of nature.

Charnel, or Charnel-house, a kind of portico or gallery, usually in or near a church-yard, over which were anciently laid the bones of the dead, after the flesh was wholly consumed. Charnel-houses are now usually adjoining to the church.

Charon, in fabulous history, the son of Erebus and Nix, whose office was to ferry the souls of the deceased over the river Acheron, for which each deceased person was to pay a piece of money. For this reason the Pagans had a custom of putting a piece of money into the mouth of the dead, in order that they might have something to pay Charon for their passage.

Charondas, a celebrated legislator of the Thuriens, and a native of Catanea in Sicily, flourished 446 before Christ. He forbade any person's appearing armed in the public assemblies of the nation; but one day going thither in haste, without thinking of his sword, he was no sooner made to observe his mistake than he ran it through his body.

Charost, a town of France, in Berry, with the title of a duchy. It is situated on the river Arnon. E. Long. 3°. 15'. N. Lat. 46°. 56'.

Charoux, a town of France, in the Bourbonnois, seated on an eminence, near the river Sioule. It has two parishes, which are in different dioceses. E. Long. 3°. 15'. N. Lat. 46°. 10'.

Charpentier, (Francis) dean of the French academy, was born in 1620. His early capacity inclined his friends to educate him for the bar: but he was much more delighted with the study of languages and antiquity than of the law; and preferred repose to tumult. M. Colbert made use of him in establishing his new academy of medals and inscriptions; and no person of that learned society contributed more than himself toward that noble series of medals which were struck on the considerable events that distinguished the reign of Louis XIV. He published several works, which were all well received; and died in 1702.
This charter may be said to derive its origin from king Edward the Confessor, who granted several privileges to the church and state by charter: these liberties and privileges were also granted and confirmed by king Henry I. by a celebrated great charter now lost; but which was confirmed or re-enacted by king Henry II. and king John. Henry III. the successor of this last prince, after having caused 12 men make inquiry into the liberties of England, and placed his seal on a new charter, which was the same as the present magna charta. This he several times confirmed, and as often broke; till, in the 27th year of his reign, he went to Westminster-hall, and there, in presence of the nobility and bishops, who held lighted candles in their hands, magna charta was read, the king all the time holding his hand to his breast, and at last solemnly swearing faithfully and inviolably to observe all the things therein contained, &c. Then the bishops extinguished the candles, and throwing them on the ground, they all cried out, “Thus let him be extinguished, and flink in hell, who violates this charter.”

It is observed, that, notwithstanding the solemnity of this confirmation, king Henry, the very next year, again invaded the rights of his people, till the barons entered into a war against him; when, after various successes, he confirmed this charter, and the charter of the forefet, in the 32d year of his reign.

This charter confirmed many liberties of the church, and red lined many grievances incidental to feodal tenures, of no small moment at the time; tho’ now, unless considered attentively and with this retrospect, they seem but of trifling concern. But, besides these feodal provisions, care was also taken therein to protect the subject against other oppressions, then frequently arising from unreasonable amercements, from illegal differrals, or other process for debts or services due to the crown, and from the tyrannical abuse of the prerogative of purveyance and pre-emption. It fixed the forfeiture of lands for felony in the same manner as it still remains; prohibited for the future the grants of exclusive fisheries; and the erection of new bridges so as to oppress the neighbourhood. With respect to private rights, it established the testamentary power of the subject over part of his personal estate, the rest being distributed among his wife and children; it laid down the law of dower, as it hath continued ever since; and prohibited the appeals of women, unless after the death of their husbands. In matters of public policy and national concern, it enjoined an uniformity of weights and measures; gave new encouragements to commerce, by the protection of merchant-strangers; and forbade the alienation of lands in mortmain. With regard to the administration of justice: besides prohibiting all denials or delays of it, it fixed the court of common-pleas at Westminster, that the suitors might no longer be harassed with following the king’s person in all his progresses; and at the same time brought the trial of suits home to the very doors of the freeholders, by directing affizes to be taken in the proper counties, and establishing annual circuits: it also corrected some abuses then incident to the trials by wager of law and of battle, directed the regular awarding of inquests for life or member; prohibited the king’s inferior ministers from holding pleas of the crown, or trying any criminal charge, whereby many forfeitures might otherwise have unjustly accrued to the exchequer; and regulated the time and place of holding the inferior tribunals of justice, the county-court, sheriff’s term, and court leet. It confirmed and established the liberties of the city of London, and all other cities, boroughs, towns, and ports of the kingdom. And lastly (which alone would have merited the sign of fluorescence), it protected every individual of the nation in the free enjoyment of his life, his liberty, and his property, unless declared to be forfeited by the judgment of his peers, or the law of the land.

This excellent charter, so equitable, and beneficial to the subject, is the most ancient written law in the kingdom. By the 25th Edward I. it is ordained, that it shall be taken as the common law; and by the 43d Edward III. all statutes made against it are declared to be void.

CHARTER, in law, a written instrument, or evidence of things acted between one person and another. The word charter comes from the Latin charta, anciently used for a public and authentic act, a donation, contract, or the like; from the Greek χαρτής, “thick paper” or “passeboard,” whereon public acts were wont to be written. Britton divides charters into those of the king, and those of private persons. 1. Charters of the king, are those whereby the king grants any grant to any person or body politic, as a charter of exemption of privilege, &c.; charter of pardon, whereby a man is forgiven a felony, or other offence committed against the king’s crown and dignity; charter of the forest, wherein the laws of the forest are compiled, such as the charter of Canute, &c. 2. Charters of private persons, are deeds and instruments for the conveyance of lands, &c. And the purchaser of lands shall have all the charters, deeds, and evidences, as incident to the same, and for the maintenance of his title.

CHARTER-Governments in America. See COLONY. CHARTER-Land, such land as a person holds by charter; that is, by evidence in writing, otherwise called freehold.

CHARTERPARTY, in commerce, denotes the instrument of freightage, or articles of agreement for the hire of a vessel. See FREIGHT, &c.

The charterparty is to be in writing; and to be signed both by the proprietor or the master of the ship, and the merchant who freights it. It is to contain the name and the burden of the vessel; the names of the master and the freighter; the price or rate of freight; and the time of loading and unloading; and the other conditions agreed on. It is properly a deed, or policy, whereby the master or proprietor of the vessel engages to furnish immediately a right sound vessel, well equipped, caulked, and stopped, provided with anchors, sails, cordage, and all other furniture to make the voyage required, as equipment, hands, victuals, and other munitions; in consideration of a certain sum to be paid by the merchant for the freight. Lastly, the ship with all its furniture, and the cargo, are respectively subjected to the conditions of the charterparty. The charterparty differs from a bill of lading, in that the first is for the entire freight or lading, and that
both for going and returning; whereas the latter is only for a part of the freight, or at most only for the voyage one way.

The present Boyer says, the word comes from hence, that per medium charta incidebat, et sic fiat charta partita; because, in the time when notaries were few common, there was only one instrument made for both parties: this they cut in two, and gave each his proportion; joining them together at their return, to know if each had done his part. This he observes to have been practised in his time; agreeable to the method of the Romans, who, in their stipulations, used to break a staff, each party retaining a moiety thereof as a mark.

CHARTOPHYLAX, the name of an officer of the church of Constantinople, who attends at the door of the rails when the sacrament is administered, and gives notice to the priests to come to the holy table. He represents the patriarch upon the bench, tries all the confessions of the bishops, and presides in the feast of the solemnity, and likewise all other subordinate clergy. This office resembles in some shape that of the 

CHARTREUSE-GRAND, a large city of France, in the province of Orleans, situated on the river Eure, in E. Long. 1. 32. N. Lat. 48. 47. It is a bishop's see.

CHARTREUSE, or CHARTREUSE-GRAND, a celebrated monastery, the capital of all the convenits of the Carthusian monks, situated on a steep rock in the middle of a large forest of fir-trees, about seven miles north-east of Grenoble, in the province of Dauphine in France: E. Long. 5. 5. N. Lat. 45. 20. See CARThUSIANS.

From this mother-convent, all the others of the same order take their name; among which was the Chartreuse of London, corruptly called the chartermouse, now converted into a hospital, and endowed with a revenue of 600l. per annum.

Here are maintained 50 decayed gentlemen, not under 50 years of age: also forty boys are educated and fitted either for the university or trades. These sent to the university, have an exhibition of 20 l. a year for eight years; and have an immediate title to nine church livings in the gift of the governors of the hospital, who are sixteen in number, all persons of the first distinction, and take their turns in the nomination of pensioners and scholars.

CHARTULARY, CHARTULARIUS, a title given to an ancient officer in the Latin church, who had the care of charters and papers relating to public affairs. The chartulary presided in ecclesiastical judgments, in lieu of the pope. In the Greek church the chartulary was called chartophylax; but his office was there much more considerable; and some even distinguished the chartulary from the chartophylax in the Greek church. See CHARTOPHYLAX.

CHARYBDIS, (anc. geog.) a whirlpool in the straits of Messina, according to the poets; near Sicily, and opposite to Scylla, a rock on the coast of Italy. Thucydides makes it to be only a strong flux and reflux; a violent division of the tide, especially if the winds doth part. But on diving into the Charybdis, there are found vast gulphs and whirlpools below, which produce all the commotion on the surface of the water.

Charybdis is used by Horace to denote a rapacious profiteer.

CHASE, or CHACE, in law, is used for a driving of cattle to or from any place; as to a duftris, or fortet, &c.

CHASE, or Chace, is also a place of retreat for deer and wild beasts; of a middle kind between a forest and a park, being usually less than a forest, and not possessed of so many privileges; but wanting, v. z. courts of assessment, swinemore, and justice-fee. Yet it is of a large extent, and fenced both with a greater diversity of wild beasts or game, and more keepers than a park. Crompton observes, that a forest cannot be in the hands of a subject, but it forthwith loses its name, and becomes a chase; in regard all those courts lose their nature when they come into the hands of a subject; and that none but a king can make a lord chief justice in eyre of the forest. See JUSTICE in Eyre.

"When our barons began to form a power, they claimed a vast, but more limited, tract for a diversion that the English were always fond of. They were very jealous of any encroachments on their respective bounds, which were often the cause of deadly feuds: such a one gave cause to the fatal day of Chevy-chase; a fact which, though recorded only in a ballad, may, from what we know of the manners of the times, be founded on truth: not that it was attended with all the circumstances which the author of that natural heroic composition hath given it; for, on that day, neither a Percy nor a Douglas fell; here the poet seems to have claimed his privilege, and mixed with this frail some of the events of the battle of Otterburn:" See Justice in Eyre.

CHASE, in the sea-language, is to pursue a ship; which is also called giving chase.

Sterne CHASE, is when the chaser follows the chased after directly upon the same point of the compass.

To lie with a ship's fore-foot in a CHASE, is to fail and meet with her the nearest distance; and fo to crofs her in her way, or to come across her fore-foot.

A ship is said to have a good chase, when she is so built forward on, or a stern, that she can carry many guns to shoot forwards or backwards; according to which she is said to have a good foremost, or good stern chase.

CHASE-Guns, are such whose ports are either in the head (and then they are used in chasing of others); or in the stern, which are only useful when they are pursued or chased by any other ship.

CHASE of a Gun, is the whole bore or length of a piece taken within-side.

Wild-goose CHASE, a term used to express a sort of racing on horseback used formerly, which resembled the flying of wild-geese; those birds generally going in a train one after another, not in confused flocks as other birds do. In this sort of race the two horse, after running twelve score yards, had liberty, which horse sooner could take the leading, to ride what ground the jockey pleased, the hindmost horse being bound to follow him within a certain distance agreed on by the articles, or else to be whipped in by the tryers and judges who rode by; and whichever horse could distil the other, won the race. This sort of racing was not long in common use; for it was found

inhuman
inhuman, and destructive to good horses, when two such were matched together. For in this case neither was able to distance the other till they were both ready to sink under their riders; and often two very good horses were both spoiled, and the wagers forced to be drawn at last. The mischief of this fort of racing soon brought in the method now in use, of running only for a certain quantity of ground, and determining the plate or wager by the coming in first at the post.

Grasino of Gold, Silver, &c. See Enchasing.

Chastity. See Vitex.

Chastity: purity of the body, or freedom from obscenity.—The Roman law justifies homicide in defence of chastity either of one's self or relations; and so also, according to Selden, the law in the Jewish republic. Our law likewise justifies a woman for killing a man who attempts to ravish her. So the husband or father may justly kill a man who attempts a rape upon his wife or daughter; but nor if he takes them in adultery by consent: for the one is forcible and felonious, but the other is not.

Chastity is a virtue universally celebrated. There is indeed no charm in the female sex that can supply woman for killing a man who attempts to ravish her. She received her last visit, and employed the plate or wager by the coming in first at the post. Chasing, or rather cruel foe, offered me violence, and reaped a joy fatal to me; but, if you are men, it will be more fatal to him.”

All promised to revenge her; and, at the same time, tried to comfort her with representing, “That the mind only fins, not the body; and where the heart is wanting, there can be no guilt.” “What Sextus deserves,” replies Lucretia, “leave you to judge; but for me, though I declare myself innocent of the crime, I exempt not myself from punishment. No immodest woman shall plead Lucretia's example to outrage her dishonours.” Thus saying, she plunged into her breast a dagger she had concealed under her robe, and expired at their feet. Lucretia's tragic death has been praised and extolled by Pagan writers, as the highest and most noble act of heroism. The gospel thinks not so: it is murder, even according to Lucretia's own principles, since she punished with death an innocent person, at least acknowledged as such by herself. She was ignorant that our life is not in our own power, but in his disposition from whom we receive it. St Aultin, who carefully examines, in his book De Civitate Dei, what we are to think of Lucretia's death, considers it not as a courageous action, flowing from
CHATEAU-Neuf, a town of Lorraine, in the

CHATEAU-Briant, a town of France in Brit-

tany, with an old castle. W. Long. 1. 20. N. Lat. 47. 40.

CHATEAU-Dauphin, a very strong castle of Pied-

mont in Italy, and in the marquisate of Saluces, belonging

to the king of Sardinia. It was taken by the com-

bined army of France and Spain in 1744, and was re-

formed by the treaty of Aix-la-Chapelle.

CHATEAU-du-Loir, a town of France in the Maine,

famous for sustaining a siege of seven years against the

Court of Mans. It is seated on the river Loir, in E. Long. 0. 25. N. Lat. 47. 40.

CHATEAU-Dieu, an ancient town of France, and ca-
pital of the Dunois, with a castle and rich monastery;

feated on an eminence near the river Loir, in E. Long. 1. 26. N. Lat. 48. 0.

CHATEAU-Neuf, the name of several towns of France,

designed one in Perche; another in Angoumois, on the

river Charente, near Angouleme; a third in Berry,

feated on the river Cher; and several other small

places.

CHATEAU-Porten, a town of France, in Champagne,

and in a district called Portien, with a castle built on

a rock, near the river Aire. E. Long. 4. 43. N.

Lat. 49. 35.

CHATEAU-Reaulx, a town of France, in the Gate-

nois, where clothes are made for the army, and where

there is a trade in saffron. E. Long. 2. 25. N. Lat. 48. 0. This is also the name of a town of Touraine,

in France, with the title of a marquise. E. Long.

2. 41. N. Lat. 47. 22.

CHATEAU-Rouix, a town of France, in Berry, with

the title of a duchy. It has a cloth-manufac-

ture, and is seated in a very large plain on the river

Indre. in E. Long. 1. 47. N. Lat. 46. 40.

CHATEAU-Thibie, a town of France, in Champa-

gne, with the title of a duchy, and a handsome castle on an

eminence, seated on the river Maine, in E. Long. 3.

23. N. Lat. 49. 12.

CHATEAU-Vilain, a town of France, in Champagne,

with a castle, and the title of a duchy; seated on the

river Anjou. E. Long. 2. 59. N. Lat. 48. 0.

CHATEL, or CHATE, a town of Lorraine, in the

Vosge, seated on the river Mofelle, eight miles from

Mirecourt.

CHATEL-Aillon, a maritime town of France, in Saint-

tongue, five miles from Rochelle; formerly very con-

siderable, but is now greatly decayed.

CHATEL-Cholon, a town of France, in Franche

Comte, remarkable for its abbey of benedictine nuns.

E. Long. 5. 25. N. Lat. 46. 50.

CHATELET, a town of the Netherlands, in Na-

mur, seated on the Sambre, in the bishopric of Leige,

E. Long. 4. 28. N. Lat. 50. 25.

CHATELET, the name of certain courts of justice

established in several cities in France. The grand

chatelet at Paris is the place where the prefidial or

ordinary court of justice of the provoif of Paris is kept;

constituting of a prefidial, a civil chamber, a criminal

chamber, and a chamber of policy. The little chatelet

is an old fort, now serving as a prison.

CHATELLERAULT, a town of France, in Pois-

Z. 2 103.
CHATHAM, a town of Kent, in England, adjoining to Rochester, and seated on the river Medway. It is the principal station of the royal navy; and the yards and magazines are furnished with all kinds of naval stores, as well as materials for building and rigging the largest men of war. The entrance into the river Medway is defended by Sheerness and other forts; notwithstanding which, the Dutch fleet burnt several ships of war here in the reign of Charles II. after the peace of Breda had been agreed upon. In the year 1757, by direction of the Duke of Cumberland, several additional fortifications were begun at Chatham; so that now the ships are in no danger of an inmutual either by land or water. It has a church, a chapel of ease, and a ship used as a church for the sailors. It has likewise about 300 houses, mostly low, and built with brick; the streets are narrow, and paved; and it contains about 3000 inhabitants. The principal employment of the labouring hands is ship-building in the king’s yard and private docks. This town gave title of Earl to that great statesman William Pitt in the reigns of George II. and III. E. Long. 40. N. Lat. 51. 24.

CHATIGAN, a town of Aia, in the kingdom of Bengal, on the most easterly branch of the river Ganges. It is but a poor place, though it was the first the Portuguese settled at in these parts, and who still keep a fort of poiffeiion. It has but a few cotton manufactures; but affords the best timber for building of any place about it. The inhabitants are so capable of each other, that they always go armed with a sword, piltol, and blunderbuss, not excepting the priests. It is subject to the great Mogul. E. Long. 91. 10. N. Lat. 23. 6.

CHATILLON-SUR-SEINE, a town of France, in Burgundy, divided into two by the river Seine. It is 12 miles from Langres, and 30 from Dijon; and has iron works in its neighbourhood. E. Long. 4. 33. N. Lat. 47. 45.

CHATRE, a town of France, in Berry, seated on the river Indres, 37 miles from Bourges. It carries on a considerable trade in cattle. E. Long. 1. 55. N. Lat. 46. 35.

CHATTELS, a Norman term, under which were anciently comprehended all moveable goods; those immovable being termed feft, or ffe.

CHATTELS, in the modern leflne of the word, are all sorts of goods, moveable or immovable, except such as are in the nature of freehold.

CHATTERER, in ornithology. See AMPHIS. CHATTERTON, (Thomas) a late unfortunate author is not known. In the Town and Country Magazine for March 1769, are two letters, probably from him, as they are dated from Bristol, and subscribed with his usually signature, D. B. that is, Dunelmias Britollenenis. The former contains short extracts from two MSS., written 300 years ago by one Rowley a monk, concerning drefs in the age of Henry II.; the latter, “Ethelgar, a Saxon poem,” in bombast prose. In the same magazine for May 1769, are three communications from Bristol, with the same signature D. B. one of them intitled “Observations upon Saxon Heraldy, with drawings of Saxon Achievements;” and in the subsequent months of 1769 and 1770, there are several other pieces in the same magazine, which are undoubtedly of his composition.

In April 1770, he left Bristol, disguised with his profession, and irreconcilable to the line of life in which he was placed; and going to London in hopes of advancing his fortune by his pen, he sunk at once from the sublimity of his views to an absolute dependence on the patronage of booksellers. Things, however, soon took a more favorable turn. He was sent to write on both sides, that he was soon reduced to the extremest indigence, but still continued to write with the same spirit, and with the same applause from his former patrons at Bristol. As to Mr. *, Mr. *, Mr. *, &c. &c. they rate literary lumber so low, that I believe an author, in their estimation, must be poor indeed, but here matters are otherwise. Had Rowley been a Londoner instead of a Bristolian, he could have lived by copying his works.” In a letter to his father, May 30, he informs her that he is to be employed in writing a voluminous History of London, to appear in numbers the beginning of next winter. Meanwhile, he had written something in praise of Beckford, then lord mayor, which had procured him the honour of being presented to his lordship; and, in the letter just mentioned, he gives the following account of his reception, with certain observations upon political writing. The lord mayor received me as politely as a citizen could; but the devil of the matter is, there is no money to be got on this side of the question.—However, he is a poor author who cannot write on both sides.—Essays on the patriotic side will fetch no more than what the copy is fold for. As the patriots themselves are searching for places, they have no gratuity to spare.—On the other hand, popular essays will not even be accepted, and you must pay to have them printed: but then you sell them by half, as courtiers are so sensible of their deficiency in merit, that they generously reward all who know how to dupe them with the appearance of it.” He continued to write incessantly in various periodical publications. July 11th, he tells his father that he had pieces last month in several magazines; in The Gofpel Magazine, The town and country, The Court and City, The London, The Political Register, &c. But all these exertions of his genius brought in so little profit, that he was soon reduced to the extremest indigence; so that at last, oppressed with poverty and also disease, in a fit of despair he put an end to his existence, Aug. 1770, with a dose of poison. This unfortunate person, though certainly a most extraordinary genius, seems yet to have been a most ungracious composition. He was violent and impetuous to a strange degree.
From the first of the above-cited letters, he seems to have had a portion of ill-humour and spleen more than enough for a lad of 17; and the editor of his Miscellany records, "that he poofled all the voices and irregularities of youth, and that his proficiency was at least as conspicuous as his abilities."

In 1777 were published, in one volume 8vo, "Poems, fappoed to have been written at Bristol, by Thomas Rowley and others, in the 15th century: the greatest part now first published from the most authentic copies, with an engraved specimen of one of the MSS. To which are added, a Preface, an introductory Account of the several Pieces, and a Glossary." And, in 1778, were published, in one volume 8vo, "Miscellanies in Prose and Verse, by Thomas Chatterton, the sappoed author of the Poems published under the names of Rowley, &c."

Of Rowley's Poems, we have the following account in the preface, given in the words of Mr George Catcot of Bristol, to whom, it is said, the public is indebted for them. "The first discovery of certain MSS. having been deposited in Redcliff church above three centuries ago, was made in the year 1768, at the time of opening the new bridge at Bristol; and was owing to a publication in Farley's Weekly Journal, Oct. 1st, containing an account of the ceremonies observed at the opening of the old bridge, taken, as it was said, from a very ancient MS. This excited the curiosity of some person to enquire after the original. The printer, Mr Farley, could give no account of it, or of the person who brought the copy; but after much inquiry it was discovered, that this person was a youth between 15 and 16 years of age, whose name was Thomas Chatterton, and whose family had been debted for them.

The poems in question. Mr Walpole also obliged the world with a Chaucer Letter on Chatterton, from his prens at strawberry-hill. On the other hand have appeared, "Observations" upon these poems, "in which their authenticity is afolemned, by Jacob Bryant, Esq. 1781, 2 vols 8vo; and another edition of the "Poems, with a comment, in which their Antiquityisconsidered and defended, by Jeremiah Milles, D. D. Dean of Exeter, 1782," 4to. In answer to these twoworks, we have had three pamphlets: 1. "Curiofy Observations on the Poems, and Remarks on the Commentaries of Mr Bryant and Dr Mflies; with a satu­tary proposall addressed to the friends of those gentle­men." 2. "An Archaeological Epistle to Dean Miles, editor of a superb edition of Rowley's Poems, &c." 3. "An Inquiry into the Authenticity of the Poems attributed to Thomas Rowley, in which the Arguments of the Dean of Exeter and Mr Bryant are examined, by Thomas Warton; and other pieces in the public prints and magazines: All preparatory to the completestatement of the buifiness in "A Vindication of the Appendix to the Poems called Rowley's", in reply to the Anwers of the Dean of Exeter, by Jacob Bryant, Esq; and a third Anonymous Writer; with some fur­ther Observations upon those Poems, and an Examination of the Evidence which has been produced in sup­port of their Authenticity. By Thomas Tyrwhitt, 1782," 8vo.

CHAUCER, (Sir Geoffry) an eminent English poet in the 14th century, born at London in 1328. After he left the university, he travelled into Holland, France, and other countries. Upon his return he entered himself in the Inner-temple, where he studied the municipal laws of England. His first station at court was page to Edward III. and he had a pension granted him by that prince till he could otherwise provide for him. Soon after we find him gentleman of the king's privy chamber; next year, shield-bearer to the king. Esteemed and honoured, he spent his younger days in the service of Richard, Duke of Lancaster, next year, lord chancellor of England. He was the author of the "Canterbury Tales," "The Prioress's Tale," "The Miller's Tale," and several other poems, which are supposed to be his. Among his other works are "The Wife of Bath's Prologue," "The Wife of Bath's Tale," "The Nun's Priest's Tale," "The Clerk's Tale," "The Reeve's Tale," "The Squire's Tale," "The Summoner's Tale," "The Lady of the.International," and "The Merchant's Tale." He died in 1386, and was buried in the church of St. Dunstan in the West.
A CHAt... [366] CHA

Chaucer. million to treat with the French; and in the begin-
ning of King Richard's reign, he was in some degree
of favour at court.

The Duke of Lancaster at last finding his views
checked, began to abandon Wickliff's party: upon
which Chaucer likewise, how much soever he had
deposited that divine's opinion, thought it prudent to
conceal them more than he had done. With the
Duke's interest that of Chaucer entirely funk; and
the former passing over sea, his friends felt all the malice
of the opposite party. These misfortunes occasioned
his writing that excellent treatise The Testament of Love,
in imitation of Boethius on the confolation of
philosophy. Being much reduced he retired to Woodlock,
to comfort himself with study, which produced his ad-
mirable treatise of the Afsfrades.

The Duke of Lancaster at last furmounting his trou-
bles, married Lady Catherine Swynford, sister to
Chaucer's wife; so that Thomas Chaucer, our poet's son,
became allied to most of the nobility, and to several of
the king's of England. Now the fun began to thine
upon Chaucer with an evening ray; for, by the influ-
ence of the Duke's marriage, he again grew to a con-
siderable share of wealth. But being now 70, he
retired to Dunnington-calle near Newbury. He had not
enjoyed this retirement long before Henry IV. son
of the Duke of Lancaster, assumed the crown, and in
the first year of his reign gave our poet marks of his
favour. But however pleasing the change of affairs
might be to him at first, he afterwards found no small
inconveniences from it. The measures and grants
of the late king were annulled; and Chaucer, in or-
der to procure fresh grants of his pensions, left his re-
tirement, and applied to court, where, though he
had gained a confirmation of some grants, yet the fatigue
of attendance, and his great age, prevented him from
enjoying them. He fell sick at London; and ended his
days in the 72d year of his age, leaving the world
as though he despised it, as appears from his song of
Flie, his poems in general possess every kind of excel-
sion of measure; defects which are to be attributed
to the imperfect state of the English language, and
the infancy of the art in that kingdom at the time when
he wrote. "As he is the father of English poetry (says
Mr Dryden), so I hold him in the same degree of venera-
tion as the Grecians held Homer, or the Romans Vir-
gil. He is a perpetual fountain of good sense, learned
in all fictitious, and therefore speaks properly on all sub-
jects. As he knew what to say, so he knew also when
to leave off; a continence which is practised by few
writers, and scarcely by any of the ancients, except
Virgil and Horace." This character Chaucer cer-
tainly deserved. He had read a great deal; and was
a man of the world, and of sound judgment. He
was the first English poet who wrote poetically, as Dr
Johnson observes in his preface to his Dictionary, and
(he might have added) who wrote like a gentleman.
He had also the merit of improving the language con-
siderably, by the introduction and naturalization of
words from the Provençal, at that time the most pol-
lished dialect in Europe.

CHACUS, (anc. geog.) the country of the Chau-
ci, a people of Germany; divided into the Minores,
now East Frieseland and the county of Oldenburg; and
into the Maiores, now the duchy of Brunswick and a part
of Lauenburg.

CHAUD-MEDLEY, in law, is of much the same im-
port with CHANCE-Medley. The former in its ety-
морology signifies an affray in the heat of blood or paflion;
the latter, a casual affray. The latter is in common
speech too often erroneously applied to any manner of
homicide by misadventure; whereas it appears by the
stat. 24 Hen. VIII. c. 5. and ancient books (Staundf.
P. C. 16.), that it is properly applied to such killing as
happens in self-defence upon sudden encounter.

CHAL, a town of the East Indies, on the coast of
Malabar, in the province of Blagana, and kingdom of
Vipapur. Its river affords a good harbour for small
vessels. The town is fortified, and is the island on
the south side of the harbour. It had formerly a good
trade, but is now miserably poor. It was taken by the
Portuguese in 1507, to whom it still belongs. It is
15 miles north of Bombay, and five miles from the sea.
E. Long. 72. 45. N. Lat. 18. 30.

CHAILIEU, (William Amfry de) abbé d'Amale,
one of the most polite and ingenious of the French
poets, was born in 1629, and died at the age of 84.
The most complete edition of his poems is that printed
in 2 vols 8vo in 1753.

CHAUMONT, a town of France, in Champagne,
and in the district of Bassigny, of which it is the capital.
It is seated on a mountain near the river Marne. E.
Long. 5. 15. N. Lat. 48. 6.

CHAUNE, a town of France, in Picardy, and
in the district of Santerre, with the title of a duchy. E.
Long. 2. 55. N. Lat. 49. 45.

CHAUNTRY Sec CHAUNTRY.

CHAUNY, a town of France, in Picardy, seated
on the river Oise, in Chauny. E. Long. 5. 17. N.
Lat. 40. 17.

CHAVIN, (Stephen) a celebrated minister of the
reformed religion, born at Nîmes, left France at the
revocation of the edict of Nantes, and retired to
Rotterdam, where he began a new Journal des Scavants;
and afterwards removing to Berlin, continued it there
three years. At this last place, he was made profes-
sor of philosophy, and discharged that office with much
honour and reputation. His principal work is a phi-
losophical dictionary, in Latin, which he published
at Rotterdam in 1692; and gave a new edition of it much
augmented, at Lewarden, in 1712, folio. He died in
1725, aged 85.

CHAVEZ, a strong town of Trales-Montes in Por-
tugal, is seated at the foot of a mountain on the river
Tamega. It has two suburbs, and as many forts; one
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CHAZELLES, (John Matthew) a celebrated French mathematician, and engineer, was born at Lyons in 1657. M. du Hamel, with whom he got acquainted, finding his genius inclined towards astronomy, presented him to M. Cassini, who employed him in his observatory. In 1683, the Duke of Mortemar made use of Chazelles to teach him mathematics; and, the year after, procured him the preferment of hydrography professor for the galleys of Marseille, where he set up a school for young pilots designed to serve aboard the galleys. In 1686, the galleys made four little campaigns, or rather four intended, and also that the galleys. In 1686, the galleys made what they wanted concerning the four cardinal points, naturally concluded this profession all the century. They were lodged with the ministers of the Palatinate, to extort money or goods by false pretences, or of sending threatening letters in order to extort money or goods, may be punished with a fine or imprisonment, or by pillory, whipping, or transportation.

CHEBRECHIN, a town of Poland, in the province of Russia and Palatinate of Belkow. It is seated on the declivity of a hill, and the river Wierpi waters its walls, and afterwards falls into the river Bog. The Jews there are very rich. E. Long. 23. 31. N. Lat. 50. 35.

CHECAYA, in Turkish affairs, the second officer of the Janizaries, who commands them under the aga, and is otherwise called protoporo.

There is also a checaya of the treasury, stables, kitchen, &c. the word signifying as much as lieutenant, or the second in any office.

CHECK, or Ckeck-Roll, a roll or book, wherein are contained the names of such persons as are attendants and in the pay of kings, or other great personages, as their household servants.
C E

CHEEK

Clerk of the Check in the king’s household, in Britain, has the check and controlment of the yeomen of the guard, and all the others belonging to the royal family, allowing their absence or defects in attendance, or diminishing their wages for the same, &c. He also, by himself or deputy, takes the view of those that are to watch in the court, and has the setting of the watch, &c.

Clerk of the Check in the royal dock-yards, in Britain, an officer who keeps a muster or register of all the men employed aboard his majesty’s ships and vessels, and also all the artificers and others in the service of the navy at the port where he is fitted.

Cheeks, in falcurry, a term used of a hawk, when she forakes her proper game, to fly at pyes, crows, rooks, or the like, that crofs her in her flight.

Checky, in heraldry, is when the shield, or a bordure, &c. is chequered, or divided in chequers or figures, in the manner of a chess-board.

This is one of the most noble and most ancient figures used in armoury; and a certain author faith, that it ought to be given to none but great warriors, in token of their bravery: for the chess-board represents a field of battle, and the pawns placed on both sides represent the soldiers of the two armies, which move, attack, advance, or retire, according to the will of the gamesters, who are generals.

This figure is always composed of metal and colour. But some authors would have it reckoned among the several sorts of arms.

Cheek, in anatomy, that part of the face situated below the eyes on each side.

Cheeks, a general name among mechanics, for almost all those pieces of their machines and instruments, that are double, and perfectly unlike. Thus, the cheeks of a printing-press are its two principal pieces: they are placed perpendicular, and parallel to each other; serving to hold the three formers, viz., the head, shelves, and winter, which bear the spindle, and other parts of the machine. See Printing-Press.

The cheeks of a turner’s lathe, are two long pieces of wood, between which are placed the puppets, which are either pointed or otherwise, serving to support the work and the mandrills of the workman. These two pieces are placed parallel to the horizon, separated from one another by the thickens of the tail of the puppets, and joined with tenons to two other pieces of wood placed perpendicularly, called the legs of the lathe.

Cheeks of the glazier’s vice, are two pieces of iron joined parallel at top and bottom; in which are the axis, or spindles, little wheel, cushions, &c. whereof the machine is composed.

The cheeks of a mortar, or the brackets, in artillery, are made of strong planks of wood, bound with thick plates of iron, and are fixed to the bed by four bolts; they rife on each side of the mortar, and to serve to keep her at what elevation is given her, by the help of strong bolts of iron which go through both cheeks, both under and behind the mortar, beliaw which are driven coins of wood; these bolts are called the brackets, and the bolts which are put one in each end of the bed, are the traverse-bolts. Because with handspikes the mortar is by these traversed to the right or left.

Cheeks, in ship-building, are two pieces of timber, fitted on each side of the mast at the top, serving to strengthen the masts there. The uppermost ball or piece of timber in the beak of a ship, is called the check. The knees which falten the beak-head to the ship, are called checks; and the sides of any block, or the sides of a ship’s carriage of a gun, are called checks.

CHEESE, a sort of food prepared of curdled milk purged from the serum or whey, and afterwards dried for use.

Cheese differs in quality according as it is made from new or skimmed milk, from the curd which separates spontaneously upon standing, or that which is more speedily produced by the addition of rennet. Cream also affords a kind of cheese, but quite fat and butyrous, and which does not keep long. Analyzed chemically, cheese appears to partake much more of an animal nature than butter, or the milk from which it was made. It is insoluble in every liquid except spirit of nitre, and caustic alkaline ley. Shaved thin, and properly treated with hot water, it forms a very strong cement if mixed with quicklime. When prepared with hot water, it is recommended in the Swedish memoirs to be used by sailors as a biscuit; it may be made into any form, is not softened by the cold water, and the slices are fond of it. As a food, physicians condemn the too free use of cheese. When new, it is extremely difficult of digestion: when old, it becomes acid and hot; and, from Dr Percival’s experiments, is evidently of a sceptical nature. It is a common opinion that old cheese digests every thing, yet is left undigested itself; but this is without any solid foundation. Cheese made from the milk of sheep digests sooner than that from the milk of cows, but is less nourishing; that from the milk of goats digests sooner than either, but is also the least nourishing. In general, it is a kind of food fit only for the laborious, or whose organs of digestion are strong.

Every country has places noted for this commodity; thus Chester and Gloucester cheese are famous in England; and the Parmesan cheese is in no lesse repute abroad, especially in France. This sort of cheese is entirely made of sweet cow-milk: but at Rochefort in Languedoc, they make it of ewe’s milk; and in other places it is usual to add goat or ewe’s milk in a certain proportion to that of the cow. There is likewise a kind of medicated cheese made by intimately mixing the expressed juice of certain herbs, as sage, balm, mint, &c. with the curd before it is fashioned into a cheese.—The Laplanders make a sort of cheese of the milk of their rein-deer; which is not only of great service to them as food, but on many other occasions. It is a very common thing in these climates to have a limb numbed and frozen with the cold: their remedy for this is the heating an iron red hot, and thrusting it through the middle of one of these cheeses; they catch what drops out, and with this anoint the limb, which soon recovers. They are subject also to coughs and diseases of the lungs, and these they cure by the fame sort of medicine: they boil a large quantity of the cheese in the fresh deer’s milk, and drink the decction in large draughts warm several times a-day. They make a lesf strong decoction of the same kind also, which they use as their common drink, for three or four days together, at several times of the year. They do...
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Cheese. do this to prevent the mischief they are liable to from their water, which is otherwise their constant drink, and is not good.

The hundred weight of cheese pays on importation into Britain 15. 3s. d. and draws back on exportation 15. 1d. at the rate of 6s. 8d.

Best methods of making cheese in England. The double Gloucester is a cheese that pleases almost every palate. The best of this kind is made from new, or (as it is called in that and the adjoining counties) covered milk. An inferior fort is made from what is called half-covered milk; though when any of these cheeses turn out to be good, people are deceived, and often purchase them for the best covered milk cheeses: but farmers who are honest have them stamped with a piece of wood made in the shape of a heart, so that any person may know them.

It will be every farmer's interest (if he has a sufficient number of cows) to make a large cheese from one meal's milk. This, when brought in warm, will be easily changed or turned with the rennet; but if the morning or night's milk be to be mixed with that which is fresh from the cow, it will be a longer time before it turns, nor will it change sometimes without being heated over the fire, by which it often gets duff or foot, or smoke, which will give the cheese a very disagreeable flavour.

When the milk is turned, the whey should be carefully strained from the curd. The curd should be broken small with the hands; and when it is equally broken, it must be put by little at a time into the vat, carefully breaking it as it is put in. The vat should be filled an inch or more above the brim, that when the whey is pressed out it may not shrink below the brim; if it does, the cheese will be worth very little. But first, before the curd is put in, a cheese-cloth or strainer should be laid at the bottom of the vat; and this should be so large, that when the vat is filled with the curd, the ends of the cloth may turn again over the top of it. When this is done, it should be taken to the press, and there remain for the space of two hours; when it should be turned and have a clean cloth put under it, and turned over as before. It must then be pressed again, and remain in the press six or eight hours; when it should again be turned and rubbed on each side with salt. After this it must be pressed again for the space of 12 or 14 hours more; when, if any of the edges project, they should be pared off: it may then be put on a dry board, where it should be regularly turned every day. It is a good way to have three or four holes bored round the lower part of the vat, that the whey may drain so perfectly from the cheese as not the least particle of it may remain.

The prevailing opinion of the people of Gloucestershire and the neighbouring counties is, that the cheeses will spoil if they do not scrape and wash them when they are found to be mouldy. But others think that suffering the mould to remain, mellows them, provided they are turned every day. Tho', however, who will have the mould off, should cause it to be removed with a clean dry funnel, as the washing the cheeses is only a means of making the mould (which is a species of fungus rooted in the coat) grow again immediately.

Some people call the curd: but this is a bad and mercenary practice; it robs the cheese of its fattens, and can only be done with a view to raise a greater quantity of whey butter, or to bring the cheeses forward for sale, by making them appear older than they really are.

As most people like to purchase high-coloured cheese, it may be right to mix a little annatto with the milk before it is turned. No cheese will look yellow without it; and though it does not in the least add to the good taste, it is perfectly innocent in its nature and effects. The whey is pressed out it may not change; but if the cheese be well wrought, it will not be good. When this is fit for the purpose, three pints or two quarts of soft water (clean and sweet) should be mixed with salt, wherein should be put sweet-briar, rose leaves and flowers, cinnamon, mace, cloves, and, in short, almost every sort of spice and aromatic that can be procured; and if these are put into two quarts of water, they must boil gently till the liquor is reduced to three pints, and care should be taken that this liquor is not finked. It should be strained clean from the spices, &c. and when found to be not warmer than milk from the cow, it should be poured upon the yell or maw. A lemon may then be sliced into it; when it may remain a day or two: After which it should be strained again, and put in a bottle; where, if well corked, it will keep good for twelve months or more. It will smell like a perfume; and a small quantity of it will turn the milk, and give the cheese a pleasing flavour. After this, if the yell be salted, and dried for a week or two near the fire, it will do for the purpose again almost as well as before.

Cheddar cheese is held in high esteem; but its goodnes is said to be chiefly owing to the land whereon the cows feed, as the method of making it is the same as is pursued throughout Somersetshire, and the adjoining counties.

Cheshire cheese is much admired; yet no people take the least pains with the rennet than the Cheshire farmers. But their cheeses are so large as often to exceed one hundred pounds weight each; to this (and the age they are kept, the richness of the land and the keeping such a number of cows as to make such a cheese without adding a second meal's milk) their excellence may be attributed. Indeed they falt the curd (which may make a difference), and keep the cheeses in a damp place after they are made, and are very careful to turn them daily.

But of all the cheese England produces, none is more highly esteemed than the Stilton, which is called the Parmesan of England, and (except faulty) is never sold for less than 15. or 15. 2d. per pound.

The Stilton Cheeses are usually made in square vats, and weigh from six to twelve pounds each cheese. Immediately after they are made, it is necessary to put them into square boxes made exactly to fit them; they being so extremely rich, that except this precaution be taken they are apt to bulge out and break abever. They should be continually and daily turned in these boxes, and must be kept two years before they are properly mellowed for sale.

Some make them in a net, somewhat like a cabbage net; so that they appear, when made, not unlike an a
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Cheeses.—But these are never so good as the other, having a thicker coat, and wanting all that rich flavour and mellowness which make them so pleasing.

It is proper to mention that the making of these cheeses is not confined to the Stilton farmers, as many others in Huntingdonshire (not forgetting Rutland and Northamptonshires) make a similar sort, sell them for the same price, and give all of them the name of Stilton Cheeses.

Though these farmers are remarked for cleanliness, they take very little pains with the rennet, as they in general only cut pieces from the vell or maw, which they put into the milk, and move gently about with hand, by which means it breaks or turns so, that they easily obtain the curd. But if the method above described for making rennet were put in practice, they would make their cheese still better; at least they would not have so many faulty and unfound cheeses; for notwithstanding their cheeses bear such a name and price, they often find them so bad as not to be saleable; which is probably owing to their being so careless about the rennet.

It has been alleged, that as good cheese might be made in other counties, if people would adhere to the Stilton plan, which is this:—They make a cheese every morning; and to this meal of new milk they add the cream taken from that which is milked the night before. This, and the age of their cheeses, have been supposed the only reasons why they are preferred to others; for from the nicest observation, it does not appear that their land is in any respect superior to that of other counties.

Excellent cream cheeses are made in Lincolnshire, by adding the cream of one meal's milk to milk which comes immediately from the cow; these are prefixed gently two or three times, turned for a few days, and are then disposed of at the rate of 1s. per pound, to be eaten while new with radishes, fallad, &c.

Many people give skimmed milk to pigs, but the whey will do equally as well after cheeses are made from this milk; such cheeses will always sell for at least 2d. per pound, which will amount to a large sum annually where they make much butter. The peasants and many of the farmers in the north of England never eat any better cheese; and though they appear harder, experience hath proved them to be much easer of digestion than any new milk cheeses. A good market may always be found for the sale of them at Bristol.

Account of the making of Parmesan Cheese: by Mr Zappa of Milan, in answer to queries from Arthur Young, Esq.

"Are the cows regularly fed in stables?"—From the middle of April, or sooner if possible, the cows are sent to pasture in the meadows till the end of November usually.

"Or only fed in stables in winter?"—When the season is past, and snow comes, they are put into stables for the whole winter, and fed with hay.

"Do they remain in the pasture from morning till night? or only in hot weather?"—Between nine and ten in the morning the cows are sent to water, and then to the pastures, where they remain four or five hours at morn, and at three or four o'clock are driven to the stables if the season is fresh, or under porches if hot; where, for the night, a convenient quantity of hay is given them.

"In what months are they kept at pasture the whole day?"—Mostly answered already; but it might be said, that no owner will leave his cattle, without great care, in uncovered places at night. It happens only to the shepherds from the Alps, when they pass, because it is impossible to find stables for all their cattle.

"What is the opinion in the Loddefan, on the best conduc for profit in the management of meadows?"—For a dairy farm of 100 cows, which yields daily a cheese weighing 70 to 75 lb. of 28 ounces, are wanted 1000 perticas of land. Of these about 800 are standing meadows, the other 200 are in the cultivation for corn and grass fields in rotation.

"Do you milk the cows morning and evening?"—Those that are in milk are milked morning and evening, with exception of such as are near calving.

"One hundred cows being wanted to make a Loddefan each day, it is supposed that it is made with the milk of the evening and the following morning; or of the morning and evening of the same day: how is it?"—The 100 cows form a dairy farm of a good large cheese; it is reckoned that 80 are in milk, and 20 with calves fucking, or near calving. They reckon one with the other about 32 boccalis of 32 oz. of milk. Such is the quantity for a cheese about 70 lb. of 28 ounces. They join the evening with the morning milk, because so it is frether than if it was that of the morning and evening of the same day. The morning milk would be 24 hours old when the next morning the cheese should be made.

"Do they skim or not the milk to make butter before they make the cheese?"—From the evening milk all the cream possible is taken away for butter, mascarporni (cream-cheese), &c. The milk of the morning ought to be skimmed slightly; but every one skim as much as he can. The butter is sold off on the spot immediately at 24 sous; the cheese at about 28 sous. The butter loses nothing in weight; the cheese loses one-third of it, is subject to heat, and requires expenses of service, attention, warehouses, &c. before it is sold; and a man in two hours makes 45 to 50 lb. of butter that is sold directly. However, it is not possible to leave much cream in the milk to make Loddefan cheese, called grated cheeses; because if it is too rich, it does not last long, and it is necessary to confume it while young and found.

"Is Parmesan or Loddefan cheese made every day in the year or not?"—With 100 cows it is. In winter, however, the milk being less in quantity, the cheese is of lesser weight, but certainly more delicate.

"After gathering or uniting the milk, either skimmed or not, what is exactly the whole operation?"—The morning of the 3d of March 1786, I have seen the whole operation, having gone on purpose to the spot to see the whole work from beginning to end. At 16 Italian hours, or ten in the morning, according to the northern way to account hours, the skimming of that morning's milk, gathered only two hours before, was finished. I did, meanwhile, examine the boiler or pot. At the top it was eight feet (English) diameter, or thereabout; and about five feet three inches deep,
Cheese. made like a bell, and narrowing towards the bottom to about two one-half feet. They joined the cream produced that morning with the other produced by the milk of the evening before. That produced by this last milk was double in quantity to that of the morning milk, because it had the whole night to unite, and that of the morning had only two hours to do it, in which it could not separate much. Of the cream some was destined to make macarporns (cream-cheese), and they put the rest into the machine for making butter. Out of the milk of the evening before and of that morning that was all put together after skimming, they took and put into the boiler 272 boccali, and they put under it two faggots of wood; which being burnt, were sufficient to give the milk a warmth a little superior to lukewarm. Then the boiler being withdrawn from the fire, the foreman put into it the rennet, which they prepare in small balls of one ounce each, turning the ball in his hand always kept in the milk entirely covered; and after it was perfectly dissolved, he covered the boiler to keep the milk defended, that it might not suffer from the coldness of the feaon, in particular as it was a windy day. I went to look on the morning that was making macarporns, &c. and then we went twice to examine if the milk was sufficiently coagulated. At the 18 hours, according to the Italian clocks, or noon, the true manufactory of cheese began. The milk was coagulated in a manner to be taken from the boiler in pieces from the surface. The foreman, with a stick that had 18 points, or rather nine small pieces of wood fixed by their middle in the end of it, and forming nine points in each side, began to break exactly all the coagulated milk, and did continue to do so for more than half an hour, from time to time examining it to see its state. He ordered to renew the fire, and four faggots of willow branches were used all at once; he turned the boiler that the fire might act; and then the underman began to work in the milk with a flick like the above, but with only four smaller sticks at the top, forming eight points, four at each side, a span long each point. In a quarter of an hour the foreman mixed in the boiler the proper quantity of sawfron, and the milk was all in knobs, and finer grained than before, by the effect of turning and breaking the coagulation, or curd, continually. Every moment the fire was renewed or fed; but with a faggot only at a time, to continue it regular. The milk was never heated much, nor does it hinder to keep the hand in it to know the fineness of the grain, which refines continually by the flick-work of the underman. It is of the greatest consequence to mind when the grain begins to take a consistence. When it comes to this state, the boiler is turned from the fire, and the underman immediately takes out the whey, putting it into proper receivers. In that manner the grain subfides to the bottom of the boiler; and leaving only in it whey enough to keep the grain covered a little, the foreman extending himself as much as he can over and in the boiler, unites with his hands the grained milk, making like a body of paste of it. Then a large piece of linen is run by him under that paste, while another man keeps the four corners of it, and the whey is directly put again into the boiler, by which is facilitated the means of raising that paste that is taken out of the boiler, and put for one quarter of an hour into the receiver where the whey was put before, in the same linen it was taken from the boiler, which boiler is turned again directly on the fire, to extract the macarporn (whey-cheese); and is a second product, eaten by poor people. After the pate remained for a quarter of an hour in that receiver, it was taken out and turned into the white cream called fajfons, without anything else made than the roundity, having neither top or bottom. Immediately after having turned it into that round wooden form, they put a piece of wood like a cheese on it, putting and increasing gradually weights on it, which serve to force out the remnant of whey; and in the evening the cheese so formed is carried into the warehouse, where, after 24 hours, they begin to give the salt. It remains in that warehouse for 15 or 20 days; but in summer only from 8 to 12 days. Meanwhile the air and salt form the crust to it; and then it is carried into another warehouse for a different service. In the second warehouse they turn every day all the cheese that are not older than fix months; and afterwards it is enough if they are only turned every 48 or 60 hours, keeping them clean, in particular of that bloom which is inevitable to them, and which, if neglected, turns them nasty, and causes the cheese to acquire a bad smell. This Lodefan, because it has a great deal of meadows, and abounds with cows, its product being mostly in cheese, butter, &c. However, the province of Pavia makes a great deal of that cheese; and we Milanese do likewise the fame from the side of Porte Tofo, Romana, Ticinene, and Ver­cillina, because we have fine meadows and dairy farms.

Cheese-Rennet. See Gallium and Runnet.

Chegro, or Nigua, the Indian name of an insect common in Mexico, and also found in other hot countries where it is called pique, is an exceeding small animal, not very unlike a flea, and is bred in the dust. It fixes upon the feet, and breaking insensibly the cuticle, it penetrates between that and the true skin, which also, unless it is immediately taken out, it breaks; and piercing that at last to the flesh, multiplying with a rapidity almost incredible. It is seldom discovered until it pierces the true skin, when it causes an intolerable itching. These insects, with their astonishing multiplication, would soon displease those countries, were it not easy to avoid them, or were the inhabitants less dexterous in getting them out before they begin to spread. On the other hand, nature, in order to lessen the evil, has not only denied them wings, but even that formation of the legs and those strong muscles which are given to the flea for leaping. The poor, however, who are in some measure doomed to live in the dust, and to a habitual neglect of their persons, suffer these insects sometimes to multiply so far as to make large holes in their flesh, and even to occasion dangerous wounds.

Cheiranthus, Stock-gillyflower, or Wallflower: A genus of the 39th natural order, Silique­se; and belonging to the tetradyynamia class of plants. The germin is marked with a glandulous denticle on each side; the calyx is close, with two of its leaves gibbous at the base; the seeds plane. The species are 13; but the following three are most worthy of notice.

1. The cheri, or common wall-flower, with ligeous, long, tough roots; an upright, woody, abiding stalk, divided into many erect angular branches, forming a bulky head from one to two feet high, closely garnished with spear.
spire-shaped, acute, smooth leaves, and all the branches terminating in long erect spikes of numerous flowers, which in different varieties are yellow, bloody, white, etc. 2. The incanus, or hoary cheiranthus, with lig- neous, long, naked, white roots; and upright, strong, woody, abiding item from one to three feet high, branchy from one to two or three feet long, of different colours in different varieties. 3. The annus, or ten-weeks-flock, with an upright, woody, smooth stalk, divided into a branchy head, 12 or 15 inches high, garnished with spire-shaped, blunt, hoary leaves, a little indented, and all the branches terminated by erect spikes of numerous flowers of different colours in different varieties. — The two first sorts are very hard everlasting biennials or perennials; but the las is an annual plant, to must be continued by seed sown every year; and even the two first, notwithstanding their being perennial, degenerate so much in their flowers after the first year, that it will be proper also to raise an annual supply of them. The seeds are to be sown only from the plants with single flowers; for the double ones bring no seeds to perfection. The seeds are to be chosen from such flowers as have five, fix, or more petals, or from such as grow near to the double ones. They may be sown in the full ground in the spring, and may be afterwards transplanted. When fine doubles of the two first kinds are obtained, they may be multiplied by slips from the old plants. CHEKA, in natural his tory, the name of an eart found in many parts of the East Indies, and sometimes used by the Chinese in their porcelain manufacturies. It is a hard and stony earth; and the manner of using it is this: they first calcine it in an open furnace, and then beat it to a fine powder. This powder they mix with large quantities of water: then stirring the whole together, they let the coarser part fall to; and pouring off the rest, yet thick as cream, they leave it to settle, and use the matter which is found at the bottom in form of a soft paste, and will retain that humidity a long time. This supplies the place of the earth called bouche, in the making of that elegant sort of china-ware which is all white, and has flowers which seem formed by a mere vapour with its surface. The manner of their using it is this: they first make the vessel of the common matter of the manufacture; when this is almost dry, they paint upon it the flowers, or whatever other figures they please, with a pencil dipt in this preparation of the chekao; when this is thoroughly dry, they cover the whole vessel with the varnish in the common way, and bake it as usual. The consequence is, that the whole is white: but the body of the vessel, the figures, and the varnish, being three different substances, each has its own particular white; and the flowers being painted in the finest white of all, are distinctly seen through the varnish upon the vessel, and seem as if traced by a vapour only. The hoacho does this as well as the chcekao; but besides the quality of serving for making the porcelain ware either alone, or in the place of kaolin: the chekao has not this property, nor any other substance besides this hoacho, which appears to be the same with the flaeites or soap-rock. CHEKE, (Sir John) a celebrated statesman, gram-
The air is pure and healthful, and the soil fertile, being watered by a number of rivers and canals, as well as springs and lakes. The chief produce is silk; a vast quantity of which is cultivated here, and for which the whole country is covered with mulberry trees. These are particularly cultivated in their growth by the natives, experience having taught them, that the leaves of the smallest trees produce the best silk. The stuff made in this province, which are embroidered with gold and silver, are reckoned the best in the empire, and notwithstanding a vast exportation to the Japanese and Philippine islands, as well as to every part of China, and to Europe, such an abundance is left in the province, that a complete suit of silk may be bought here as cheap as one of the coarsest woolens in France.

This province is also remarkable for a particular species of mushrooms, which is exported to every part of the empire. They are pickled, and then dried; when they will keep good for a whole year. When eaten they must be soaked in water, which renders them as fresh as at first. Here also the tallow tree is met with; and the province affords excellent hams, and those small gold-fishes with which the ponds are usually stocked.

Che-kyang contains 11 cities of the first class, 72 of the third, and 18 fortrresses, which, in Europe, would be accounted large cities. The principal of these are, 1. Hang-tcheou-fou, the metropolis, accounted by the Chinese to be the paradise of the earth. It is four leagues in circumference, exclusive of the suburbs; and the number of its inhabitants is computed at more than a million, and 10,000 workmen are supposed to be employed within its walls in manufacturing of silk. Its principal beauty is a small lake, close to the walls on the western side, the water of which is pure and limpid, and the banks almost everywhere covered with flowers. Its banks are likewise adorned with halls and open galleries supported by pillars, and paved with large flag-stones for the convenience of those who are fond of walking; and the lake itself is intersected with causeways cased with cut-stones, openings covered with bridges being left in them for the passage of boats. In the middle are two islands with a temple and several pleasure-houses, and the emperor has a small palace in the neighbourhood. The city is garrisoned by 5000 Chinese and as many Tartars, and has under its jurisdiction seven cities of the third class. 2. Hou-tcheou-fou is also situated on a lake, and manufactures an incredible quantity of silk, inomuch that the tribute of a city under its jurisdiction amounts to more than 500,000 ounces of silver. 3. Ning-po, by Europeans called Liamo, is an excellent port, opposite to Japan. Eighteen or twenty leagues from it is an island called Tcheou-chan, where the English first landed on their arrival at China. 4. Ning-po is remarkable for the silk manufactured there, which is much esteemed in foreign countries, especially Japan, where it is exchanged for gold, silver, and copper. 5. Chao-hing-fou, situated in an extensive and fertile plain, is remarkable for a tomb about half a league distant, which is said to be that of Y’he-ming-fou. The people of this province are said to be the most vered in chicanery of any in China. 6. Tchou-tcheou-fou is remarkable for having in its neighbourhood pines of an extraordinary size, capable of containing 40 men in their trunks. The inhabitants are ingenious, polite, and courteous to strangers, but very superstitious.

CHELIDONIAS, according to Pliny, an anniver-sary wind, blowing at the appearance of the swallows; otherwise the Favonius, or Zephyrus.

CHELIDONIUM, Celandine, and Horner or prickly poppy: A genus of the monogyynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 27th order, Rhoeadaceae. The corolla is tetrapetalous, the calyx diphylous, the filixa unilocular and linear. There are five species, none of which are remarkable for their beauty; but one of them, viz. the majus, is an article in the materia medica. It grows on old walls, among rubbish, and in waste shady places. The herb is of a bluish green colour; the root of a deep red; and both contain a gold-coloured juice: their smell is disagreeable, the taste somewhat bitterish, very acrid, burning and biting the mouth; the root is the most acrid. The juice takes off warts; cures terrors, ring-worms, and the itch; and, diluted with milk, it confumes opaque white spots on the eye. - Hories, cows, goats, and swine, refuse to eat the herb.

CHELIDONIUM LAPIS, in natural history, a stone said by the ancients to be found in the stomachs of young swallows, and greatly cried up for its virtues in the falling-licknefs; but, from their description, it appears to be only a species of lycodontes, or bufontes. See Lycodontes, and Bufonite.

CHELM, a town of Poland, capital of a palatinate of the same name. It is situated in the province of Red Russia. F. Long. 23°. 50'. N. Lat. 51°. 25'.

CHELMSFORD, the county town of Essex, situated on the river Chelmer, in F. Long. 0°. 30'. N. Lat. 51°. 40'. It sends two members to parliament.

CHELONE, in botany: A genus of the angiospermium order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, Peronaceae. The calyx is quinquepartite; the rudiment of a fifth filament among the highest flamina, the capsula bicostate. There are three species, viz. the Glabra, the Hirsuta, and the Penterguson. They are natives of North America; and are herbaceous flowery perennials, with upright stalks two feet high, decorated with spear-shaped leaves, and beautiful spikes of monocotyledonous, ringent flowers, red, rose-coloured, blue, and purple. They flower from September to November, and are sometimes succeeded by ripe seeds in Britain. They are very hardy plants, and may be propagated by seeds sown in any soil or situation; but the two first multiply by falt by their creeping roots, that the seeds are seldom regarded.

CHELSEA, a fine village situated on the northern bank of the river Thames, a mile westward of Westminster, remarkable for a magnificent hospital of invalids and old decrepit soldiers; and a pleasure-house, called Ranelagh, to which a great deal of fine company resort in summer; and a noble botanical garden belonging to the company of apothecaries. The royal hospital of invalids was begun by Charles II. carried on by James II. and finished by king William. It consists of a vast range of buildings, that form three large squares, in which there is an uncommon air of neatness and elegance observed. It is under the direction of commissioners, who confit generally of 11...
CHEMISTRY

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CHELTEMHAM, or CHILTEMPHAM, a market town of Gloucestershire, seven miles north-east of Gloucester. W. Long. 2. 10. N. Lat. 51. 50. It is chiefly remarkable for its mineral waters, of the same kind with those of Scarborough. See Scarborough.

CHEMISE, in fortification, the wall with which a baffle, or any other bulwark of earth, is lined for its greater support and strength: or it is the solidity of the wall from the talus to the flone-row.

Fire-CHEMISE, a piece of linen cloth, steeped in a composition of oil of petrol, camphor, and other combustible matters, used at sea, to let fire to an enemy’s vessel.

CHEMISTRY

1. Definition. May be defined, The study of such phenomena or properties of bodies as are discovered by variously mixing them together, and by exposing them to different degrees of heat, alone, or in mixture, with a view to the enlargement of our knowledge in nature, and to the improvement of the useful arts: or, it is the study of the effects of heat and mixture upon all bodies, whether natural or artificial, with a view to the improvement of arts and natural knowledge.

2. Antiquity. The science of chemistry is undoubtedly of very high antiquity; and, like most other sciences, its origin cannot be traced. In scripture, Tubal Cain, the 8th from Adam, is mentioned as the father or instructor of every artificer in brass or iron. This, however, does not constitute him a chemist, any more than a founder or blacksmith among us has a right to that title. The name of chemist could only belong to him, whoever he was, who first discovered the method of extracting metals from their ores; and this person must necessarily have lived before Tubal Cain, as every blacksmith or founder must have metals ready prepared to his hand. Nevertheless, as Tubal Cain lived before the flood, the science of chemistry must have existed before his time, some have conjectured, that the metallic part, on account of its extreme usefulness to mankind, was revealed to Adam by God himself.

Be this as it will, Siphos, an Egyptian, is considered as the chemist as the founder of their science. He was known by the Greeks under the name of Hermes, or Mercureius, or Triumfugius; and is supposed to have lived more than 1000 years before the Christian era. A numerous list of this philosopher’s works is given by Clemens Alexander; but none of them are now to be found, nor do any of them appear to have been written professedly on chemistry.

Two illustrious Egyptians, of the name of Hermes, are recorded by ancient authors. The elder supposed to be the same with Misraim, the grandson of Noah, the Hermes of the Greeks, and Mercury of the Romans. The younger Hermes lived a thousand years afterwards; and is supposed to have restored the sciences after they had fallen into oblivion, in consequence of an inundation of the Nile. No less than 36,000 books are said to have been written under the name of Hermes; but, according to Jamblichus, a custom prevailed of incribing all books of science with the name of Hermes. Some authors deny the existence of Hermes, and maintain that his history is allegorical.

As the science of chemistry is supposed to have been well known to the Egyptians, Moses, who was skilled in their wisdom, is thence ranked among the number of chemists; a proof of whose skill in this science is thought to be, his dissolving the golden calf made by the Israelites, so as to render it potable.

Of all the Greeks who travelled into Egypt in order to acquire knowledge, Democritus alone was admitted into their mysteries. The Egyptian priests are said to have taught him many chemical operations; among which were the art of softening ivory, of vitrifying flints, and of imitating precious stones. Dr Black, however, is of opinion, that Democritus knew nothing more of these arts than that of making a coarse kind of glass, as no mention is particularly made of precious stones. As no mention is particularly made of the making of glass, so as to render it potable.

After the time of Democritus, we may know that considerable improvements were made in chemistry, as physicians began to make use of metallic preparations, as cinnabar, verdigris, litharge, &c. Dioscorides describes the distillation of mercury from cinnabar by means of an embic, from which, by adding the Arabic A1, comes the term Alchemic. The art of distillation, how, of the word ever, at that time was in a very rude state; the operation being performed chiefly by separating the air, and more subtle part of tar, from the rest of the matter.

This was done by putting the matter to be distilled in a vessel, the mouth of which was covered with a wet cloth; and by this the steam of ascending vapour were condensed, which were afterwards procured by wringing out the cloth. No other distillation, besides this kind, is mentioned by Galen, Oribasius, Aldian, or Paulus Aegineta.

The precise time is not known when the three mineral acids were first discovered: though, as no mention is made of them by Geber, Avicenna, or Roger Bacon, it is probable that they were not known in the 12th century.
The Arabian alchemy, paring rose-water, the Argonauts, the making of glass, which he ascribes to the first Maternus.

"Some merchants in the Levant, who had niter on board their ship, having occasion to land, lighted a fire on the sand in order to prepare their food. To support their vessels they took some of the lumps of niter with which their ship was loaded: and the fire acting on these, melted part of them along with the sand, and thus formed the transparent substance called glass, to the great surprize of the beholders." It is probable, that the art of glass-making was known long before; and it is by no means likely that it took rise from such an accident.

The next traces we find of chemistry are to be extracted from the extravagant purports of the Alchemists, who imagined it possible to convert the bafer metals into gold or silver. The first mention we find of this study is by Julius Firmicus Maternus, who lived in the beginning of the fourth century, and first heft it as a well known pursuit in his time. Aeneas Blanius, who lived in the fifth century, likewise speaks of it; and Suidas explains the term by telling us, that it is the art of making gold and silver. He tells us, that Diocletian, when persecuting the Christians, forbade all chemical operations, lest they should discover the art of making gold, and thus be induced to rebel against him. He supposes also, that the Argonautic expedition was only an attempt to procure a skin or parchment, on which was written the receipt for making gold. It is a common practice, however, in some places where gold is washed down in small particles by brooks and rivulets from the mountains, to suspend in the water the skins of animals having wool or hair upon them, in order to detain the heavier particles which contain the gold; and this probably gave rise to the fable of the golden fleece. Suidas, however, who lived as late as the tenth century, deferves very little credit, especially as alchemy is not mentioned by any ancient author. The Arabian physicians afford the most clear and distinct evidence concerning alchemy. Avicenna, who lived in the tenth century, is said by a disciple of his to have written upon alchemy; he mentions also rofe-water, and some other chemical preparations; and in the 12th century we find physicians advised to cultivate an acquaintance with the chemists; and another of the Arabian writers says, that the method of preparing rofe-water, &c. was then well known. From this evidence of the existence of alchemy among the Arabians, with the prefatory article A/, to denote the greatnecf of the science, it has been conjectured, that the doctrine of the tranmutation of metals first took its rise among the Arabians, and was introduced into Europe by means of the Crusades, and by the rapid conquests of the Arabians themselves in Europe as well as in Asia and Africa. Europe at that time had been in a state of the greatest barbarity from the incursions of the northern nations; but the Arabians contributed to revive some of the sciences, and introduced alchemy among the rest, which continued till the middle of the 17th century; at which time the extravagance of its professors rose to the greatest height.

Though the pretensions of the alchemists are now no more universally refuted, yet from some of the discoveries which have been made in chemistry, we are far from being in danger of giving some credit to the possibility of the proceeds of transmutation. When we consider that the metals are bodies compounded of parts which we can take away and restore, and that they are closely allied to one another in their external appearance, we may be inclined to think favourably even of the projects of the alchemists. The very separation of the metals from their ores, the depriving them of their ductility and malleability, and the restoration of these properties to them at pleasure, will appear very surprising to those who are unacquainted with chemistry. There are also processes of the more difficult kind, by which quicksilver may be produced from metals that are commonly solid, as from lead. Some of these we find in Boerhave, Boyle, &c. authors of the greatest credit, who both speak of the operation and produce as realities of which they were convinced by their own experience. These processes have been urged, not without some plausibility, in favour of the tranmutation of the imperfect metals into gold; and hence the delusions of alchemy were not confined to the vain, the ignorant, and the ambitious part of mankind; but many ingenious and learned men, who took pleasure in the study of nature, have been seduced into this unhappy pursuit. This happened chiefly in Germany, where the variety of mines naturally turned the thoughts of chemists principally towards the metals, though the numerous failures of those who had attempted this art ought to have taught them better.

About the beginning of the 16th century, the pretenders to alchemy were very numerous, and a multitude of knaves, who had beggared themselves in the attempt, now went about to ensnare others, performing legendarie tricks, and causing people believe that they could actually make gold and silver. A number of the tricks they made use of are to be met with in Lernery. Many books, with the same design of imposing upon mankind, were written upon the subject of alchemy. They assumed fictitious names of the greatest antiquity, and contained rules for preparing the philosopher's stone; a small quantity of which thrown into a base metal should convert the whole into gold. They are wrote in a mysterious style, without any distinct meaning; and though sometimes processes are clearly enough described, they are found to be false and deceitful upon trial, the products not answering the pretensions of the authors. Their excuse was, that it was vain to expect plain accounts of these matters, or that the books on these subjects should be written distinctly and clearly; that the value of gold was in proportion to its scarcity, and that it might be employed to bad purposes: they wrote only for the laborious and judicious chemists, who would understand them provided they made themselves acquainted with the metals by study and experience. But in fact, no distinct meaning has ever been obtained, and the books have only served to delude and betray a great number of others into the loss of their lives. But though the alchemists failed in the execution of their

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their grand project, we must still own ourselves indebted to them for many discoveries brought to light during the time they vainly spent their labour in the expectation of making gold. Some of these are the methods of preparing spirit of wine, aquafortis, volatile alkali, vitriolic acid, and gun powder. Medicine too was indebted to them for several valuable remedies; whence also it appears that many, who had wasted their time in the vain pursuit of the philosopher's stone, thought of trying some of their most elaborate preparations in the cure of diseases; and meeting with some success, they presumed that diseases were only to be cured by the assistance of chemistry; and that the most elaborate of all its preparations, the philosophers' stone, would cure all diseases. Some cures they performed did indeed awaken the attention of physicians; and they introduced the use of opium, which had formerly been accounted poisonous. They succeeded also in the cure of the venereal disease, which had lately made its appearance, and baffled the regular physicians; but the chemists, by giving mercury, put a stop to its ravages, and, thus introduced this valuable article into the materia medica. This he used with great freedom and boldness. His successes in some cafes operated for upon the natural arrogance and self-sufficiency of his disposition, that he formed a design of overturning the whole system of medicine, and supplying a new one from chemistry: and indeed he found but very weak adversaries in the subtle theories of Galen with the refinements of the Alexandrian physicians, which only prevailed in his time; and he no doubt had some share in banishing that vaporation which had been so long entertained for their celebrated personages.

From the time of Paracelsus, chemistry began everywhere to assume a new face. In Great Britain, Lord Verulam amused himself at his leisure hours with forming plans for promoting the sciences in general, especially those which related to the study of nature. He soon found that chemistry might turn out one of the most useful and comprehensive branches of natural philosophy, and pointed out the means of its improvement. A number of experiments were proposed by him: but he observed, that the views of chemists were as yet only adapted to explain their particular operations on metals; and he observed, that, instead of the abstruse and barren philosophy of the times, it was necessary to make a very large collection of facts, and to compare them with each other very maturely and cautiously, in order to discover the common causes and circumstances of connection upon which they all depend. He did not, however, make any considerable discoveries, and his works are tedious and disagreeable to the reader.

A superior genius to Lord Verulam was Mr. Boyle, who was born the very day that the former died. His circumstances were opulent, his manners agreeable; he was endued by nature with a good heart; and his inclination led him entirely to the study of nature, which he was bent on cultivating in the way of experiment. He considered the weight, spring, and qualities of the air; and wrote on hydrostatics and other subjects; and was possessed of that happy penetration and ingenuity so well suited to the making of experiments in philosophy, which serves to deduce the most useful truths from the most simple and seemingly insignificant facts. As chemistry was his favourite science, he spared no pains to procure from chemists of great note the knowledge of curious experiments, and entertained a number of operators constantly about him. His discoveries are related in an easy style; and though rather copious, suited to the taste of the times in which he lived, and free from that abstruse and mysterious air which formerly prevailed in chemical writings: nor does he betray a design of concealing anything except several particulars which were communicated to him under the notion of secrecy, or the knowledge of which might do more harm than good. It is objected indeed, that he betrays a good deal of credulity with regard to facts which were given on the faith of others, and which may seem incredible; but this proceeded from his candour, and his being little disposed to suspect others. He showed the necessary connection between chemistry and the arts; and said, that by attending the stop of a workman, he learned more philosophy than he had done in the schools for a long time. Thus his writings showed an universal taste for the study of nature, which had now made some advances in the other parts of the world.

Agricola is one of the first and best authors on the subject of metallurgy. Being born in a village in Misnia, a country abounding in mines and metallurgical works, he described them exactly and copiously. He was a physician, and contemporary with Paracelsus, but of a character very different. His writings are clear and instructive, as those of Paracelsus are obscure and useless. Lazarus Ercker, Schinder, Schlotter, Henkel, &c. have also written on metallurgy, and described the art of assaying metals. Anthony Neri, Dr. Merret, and the famous Kinkel (who discovered the phaeanth of urine), have described very fully the arts of making glafs, enamels, imitations of precious stones, &c.; but their writings, as well as those of succeeding chemists, are not free from the illusions of alchemy: so true it is, that an obstinate and invertebrate malady never disappears at once, without leaving traces behind. In a short time, however, the alchemical phrenzy was attacked by many powerful antagonists, who contributed to rescue the science of chemistry from an evil which at once disgraced it and retarded its progress. Among these, the most distinguished are Kircher a Jesuit, and Conringius, a physician, who wrote with much success and reputation.

About the year 1650 the Royal Society was formed by a number of gentlemen who were unwilling to engage in the civil wars; and being struck with the extensive views of Lord Verulam and Mr. Boyle, contributed to the expense of costly experiments. This example appeared so noble, and the design so good, that it has been followed by all the civilized states of Europe, and has met with the protection of their respective sovereigns; and from these chemistry has received considerable improvements. In France, Groftruy, Lemery, Reaumur, &c. came to be distinguished;
The chemists who have made a considerable figure in that science. Kunc-
kel, Bega, Stahl, and Hoffman, &c. have done great
service to society, by introducing new arts, and the nu-
erous improvements they have made.

Of the improvements made by different
nations in chemistry.

The chemists who have made a figure in Germany
and France are more in number than those whom Bri-
tain has produced. In France, the society was en-
couraged by the sovereign; and in it they have de
cided themselves of that mysterious air which was affect-
ed in former ages. In Germany, the richmen of
the country, and the great variety of mines, by turning
the attention of chemists to the metals, have given that
alchemical air to their writings which we observe in
them. The number of those who have applied them-

elves to chemistry is very small in England, owing to
the great improvements made by Sir Isaac Newton in
the sciences of astronomy and optics; which, by turn-
ing the general attention that way, has occasioned what
may be called a neglect of chemistry. But if their
number be inconsiderable, they are by no means infe-
rior in merit and fame. The name of Boyle has always
been held in the highest esteem, as well as that of Hales,
for the analysis he has made of the air. Sir Isaac
Newton alone has done more to the establishing a ra-
tional chemical theory than ever was done before. Of
late, the taste for the study has become more general,
and many useful books have appeared; so that it is to
be hoped they will soon excel in this branch of science,
as they have done in all the rest.

**PART I. THEORY OF CHEMISTRY.**

According to the definition we have given of this
science, the theory of it ought to consist in a
thorough knowledge of all the phenomena which result
from every possible combination of its objects with one
another, or from exposing them in all possible ways to
those substances which chemists have found to be the
most active in producing a change. So various, how-
ever, and so widely extended are the objects of che-


mistry (comprehending all terrestrial bodies whatever),
that a knowledge of this kind is utterly unattainable by
man. The utmost that can be done in this case is, to
give some account of the phenomena which accompany
the mixtures of particular substances, or the appear-
cances they put out when exposed to heat; and these
have already been so well ascertained, that they may now be
laid down as rules, whereby we may, with a good
deal of certainty, judge of the event of our experi-
ments, even before they are made.

Here we must observe, that though the objects of
chemistry are as various as there are different substan-
ces in the whole system of nature, yet they cannot all
be examined with equal care. Some of these sub-
stances act upon others with great violence, and the
greater their activity, the more difficultly are they
themselves subjected to a chemical examination. Thus,
fire, which is the most active body in nature, is so
little the subject of examination, that it hath hi-


thero baffled the ingenuity of the greatest philos-


phers to understand its composition. This substance,
therefore, though it be the principal, if not the only
agent in chemistry, is not properly an object of it, be-


cause it cannot be made a subject of any chemical ope-


ration.

It hath been customary to consider all bodies as com-
posed of certain permanent and unchangeable parts
called elements; and that the end of chemistry was to
reduce bodies into these elements, and to recompose
them again by a proper mixture of the elements
when so separated. Upon this supposition the alche-


mists went; who, supposing that all bodies were com-
posed of salt, sulphur, and mercury, endeavoured to
find out the proportions in which these existed in gold,
and then to form that metal by combining them in a
similar manner. Had they taken care to ascertain the
real existence of their elements, and, by mixing them
together, composed any one metal whatever, though


but a grain of lead, the least valuable of them all;
their pretensions would have been very rational and
well founded; but as they never ascertained the exis-
tence of such elementary bodies, it is no wonder that
their labours were never attended with success.

Another set of elements which were as generally
reduced, and indeed continue to be so in some mea-
sure, to this day, are fire, air, earth, and water.—
This doctrine of elements was strenuously opposed by
Mr Boyle; who endeavoured to prove, that fire was
not an element per se, but generated merely from the
motion of the particles of terrestrial bodies among one
another; that air was generally produced from the sub-
stance of solid bodies; and that water, by a great
number of distillations, was converted into earth. His
arguments, however, concerning fire were not at all con-
clusive; nor does the expulsion of air from fixed bod-
ies prove that any of their solid parts were employ-
ed in the composition of that air; as later discoveries
have shown that air may be abstracted from the external
atmosphere, and fixed in a great number of solid sub-
stances. His offence concerning water deserves much
consideration, and the experiment is well worth re-
peating; but it does not appear that he, or any other
person, ought to have relied upon the experiment
which was intended to prove this transmutation. The
fact was this. Having designed to try the possibility
of reducing water to earth by repeated distillations,
he distilled an ounce of water three times over itself,
and found a small quantity of earth always remaining.
He then gave it to another, who distilled it 197 times.
The amount of earth from the whole distillations was
fix grains, or 1/4th of the quantity of water employed;
and this earth was fixed, white, and insoluble in wa-


ter.—Here it is evident, that great specious na-


tive against the fidelity of the unknown operator, who
no doubt would be wearied out with such a number of
distillations. The affair might appear trivial to
him; and as he would perhaps know to which side Mr
Boyle's opinion inclined, he might favour it, by mix-


ing some white earth with the water. Had the ex-
periment been tried by Mr Boyle's own hand, his
known character would have put the matter beyond a
doubt.

The decomposition of water, however, in another
way, by the combination of one part of it with the


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CHEMISTRY.

Theory.

The opinions concerning the element of fire may be divided into two general classes; the one considering it as an effect, the other as a cause. The former is maintained by Lord Bacon, Mr Boyle, and Sir Isaac Newton; whose respectable names for a long time gave such a sanction to this theory, that it was generally looked upon as an establisht truth. Some learned men, however, among whom was the great Dr Berkeley, always disbelieved, and insisted that fire was a fluid universally diffused, and equally present in the frozen regions of Nova Zembia, as in a glass-house furnace, only that in the latter its motion made it conspicuous; and by setting it in motion in the coldest parts of the world, its previous existence there would be equally demonstrable as in the furnace abovementioned.

Lord Bacon defines heat, which he uses as a synonymous term with fire, to be an expansive undulatory motion in the particles of a body, whereby they tend with facility towards the circumference, and also a little upwards. Hence, if in any natural body you can excite a motion whereby it shall display the property of heat, and can reproduce and direct this motion upon itself, in such a manner that the motion shall proceed uniformly, but obtain in some parts and be checked in others, you will generate heat or fire.

The same opinion is supported by Mr Boyle in the following manner: "The production of heat discovers opinion nothing, either in the agent or patient, but motion, and its natural effects. When a smith briskly hammers a small piece of iron, the metal thereby becomes exceedingly hot; yet there is nothing to make it so, except the motion of the hammer impressing a vehement and universally determined agitation on the small parts of the iron; which, being a cold body before, grows hot by that superinduced motion of its small parts: first, in a more loose acceptance of the word, with regard to some other bodies, in comparison of which it was cold before; then feebly hot, because the motion in the parts of the iron is greater than that in the parts of our fingers; at the same time that the hammer and anvil, by which the percussion is communicated, may, on account of their magnitude, remain cold. It is not necessary, therefore, that a body should itself be hot in order to communicate heat to another."

The arguments made use of by Sir Isaac Newton are not intended positively to establish any kind of theory relating to fire, but are to be found in a conjecture, published at the end of his Treatise on Optics, concerning the nature of the sun and stars. "Large bodies (he observes) preserve their heat the longest, their parts heating one another; and why may not great, dense, and fixed bodies, when heated beyond a certain degree, emit light to copiously, as, by the evaporation and reaction of it, and the refractions and refractions within the pores, to grow continually hotter, till they arrive at such a period of heat as is that of the sun? Their parts
The hypothesis of these great men produced long and violent disputes, which were never decisively settled: The discoveries in electricity, however furnished such additional strength to the followers of Dr Boerhaave, that fire is now believed to be an element and fluid distinct from all others, by at least as many as espoused the contrary system; but the question is not decided, Whether the fire itself is to be considered as the agent! or, Whether its action is to be derived from the principles of attraction and repulsion, the natural agents supposed to influence other material substances. This has produced two other systems of a kind of mixed nature, in which heat or fire is considered as a substance distinct from all others, but which acts in other bodies according to its quantity. These systems have been promulgated by Dr Black of Edinburgh and Dr Irvine of Glasgow. They differ from the opinions of Mr Boyle, Lord Bacon, and Sir Isaac Newton, in supposing heat to be a fluid distinct from all other material substances; and they also differ from the hypothesis of Dr Boerhaave, Lemery, and others, in supposing different terrestrial substances to be hot according to the quantity of fluid contained, and not according to the force with which it moves in them.

Dr Black is of opinion that heat, which he seems to make synonymous with fire, exists in two different states; in one of which it affects our senses and the thermometer, in the other it does not. The former therefore he calls sensible heat, the later latent heat. On these principles he gives the only satisfactory explanation of the phenomena of evaporation and fluidity that has yet appeared, as shall afterwards be more fully explained. At present we shall only observe, that, according to the theory of Dr Black, heat or fire itself seems to be the agent; but, according to that of Dr Irvine, as far as we can gather it from the treatises of Dr Crawford and others, the principles of attraction and repulsion are the agents by which heat, as well as other bodies, is influenced. Thus, on the principles of Dr Black, we say, that water is converted into vapour by a quantity of heat entering into it in a latent state, and thereby rendering it specifically lighter than the atmosphere; according to the principles of Dr Irvine, we say, that water is converted into vapour by having its capacity for attracting heat from the atmosphere increased. So that, according to the former, of the abstraction of heat is the cause; according to the latter, the effect of its conversion into vapour.

Dr Crawford, in his Treatise on Heat, published in 1788, informs us, that heat, in the philosophical sense of the word, has been used to explain what is frequently called the element of fire, in the abstract, without regard to the peculiar effects which it may produce in relation to other bodies. This, with Dr Irvine, he calls absolute heat; and the external cause, as having a relation to the effects it heat produces, he calls relative heat. "From this view of the matter (says he), it appears, that absolute heat expresses, in the abstract, that power or element which, when it is present to a certain degree, excites in all animals the sensation of heat; and relative heat expresses the same power, considered as having a relation to heat, the effects by which it is known and measured. The effects by which heat is known and measured are three; and therefore relative heat may admit of three subdivisions. 1. This principle is known by the peculiar sensations which it excites in animals. Conceived as exciting these sensations, it is called sensible heat. 2. It is known by the effect which it produces upon an instrument that has been employed to measure it, termed a thermometer. This is called the temperature of heat in bodies. 3. It has been found by experiment, that in bodies of different kinds the quantities of absolute heat may be unequal, though the temperatures and weights be the same. When the principle of heat is considered relatively to the whole quantity of it contained in bodies of different kinds, but which have equal weights and temperatures, I shall term it comparative heat. If, for example, the temperatures and tive weights being the same, the whole quantity of heat in defined water be four times as great as that of Antony, the comparative heats of these substances are said to be as four to one."

In order to have a proper conception of what is Experimented by a difference in absolute heat, when the temperatures by peratures are the same, it will be necessary to relate which Dr Black was of the experiments, by which Dr Black was first led to the discovery of latent heat. He observes, that when he discovered two equal masses of the same matter, heated to different degrees, are mixed together, the heat of the mixture ought to be an arithmetical mean between the two extremes. This, however, only takes place on mixing hot and cold water together; but if instead of cold water we take ice, the difference is remarkably different. Here the temperature of the mixture is much below the arithmetical mean, and a quantity of heat is apparently lost. Now we know that the temperature of ice newly frozen is generally 32 degrees of Fahrenheit; supposing therefore the temperature of the water which dilutes it to be 120, the arithmetical mean is 71; but if the mixture indicates a temperature only of 60°, then we must suppose that the ice contained 11° of heat left than was indicated by the thermometer; and consequently, that water at 32° contains 11° more of absolute heat than ice at 32°.

The same thing is made still more evident from the condensation of vapour. The fluid of water is not capable of sustaining a great degree of heat; and 212° of Fahrenheit is the utmost it can be made to bear, by the contraction of heat, without an extraordinary degree of pressure, as in Pa-

3 B 2
C H E M I S T R Y.

Theory:

Of the Elements of Fire.

Of the Element of Fire.

Of the Element of Fire.

Of the Element of Fire.

Of the Element of Fire.

Dr Black's method of calculating it.

Dr Black's method of calculating it.

Mr Watt's method of experiment on the dilution of water in vacuo.

Mr Watt's method of experiment on the dilution of water in vacuo.

Difference of absolute heat in different fluids.

Difference of absolute heat in different fluids.

Thinnest fluids contain the greatest quantity of heat.

Great difference betwixt the calculations of Drs. Cleghorn and Crawford.

Crawford's account of sensible heat.

The temperature, the capacity for containing heat, and the absolute heat contained, may be distinguished from each other in the following manner.

"The capacity for containing heat, and the absolute heat contained, are distinguished as a force distinct from the subject upon which it operates. When we speak of the capacity, we mean a power inherent in the heated body; when we speak of the absolute heat, we mean an unknown principle which is retained in the body by the operation of this power; and when we speak of the temperature, we consider the unknown principle as producing certain effects upon the thermometer.

"The capacity for containing heat may continue unchanged, while the absolute heat is varied without end. If a pound of ice, for example, be supposed to retain its solid form, the quantity of its absolute heat will be altered by every increase or diminution of its sensible heat: but as long as its form continues the same, its capacity for receiving heat is not affected by

pin's digester, or the admixture of saline substances: the temperature of the steam emitted by it therefore never can exceed 212°, except in the cafes just mentioned; and it is often capable of bearing a great degree of cold without being condensed. When the conden-

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densation takes place at last, however, a very con-

iderable degree of heat is always produced; and Dr Black has shown, that in the condensation of steam by the refrigeratory of a common still, as much heat is communicated to the water in the refrigeratory as would be sufficient to make the water which comes over as hot as red hot-iron, were it all to exist in a sensible state. His method of making the calculation is very easy. For, supposing the refrigeratory to contain 100 pounds of water, and that one pound has been distilled; if the water in the refrigeratory has received 10 degrees of heat, we know that the distilled pound has parted with 1000. If in passing through the worm of the refrigeratory, it has been reduced to the temperature of 50° of Fahrenheit, having been at 321° when it entered it, then it has lost only 162° of sensible heat; all the rest communicated to the water of the refrigeratory amounting to more than 800°, having been contained in a latent state, and such as could not then afford a degree of sensible heat as in the common method of distilling. It came over therefore with a very gentle warmth, scarce more than what the hand could bear; nevertheless it had absorbed as much heat as though the distillation had been performed in the common way; for the refrigeratory had 1000 degrees of heat communicated to it.

The difference of absolute heat is likewise perceptible betwixt any two bodies of different density, water and mercury for instance: and in comparing these, it will always be found that the thinnest fluids contain the greatest quantity of absolute heat; as water more than mercury, spirit of wine, more than water, ether more than spirit of wine, and air more than any of them. Dr Black having brought equal bulks of water and water, the former to a temperature of 50 degrees higher than the latter, found that, on mixture, there was a gain of only 20 degrees above the original; but on reverting the experiment, and heating the water 50 degrees above the mercury, there was a gain of 50 degrees on the whole. "Hence (says Dr Cleghorn in his thesis de Iqce) it appears, that the quantity of heat in water is to that in mercury, when both are of equal temperatures, as 3 to 2." Dr Crawford, however, tells us, that "the same quantity of heat which raises a pound of water one degree, will raise a pound of mercury 29 degrees; whence it follows, that the comparative heat of water is to that of mercury as 28 to 1: and consequently, the alterations which are produced in the temperatures of bodies by given quantities of absolute heat, may properly be applied as a measure of their comparative heats; the alterations of temperature and the comparative heats being reciprocally proportional to one another.

"Sensible heat (continues Dr Crawford) depends partly on the state of the temperature, and partly on that of the organ of feeling; and therefore if a variation be produced in the latter, the sensible heat will be different, though the temperature continue the same. Thus water at the temperature of 62° of Fahrenheit appears cold to a warm hand immersed in it; but on the contrary, that fluid will appear warm if a hand be applied to it which has a lower degree of heat than 62°. For this reason, the thermometer is a much more accurate measure of heat than the senses of animals. As long, however, as the organs remain unchanged, the sensible heat is in proportion to the temperature; and therefore those terms have generally been considered as synonymous. On this subject Dr Reid observes, that until the ratio between one temperature and another be ascertained by experiment and induction, we ought to consider temperature as a measure which admits of degrees, but not of ratios; and consequently ought not to conclude, that the temperature of one body is double or triple to that of another, unless the ratio of different temperatures were determined. Nor ought we to use the expressions of a double or triple temperature, those being expressions which convey no distinct meaning until the ratio of different temperatures be determined."

In making experiments on the comparative quantities of heat in different bodies, our author chooseth rather to use equal weights than equal bulks of the substances to be compared. Thus he found the comparative heat of water to be to that of mercury as 28 to 1 by weight, and 2 to 1 by bulk; which differs very considerably from the conclusion of Dr Black, who makes it only as 3 to 2, as has been already mentioned.

From the differences observed in the quantities of absolute heat contained in different bodies, our author concludes, that "there must be certain essential differences in the nature of bodies; in consequence of explained which, some have the power of collecting and retaining that element in greater quantity than others. These different powers he calls the capacities for containing heat. Thus, if we find by experiment that a pound of water contains four times as much absolute heat as diaphoretic antismony, when at the same temperature, the capacity of water for containing heat is said to be to that of antismony as 4 to 1.

"The temperature, the capacity for containing heat, and the absolute heat contained, may be distinguished from each other in the following manner."

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Theory.

Of the Element of Fire

An alteration of temperature, and would remain unchanged though the body were wholly deprived of its heat.

In the course of his work, Dr Crawford observes, that "he has not entered into the inquiry which has been so much agitated among the English, the French, and the German philosophers: Whether heat be a substance or a quality? In some places indeed he has used expressions which seem to favour the former opinion; but his whole motive for adopting this was, because the language seemed to be more simple and natural, and more consonant to the facts which had been established by experiment. At the same time, he is persuaded that it would be a very difficult matter to reconcile the following facts. Thus for instance, heat is preserved in the course of his work, Dr Crawford observes, that heat is a quality.

It is not easy to conceive, upon this hypothesis, how heat can be absorbed in the processes of fusion, evaporation, combustion; how the quantity of heat in the air can be diminished, and that in the blood increased, by respiration, though no sensible heat or cold be produced.

Whereas, if we adopt the opinion that heat is a distinct substance, or an element sui generis, the phenomena will be found to admit of a simple and obvious interpretation.

Fire will be considered as a principle; which is distributed in various proportions throughout the different kingdoms of nature. The mode of its union with bodies will resemble that particular species of union, wherein the elements are combined by the joint forces of pressure and attraction. Of this kind is the combination of fixed air and water; for fixed air is retained in water partly by its attraction for that fluid, and partly by the pressure of the external air; and if either of these forces be diminished, a portion of the fixed air escapes. In like manner, it may be conceived that elementary fire is retained in bodies, partly by its attraction to these bodies, and partly by the action of the surrounding heat; and in that case a portion of it will be disengaged, either by diminishing the attractive force, or by lessening the temperature of the surrounding medium. If, however, fire be a substance which is subject to the laws of attraction, the mode of its union with bodies seems to be different from that which takes place in chemical combination; for, in chemical combination, the elements acquire new properties, and either wholly or in part lose those by which they were formerly characterized. But we have no sufficient evidence for believing that fire, in consequence of its union with bodies, does, in any instance, lose its distinct properties.

Dr Berkenhout, in his first Lines of the Theory and Practice of Philosophical Chemistry, informs us, that "heat, or the matter of heat, is by Scheele and Bergman substituted for fire, which they believe to be the action of heat when increased to a certain degree.

The first of these celebrated chemists believed this matter of heat to be a compound of phlogiston and pure air. He was certainly mistaken. It seems more philosophical to consider heat as an effect, of which fire is the sole cause.

Heat I consider not as a distinct substance, but as an effect of fire, fixed or volatile; in both which states fire seems to exist in all bodies, solid and fluid. Fixed fire I believe to be a conjoint part of all bodies, and their specific heat to depend on the quantity of the fixed fire in each. This fixed, this latent fire, cannot be separated from the other constituent parts of bodies but by their decomposition: it then becomes volatile and incorrigible. If this hypothesis be true, fire exists, in all natural bodies that contain phlogiston, in three different states: 1. In that volatile state in which it perpetually fluctuates between one body and another. 2. Combined with an acid, probably in the form of fixed inflammable air or phlogiston. 3. Uncombined and fixed, as a constituent principle, determining the specific heat of bodies.

Pure (or volatile) fire is distinguished by the following properties. 1. It is essentially fluid, invisible, light, and without weight. 2. It is the immediate cause of all fluidity. 3. It penetrates and pervades all bodies on the surface of the earth, and as far beneath the surface as hath hitherto been explored. Water hath never been found in a congealed state in the deepest mines. 4. It has a constant tendency to diffuse itself equally through all bodies, howsoever different in point of density. A marble slab, a plate of iron, a decanter of water, and a lady's muff, at the same distance from the fire, and other external circumstances, being equal, possesses an equal degree of heat, which is precisely that of the atmosphere in which they stand. 5. It is perpetually in motion from one body to another, and from different parts of the same body, because external circumstances are continually varying. 6. In fluctuating from one body to another, it produces a constant vibration of their constituent parts; for all bodies expand and contract in proportion to the quantity of fire they contain. 7. Accumulated beyond a certain quantity, it affects the diffillation of bodies, by forcing their constituent parts beyond the sphere of mutual attraction, called the attraction of cohesion, which is the cause of solidity. Hence the sovereign agency of fire in chemical operations.

Dr Crawford, besides the opinions already quoted, tells us, that fire, in the vulgar acceptation of the word, expresses a certain degree of heat accompanied with light. In this sense, heat and light which are produced by the decomposition of combustible bodies. But as heat, when accumulated in a sufficient quantity, is constantly accompanied with light; or, in other words, as fire is always produced by the increase of heat, philosophers have generally considered these phenomena as proceeding from the same cause: and have therefore used the word fire to express that unknown principle, which, when it is present to a certain degree, excites the sensation of heat alone; but, when accumulated to a greater degree, renders itself obvious both to the sight and touch, or produces heat accompanied with light. In this sense, the element of fire signifies the same thing with ab ab light heat.

Having premised these general definitions and remarks, he gives the properties of heat in the following words:

I. Heat has a constant tendency to diffuse itself over all bodies: with the aid of heat alone: but, when accumulated to a greater degree, renders itself obvious both to the sight and touch, or produces heat accompanied with light. In this sense, the element of fire signifies the same thing with ab light heat.

Having premised these general definitions and remarks, he gives the properties of heat in the following words:

II. Heat has a constant tendency to diffuse itself over all bodies: with the aid of heat alone: but, when accumulated to a greater degree, renders itself obvious both to the sight and touch, or produces heat accompanied with light. In this sense, the element of fire signifies the same thing with ab light heat.
and that all inanimate bodies, when heated and placed in a cold medium, continually lose heat, till in process of time they are brought to the state of the surrounding medium.

If, from this property of heat it follows, that the various classes of bodies throughout the earth, if they were not acted upon by external causes, would at length, arrive at a common temperature when the heat would become quiescent; in like manner as the waters of the ocean, if not prevented by the winds and by the attractions of the sun and moon, would come to an equilibrium, and would remain in a state of rest. But as causes continually occur in nature to disturb the balance of heat as well as that of the waters of the ocean, those elements are kept in a constant fluctuation.

II. Heat is contained in considerable quantities in all bodies when at the common temperature of the atmosphere.

From the interesting experiments which were made on cold by Mr Wilson, we learn, that at Glasgow, in the winter of the year 1780, the thermometer on the surface of snow sunk 25 degrees below the beginning of Fahrenheit’s scale.

We are told by Dr Pallas, that in the deserts of Siberia, during a very intense frost, the mercury was found congealed in thermometers exposed to the atmosphere, and a quantity of that fluid in an open bowl placed in a similar situation, at the same time became solid. The decisive experiments of Mr Hutchins at Hudson’s Bay prove, that the freezing point of mercury is very nearly 40° below the zero (or 0°) of Fahrenheit. From which it follows, that at the time of Dr Pallas’s observation, the atmosphere in Siberia must have been cooled to minus 40°. By a paper lately transmitted to the Royal Society we are informed, that the spirit-of-wine thermometer in the open air at Hudson’s Bay fell to — 42 in the winter of 1785; and from the same communication we learn, that by a mixture of snow and vitriolic acid, the heat was so much diminished, that the spirit of wine sunk to — 80, which is 112 below the freezing point of water.

Hence it is manifest, that heat is contained in considerable quantities in all bodies when at the common temperature of the atmosphere. It is plain, however, that the quantity inherent in each individual body is limited. This, I think, must be admitted, whatever be the hypothesis which we adopt concerning the nature of heat; whether we conceive it to be a force or power belonging to bodies, or an elementary principle contained in them. For those who consider heat as an element, will not suppose that an unlimited quantity of it can be contained in a finite body; and if heat be considered as a force or power, the supposition that finite bodies are actuated by forces or powers which are infinite is equally inadmissible.

To place this in another light, we know that bodies are universally expanded by heat, excepting in a very few instances, which do not afford a just objection to the general fact; because, in those instances, by the action of heat a fluid is extricated that previously separated the particles from each other. Since, therefore, heat is found to expand bodies in the temperatures which fall within the reach of our observation, we may conclude that the finite thing takes place in all temperatures.

Our author, by a fact of very accurate and laborious experiments, determines that the expansions in mercury and some other fluids are proportional to the quantities of heat applied; from which (says he) it is manifest, that the quantities of heat in bodies are limited, because an infinite heat would produce an infinite expansion.

It is manifest, that the number of degrees of sensible heat, as measured by the thermometer, and estimated from the beginning of the scale, must be the same in all bodies which have a common temperature; for by the first general fact it is proved, that heat has a constant tendency to diffuse itself uniformly over bodies till their temperatures become equal. From which it may be inferred, that if a quantity of heat were added to bodies absolutely cold, the same uniform diffusion would take place; and that if a thermometer, altogether deprived of its heat, were applied to such bodies, it would be equally expanded by them, the whole of the sensible heat which they had acquired being indicated by that expansion.

III. If the parts of the same homogeneous substance have a common temperature, the quantity of absolute heat will be proportional to the bulk or quantity of matter. Thus the quantity of absolute heat in two pounds of water is double that which is contained in one pound when at the same temperature.

IV. The dilatations and contractions of the fluid in the mercurial thermometer are nearly proportional to the quantities of absolute heat which are communicat ed to the same homogeneous bodies, or separated from them, as long as they retain the same form. Thus the quantity of heat required to raise a body four degrees in temperature by the mercurial thermometer, is nearly double that which is required to raise it two degrees, four times that required to raise it one degree, and so in proportion.

Thus we find, that Dr Black, Dr Irvine, Dr Crawford, and Dr Berkenhout, agree in speaking of fire or heat as a fluid substance distinct from all other bodies.

Mr Kirwan, in his Treatise of Phlogiston, agrees in the same sentiment. Some (says he) have thought, that wasn’t opinion; I should have included the matter of heat, or elementary fire, in the definition of inflammable air; but as fire is contained in all corporeal substances, to mention it is perfectly needless, except where bodies differ from each other in the quantity of it they contain.

Mr Cavendish, on the other hand, Mr Cavendish, Phil. Trans. xxvii. on the subject of fire, gives no reason for this opinion, it seems probable that the greater part of philosophers either positively believe that heat is an elementary fluid distinct from all others, or find themselves obliged to adopt a language which necessarily implies it. The only difficulty which now remains therefore is, to affix a proper idea to the phrase quantity of heat, which we find universally made use of, without any thing to determine our opinions concerning it.

That we cannot speak of a quantity of fire or heat in the same sense as we speak of a quantity of water or any other fluid is evident, because we can take away the quantity of water which any substance contains, but cannot do so with heat. Nay, in many cases we are sure, that a substance very cold to the touch does not lose the word "degree of heat."
The quantity of heat contained in any substance depends, in the first place, on the attracting power of that substance, which is altogether unknown; and, in the second place, on the repulsive powers of the particles of heat themselves, which are equally unknown. To determine the quantity, therefore, must be impossible. Neither will the mixture of two different fluids, as in Dr Black's experiments, affift us in the least; for though water, heated more than mercury, communicates a greater heat to that fluid than the latter does to water; this only shows that water more readily parts with some part of the heat it contains than mercury does, but has not the least tendency to discover the quantity contained in either.

Dr Crawford, as we have already seen, calls the degree, or, if we may vary the phrase, the quantity of power or element (fluid, if we may substitute a synonymous word) existing or present in any body, its absolute heat; and lays down a rule for determining the proportional quantities of heat in different bodies. "It will appear (says he) from the experiments afterwards recited, that if a pound of water and a pound of diaphoretic antimony have a common temperature, the quantity of absolute heat contained in the former is nearly four times that contained in the latter." The manner in which he illustrates this is as follows.

"If four pounds of diaphoretic antimony at 20 be mixed with one pound of ice at 32, the temperature will be nearly 26: the ice will be cooled six degrees, and the antimony heated six. If we reverse the experiment, the effect will be the same. That is, if we take six degrees of heat from four pounds of antimony, and add to it a pound of ice, the latter will be heated six degrees. The same quantity of heat, therefore, which raises a pound of ice six degrees, will raise four pounds of antimony six degrees.

"If this experiment be made at different temperatures, we shall have a similar result. If, for example, the antimony at 15, or at any given degree below the freezing point, be mixed with the ice at 32, the heat of the mixture will be the arithmetical mean between that of the warmer and colder substance. And since the capacities of bodies are permanent as long as they retain the same form, we infer, that the result would be the same if the antimony were deprived of all its heat, and were mixed with the ice at 32. But it is evident, that in this case the ice would communicate to the antimony the half of its absolute heat. For if 200 below frost be conceived to be the point of total privation, the antimony will be wholly deprived of its heat when cooled to 200 degrees below 32, and the heat contained in the ice when at 32 will be 200 degrees. If we now suppute these to be mixed together, the temperature of the mixture will be half the excess of the hotter above the colder, or the ice will be
be cooled 100 degrees and the antimony heated 100.
The one half of the heat, therefore, which was con-
tained in the ice previous to the mixture will be com-
municated to the antimony; from which it is manifest,
that after the mixture the ice and antimony must con-
tain equal quantities of absolute heat.

"To place this in another light, it has been proved,
that the same quantity of heat which raises a pound of
ice 100 degrees will raise four pounds of antimony 25
degrees. And as the capacities of bodies, while they
retain the same form, are not altered by a change of
temperature; it follows, that the same quantity of heat
which raises the ice 100 degrees, or any given number
of degrees, will raise the antimony an equal number of
degrees.

A pound of ice, therefore, and four pounds of
antimony, when at the same temperature, contain
equal quantities of absolute heat. But it appears from
the third general fact (n° 6), that four pounds of
antimony contain four times as much absolute heat as
one pound of antimony; and hence the quantity of
absolute heat in a pound of ice is to that in a pound of
antimony as four to one."

From this quotation it is evident, that notwithstanding
all the distinctions which Dr Crawford has
laid down betwixt absolute heat and temperature, it is
only the quantity of the latter that can be measured;
and it is only from a consideration of this latter, that
we can say concerning the matter is, that
when certain bodies are mixed together, some of them
part with a greater quantity of heat than others; but
how much they contain must remain for ever
unknown, unless we can fall on some method of measur­
ing the quantity of heat as we do that of any other
fluid.

Mr Nicholson, who has collected the principal opini­
sions on the subject of heat, seems determined not to
accept the doctrine of Boyle or of Boerhave on the
subject. "There are two opinions (says he) concern­ing heat. According to one opinion, heat
consists in a vibratory motion of the parts of bodies
among each other, whose greater or lesser intensity oc­
casions the increase or diminution of temperature. Ac­
cording to the other opinion, heat is a fluid which
cannot pervade the pores of all bodies, causing them
to expand by its influence, and which, unless they
are endowed with some property of vibratory motion,
will not be communicated to the particles of bodies.
Each of these opinions is attended with its peculiar diffi­
culties. The phenomena of heat may be accounted for
by either of them; provided certain suppositions be
allowed to each respectively; but the want of proof of
the truth of such suppositions renders it very difficult,
if not impossible, to decide as yet whether heat consists
merely in motion or in some peculiar matter. The
word quantity, applied to heat, will therefore denote
either motion or matter, according to the opinion
made use of, and may be used indefinitely without de­
determining which."

"The chief advantage which the opinion that heat
is caused by mere vibration possesses, is its great sim­
pli city. It is highly probable, that all heated bodies
have an intrinsic motion, or vibration of their parts;
and it is certain that percution, friction, and other
methods of agitating the minute parts of bodies, will
likewise increase their temperature. Why, then, it is
demanded, should we multiply causes, by supposing the
existence of an unknown fluid, when the mere vi­

bration of parts which is known to obtain may be ap­
plied to explain the phenomena?"

To this the reply is obvious, that the vibration of parts is an effect; for matter will not begin to move of
itself: and if it is an effect, we must suppose a cause for
it; which, though we should not call it a fluid, would
be equally unknown and inexplicable with that whole
existance is asserted by those who maintain that fire is
a fluid per se. Dr Cleghorn, however, in the discussion
already quoted, affirms, that "heat is occasioned
by a certain fluid, and not by motion alone, as some
 eminent writers have imagined: because 1. Those
who have adopted the hypothesis of motion could
never even prove the existence of that motion for
which they contended; and though it should be
granted, the phenomena could not be explained by it.
2. If heat depended on motion, it would instantaneously pass through an elastic body; but we see
that heat passes through bodies slowly like a fluid.
3. If heat depended on vibration, it ought to be com­
municated from a given vibration in proportion to the
quantity of matter; which is found not to hold true
in fact. On the other hand, there are numberless arguments in favour of the opinion that heat proceeds from
elementary fire. 1. Mr Locke hath observed, that
when we perceive a number of qualities always existing
 together, we may gather from thence that there really
is some substance which produces these qualities. 2. The
hypothesis of elementary fire is simple and agreeable
to the phenomena. 3. From some experiments made
by Sir Isaac Newton, it appears, that bodies acquire heat
and cold as metals, until they become of the same tem­
perature with the atmosphere; so that heat exists in the
absence of all other matter, and is therefore a sub­
stance by itself."

But though these and other arguments seem clearly
difficulties concerning the nature and properties. If it be supposed a fluid, it is impossible to assign any limits to its extent;
and we must of necessity like­wise suppose that it per­
vades the whole creation, and consequently constitutes
an absolute plenum, contrary to a fundamental princi­
ples of the received system of natural philosophy. But
if this be the case, it is vain to talk of its being absorb­
ed, accumulated, collected, or attracted by different
bodies, since it is already pre­sent in all points of space;
and we can conceive of terrestrial bodies no other­wise
than as sponges thrown into the ocean, each of which
will be as full of fluid as it can hold. The different capac­
ities will then be similar to the differences between bits
of wood, sponge, porous stones, &c. for containing
water; all of which depend entirely on the structure of
the bodies themselves, and which, unless we could se­
parate the water by pre­sure, or by evaporation, would
be for ever unknown. Supposing it were impossible to
collect this water in the manner we speak of, we
could only judge of the quantity they contained by the
degree to which they swelled by being immersed in it.
It is easy to see, however, that such a method of
judging would be very inadequate to the purpose, as
substances might contain internal cavities or pores in
which water could lodge without augmenting the ex­
ternal bulk. This would suggest another method of
judging of the quantity, namely, the specific gra­
vity; and we might reasonably suppose, that substance of the greatest specific gravity would contain the smallest quantity of water, though still we could by no means determine what quantity they did contain, unless we could lay hold of the element itself.

This seems to be very much the case with elementary fire, if we suppose it to be a fluid per se. We judge of its presence by the degree of expansion which one heated body communicates to another: but this is only similar to the calculation of the quantity of moisture a sponge or any other body contains, by what it communicates to wood when it comes into contact with it; which never could be supposed to carry the least precautions to accuracy, though we should ascertain it with all imaginable exactness. It is likewise probable, that the most dense bodies contain the smallest quantity of fire, as they generally communicate least when heated to an equal temperature than those which are more rare, though we are far from having any perfect knowledge in this respect.

But the greatest difficulty of all will be, on the supposition that heat is a fluid, and an omnipresent one (which it must be, or there would be some places where bodies could not be heated), to answer the question: Why are not all bodies of an equal temperature, excepting only the differences arising from their specific densities, which render some capable of containing a greater quantity than others?—The difficulty will not be lessened, though the omnipresence of the fluid should be given up, if we suppose, as is generally done, that heat has a tendency to diffuse itself equally every way. If it has this tendency, what hinders it from doing so? Why doth not the heat from the burning regions of the torrid zone diffuse itself equally all over the globe, and reduce the earth to one common temperature? This indeed might require time; but the experience of all ages has shown that there is not the least advance towards an equality of temperature. The middle regions of the earth continue as hot, and the polar ones as cold, as we have any reason to believe that they were at the creation of the world, or as we have any reason to believe they will be while the world remains. This indeed is one of the many instances of the impropriety of establishing general laws from the trifling experiments we are capable of making, and which hold good only on the narrow scales on which we can make them, but are utterly insufficient to solve the phenomena of the great system of nature, and which can be solved only by observing other phenomena of the same system undisturbed by any manoeuvres of our own.

Again, supposing the objection already made could be got over, and satisfactory reasons should be given why an equilibrium of temperature in the earth and its atmosphere should never be obtained, it will by no means be easy to tell what becomes of the heat which is communicated to the earth at certain times of the year. This difficulty, or something similar, Dr Crawford seems to have had in view when treating of the effects of the evolution and absorption of heat. Thus, says he, "the Deity has guarded against sudden vicissitudes of heat and cold upon the surface of the earth.

"For if heat were not evolved by the process of congelation, all the waters which were exposed to the influence of the external air, when its temperature was reduced below 32°, would immediately become solid; and, at the moment of congelation, the progress of cooling would be as rapid as it was before the air had arrived at its freezing point.

"This is manifest from what was formerly observed respecting the congelation of different fluids. It was shown, that if the velocities of the separation of heat were equal, the times of the congelation would be in proportion to the quantities of heat which the fluids gave off from an internal source in the freezing process. Whence it follows, that if no heat were evolved, the congelation should be instantaneous.

"In the present state of things, as soon as the atmosphere is cooled below 32°, the waters begin to freeze, and at the same time to evolve heat; in consequence of which, whatever may be the degree of cold in the external air, the freezing maifs remains at 32°, until the whole is congealed; and as the quantity of heat extricated in the freezing of water is considerable, the progress of congelation in large masses is very slow.—That the absorption and extraction of heat in the melting and freezing of bodies has a tendency to retard the progress of these processes, is remarked by Mr Wilkie in his essay on latent heat. The same doctrine is likewise taught by Dr Black in his lectures.

"In the northern and southern regions, therefore, as the quantity of the cooling fluid in the ice is extricated from the waters, proportional to the degree of cold that prevails in the atmosphere. Thus it is that the severity of the frost is mitigated, and its progress retarded; and it would seem, that during this retardation of the cooling process, the various tribes of animals and vegetables which inhabit the circumpolar regions become gradually acquire power of resifting its influence.

"On the contrary, if, in the melting of ice, a quantity of heat were not absorbed, and rendered insensible, that substance, when it was exposed to a medium by which it was rendered warmer than 32°, would speedily become fluid, and the process of elevation would be as rapid as if no alteration in its form had taken place. If things were thus constituted, the vast maifs of ice and snow which are collected in the frigid zones would, upon the approach of summer, suddenly disolve, and great inundations would annually overflow the regions near to the poles.

"But by the operation of the law of the absorption of heat, when the ice and snow upon the return of spring have arrived at 32°, they begin to melt, and at the same time to imbibe heat: during this process, a large quantity of elementary fire becomes insensible; in consequence of which the earth is slowly heated, and those gradual changes are produced which are essential to the preservation of the animal and vegetable kingdoms.

"We may remark, in the last place, that this law equalizes not only refults sudden changes of temperature, but prevents them from being repeated in different climates, and that it likewise contributes to a more equal distribution of heat proportionate to the principle of heat throughout the various parts of the earth, in different seasons and climates. Thus the diurnal heats are moderated by the evaporation of the waters on the earth's surface, a portion of the fire derived from the sun being absorbed and extinguished by the vapours at the moment of their ascent. On the approach of night the vapours are again condensed, and falling in the form of dew, communicate

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...to the air and to the earth the fire which they had immersed during the day.

"It was before shown, that, in the regions near to the poles, when the vernal and summer heats prevail, provision is made for tempering the severity of the winter cold, a quantity of elementary fire, upon the dissipation of the ice and snow, being absorbed by the waters, and deposited, as it were, in a great magazine for the purpose of mitigating the intensity of the cold when the frost returns.

"From the experiments of Hales, Halley, and Watson, it appears, that vast quantities of water are continually converted into vapour by the action of the solar rays upon the portion of the earth's surface which is exposed to the light; and by the celebrated discovery of Dr Black, it is proved, that, in the process of evaporation, much elementary fire is absorbed. It is manifest, that this cause will have a powerful influence in mitigating the intensity of the heat in the torrid zone, and in promoting a more equal diffusion of it through the earth. For a considerable portion of the heat, which is excited by the action of the solar rays upon the earth's surface within the tropics, is absorbed by the aqueous vapours, which being collected in the form of clouds, are spread like a canopy over the horizon, to defend the subjacent regions from the direct rays of the sun. A great quantity of elementary fire is thus rendered intenable in the torrid zone, and is carried by the dispersion of the vapours to the north and to the south, where it is gradually communicated to the earth when the vapours are condensed."

"That all this takes place, as the Doctor has advanced, cannot be denied; but, by allowing it, the difficulty is not removed in the smallest degree, as will appear from a due consideration of the phenomena which he himself has mentioned. He owns that the sun communicates fire to the earth; the question is, What becomes of it, seeing the emission is continual? In summer, the air, the earth, and the water, are heated to a certain degree. On the sun's declining southward, the air first loses its heat. Whether does it go? It does not ascend into the higher regions of the atmosphere, of which we are constantly found colder than the parts below. It does not descend to the earth and water; for these give out the quantity they had absorbed, as Dr Crawford observes. Neither does it go laterally to the southern regions; for they are constantly very hot, and ought to impart their heat to those farther north, instead of receiving any from them. How comes it, then, that the atmosphere seems perpetually to receive heat without ever being fattated? or if the heat cannot be found going off either upwards, downwards, or sidewise, how are we to account for its disappearance?

This question seems to be altogether unsatisfactory on the supposition that heat is occasioned by the mere presence of a fluid; but if we suppose it to be only a particular mode of action of an omnipresent fluid, the whole difficulty vanishes at once. On this supposition indeed the question will naturally arise, Whence does this motion proceed, or by what is its action in general determined? Dr Berkenhout, in enumerating the properties of matter, exempts fire from two of those usually ascribed to other material substances, viz. gravitation and the vis inertiae. "According to the philosophers (says he), matter cannot move without being either impelled or attracted. I doubt much whether this is true of fire, and whether, when combined, motion be not one of its essential properties.—Gravitation seems also to be no property of fire, which moves with equal facility in all directions, and may be accumulated in hard bodies to any degree without increasing their weight. Fire, being the cause of volatility, seems rather to be in confant contradiction to gravity."

"But however essential we may suppose the motion of fire to be to it, there cannot be any self-existent mobility in its parts, otherwise it would soon be diffused equally throughout the universe, and the temperature of the whole reduced to an equilibrium. According to the present constitution of nature, we see that the distribution of heat is principally owing to the sun; and owing to what we call its quantity, depends on the position of the sun with regard to terrestrial objects and the length of time they are exposed to his rays. Heat is not produced while the rays have a direct passage; and therefore fluids through which they pass easily, as air, are not heated by the rays of the sun. But when the rays are impeded in their course, and reflected in considerable quantity, a degree of heat takes place, which is always greater or less in proportion to the intensity of the rays. In the reflecting substance, the heat will be comparatively greater in proportion to the quantity of rays which are absorbed or stopped in their course by it: but in any substance interposed between the sun and the reflecting body, the heat is proportional to the quantity of rays reflected. Now it is plain, that when the particles of light fall upon any opaque substance, and enter its pores, which by their extreme fubtility they are well calculated to do, they must make an attempt to pass directly through it in their natural course; but as this cannot be done, they will pass laterally, and in all directions, in consequence of being perpetually urged by the impulse of the light coming from the sun; and thus an action will be propagated in all directions as radii from a centre towards a circumference, which when it takes place in that fubtile fluid always produces what we call electricity."

"In completing the system of nature, we perceive three kinds of fluids of extreme fubtility, and very the identity much resembling one another, viz. fire, light, and electricity. That it should be agreeable to vulgar conception to suppose these all to be ultimately the same, is not surprising; and on examining the evidence of their identity, it will certainly be found exceedingly strong. They all agree in the property of exciting the fentation of heat in certain circumstances, and in not doing so in others. Fire, we know, in the common acceptance of the word, always does so; but when it affumes the latent and invisible state, as in the formation of vapour, it lays aside this seemingly essential property, and the vapour in which it is is devitalised. Light, when collected in a focus by a burning glass, i.e. when its rays converge towards a centre, and diverge or attempt to diverge from one, produces heat also: and so does the electric fluid; for it has been found that the aura converging from a very large conductor to the point of a needle, is capable of setting fire to a small cartridge of gunpowder, or a quantity of tinder surrounding it *. There seems also to be a connexion between..."
fire and electricity in another way; for in proportion as heat is diminished, or the bodies are cooled, electricity succeeds in its place. Thus all electric bodies by heat become condensers of electricity, and cannot be excited or made to show any signs of containing that fluid; but as soon as the heat is removed, their electric property returns. Water is naturally a conducting substance: by being frozen its conducting power is lessened, which shows an approach to electricity; and, by being cooled down to 20° below 0 of Fahrenheit, the ice actually becomes electric, and will emit sparks by friction like glass#. The atmosphere is a natural electric: but by a certain degree of heat it loses this property, and becomes a conductor; nor is there any doubt that its electric properties are increased in proportion to the degree of cold imparted to it. In the winter time, therefore, we must consider the frozen surface of the earth, the water, and the atmosphere of the polar regions, as forming one electrical machine of enormous magnitude; for the natural cold of those countries is often sufficient to cool the water to more than not below 0, and consequently to render it an electric. That this is really the case, appears from the exceedingly bright aurora borealis and other electric appearances, far exceeding any thing observed in this country. In the summer time, however, no such appearances are to be seen, nor anything remarkable except an excessive heat from the long continuance of the fun above the horizon. This quantity of heat then being succeeded by a proportionable quantity of electricity in winter, it is impossible to avoid concluding that the heat in summer becomes electric fluid in winter, which, going off through the celestial expanse, returns again to the grand source of light and heat from which it originally came; thus making room for the succeeding quantities which are to enliven the earth during the following summer.

Thus the disappearance of heat in winter, and of electricity in summer, in these countries, will be very naturally and easily accounted for. It is true, that the phenomena of thunder and lightning show the existence of this fluid in vast quantities during the summer season; but these phenomena are only partial, and therefore formidable to us, arisirring in comparison with the vast quantities of electric matter discharged by the continual flashing of the aurora borealis, not to mention the fire-balls and meteors called falling stars, which are very often to be seen in the northern countries. In the summer-time, the air which is an electric, heated by the rays of the sun, is excited or made to part with the fluid to the vapours contained in it; and it is the unequal or opposite electricity of the clouds to one another, or to the earth, which produces the lightning. But in winter, when the air, earth, and vapours, all become electric, they cannot discharge sparks from one to another as before; but the whole, as one connected and vaft electrified apparatus, discharges the matter almost in a continued stream for many months.

From a consideration of these and other phenomena of nature, as well as of the beet experiments which have hitherto been made, we must consider fire in the abstract as an omnipresent fluid, of such fubtility as to pervade all terrestrial substances. When by any means it is made to diverge every way as from a centre, there it operates as heat; expands, rarefies, or burns, according to the intensity of its action. Proceeding in straight lines and parallel lines, or such as diverge but little, it acts as light, and shows none of that power discoverable in the former case, though this is easily discoverable by making it converge into a focus. In a quiescent state, or where the motion is but little, it prolixes on the surfaces of bodies, contracts and diminishes them every way in bulk, forces out the expanding fluid within their pores, and then acts as cold. In this case also, being obliged to sustain the vehement action of that part of the fluid which is in motion, it flies with violence to every place where the pressure is lessened, and produces all the phenomena of Electricity.

§ 1. Of the Nature of Heat.

The manner in which the phenomena of heat may be solved, and its nature understood, will appear from the following propositions.

1. It is in all cases observed, that when light proceeds in considerable quantity from a point, diverging as the radii of a circle from its centre, there a considerable degree of heat is found to exist, if an opaque body, having no great reflective power, is brought near that point.

2. This action of the light, therefore, may be accounted the ultimate cause of heat, without having recourse to any further suppositions; because nothing else besides this action is evident to our senses.

3. If the point from which the rays are emitted is placed in a transparent medium, such as air or water, that medium, without the presence of an opaque body, will not be heated.

4. Another cause of heat, therefore, is the resistance of the parts of that body on which the light falls, to the action mentioned in Prop. 1. Where this resistance is weak, as in the cases just mentioned, the heat is either nothing, or very little.

5. If a body capable of reflecting light very copiously is brought near the lucid point, it will not be heated#.

6. A penetration of the light, therefore, into the substance of the body, and likewise a considerable degree of resistance on the part of that body to the action of the light, are the requisites to produce heat.

7. Those bodies ought to conceive the greatest degrees of heat into whole substance the light can best penetrate, i.e. which have the least reflective power, and which most strongly resist its action; which is evidently the case with black and solid substances.

8. By heat all bodies are expanded in their dimensions every way, and that in proportion to their bulk and the quantity of heat communicated to them.

9. This expansion takes place not only by an addition of sensible heat, but likewise of that which is latent. Of this last we have a remarkable instance in the case of snow mixed with spirit of nitre. The spirit of nitre contains a certain quantity of latent heat, which cannot be separated from it without effecting a change on the spirit itself; so that, if deprived of this heat, it would no longer be spirit of nitre.—Besides this, it contains a quantity of sensible heat, of a great part of which it may be deprived, and yet retain its characteristic properties as nitrous acid. When it is poured upon snow, the latter is immediately melted by the action of the latent heat in the acid. The snow cannot
be melted or converted into water, without imbuing a quantity of latent heat, which it receives immediately from the acid which melts it. But the acid cannot part with the heat without decomposition; to prevent which, its sensible heat occupies the place of that which has entered the snow and liquefied it. The mixture then becomes exceedingly cold, and the heat forces into it from all the bodies in the neighbourhood; so that, by the time it has recovered that quantity of sensible heat which was lost, or arrived at the temperature of the atmosphere around it, it will contain a considerably larger quantity of heat than it originally did, and is therefore observed to be expanded in bulk. Another instance of this expansive power of latent heat is in the case of steam, which always occupies a much larger space than the substance from which it was produced; and this whether its temperature is greater or less than the surrounding atmosphere.

10. The difference between latent and sensible heat, then, as far as we can conceive, is, that the expansive power of the former is directed only against the particles of which the body is composed; but that of the latter is directed also against other bodies. Neither doth there seem to be any difference at all between them farther than in quantity. If water, for instance, hath but a small quantity of heat, its parts are brought near each other, it contracts in bulk, and feels cold. Still, however, some part of the heat is detained among the aqueous particles, which prevents the fluid from condensing into a solid mass. But, by a continuation of the contracting power of the cold, the particles of water are at last brought so near each other that the internal or latent heat is forced out. By this discharge a quantity of air is also produced, the water is congealed, and the ice occupies a greater space than the water did; but then it is full of air-bubbles, which are evidently the cause of its expansion. The heat then becomes sensible, or, as it were, lies on the outside of the matter; and consequent is coldly diffipated into the air, or communicated to other bodies. Another way in which the latent heat may be extracted is by a continuous addition of sensible heat. In this case the body is first raised into vapour, which for some time carries off the redundant quantity of heat. But as the quantity of this heat is continually increased, the texture of the vapour itself is at last totally destroyed. It becomes too much expanded to contain the heat, which is therefore violently thrown out all on sides into the atmosphere, and the body is said to burn, or be on fire. See Combustion, Flame, and Ignition.

11. Hence it follows, that those bodies which have the least share of latent heat, appear to have the greatest quantity of sensible heat; but this is only in appearance, for the great quantity they seem to contain is owing really to their inability to contain it. Thus, a body composed of a fluid is capable of emitting heat through it as fast as it received it; if such a substance was set over a fire, it would be as hot as the fire itself, and yet the moment it was taken off, it would be perfectly cool, on account of its incapacity to detain the heat among the particles of which it was composed.

12. The heat, therefore, in all bodies consists in a certain violent action of the elementary fire within them tending from a centre to a circumference, and making an effort to separate the particles of the body from each other, and thereby to change its form or mode of existence. When this change is effected, bodies are said to be diffipated in vapour, calcined, vitrified, or burnt, according to their different natures.

13. Inflammable bodies are such as are easily raised in vapours; that is, the fire easily penetrates their parts, and combines with them in such quantity, that, becoming exceedingly light, they are carried up by the atmosphere. Every succeeding addition of heat to the body increases also the quantity of latent heat in the vapour, till at last, being unable to retain its action, the heat breaks out all at once, the vapour is converted into flame, and is totally decomposed. See the article Flame, and Prop. 10.

14. Uninflammable bodies are those which have their parts more firmly connected, or otherwise disposed in such a manner, that the particles of heat cannot easily combine with them or raise them into vapour.

15. Heat therefore being only a certain mode of the action of elementary fire, it follows, that the capacity of a body for containing it, is only a certain constitution of the body itself, or a disposition of its parts, which can allow the elementary fire contained in it to exert its expansive power upon them without being diffipated on other bodies. Those substances which allow the expansive power of the fire to operate on their own particles are said to contain a great deal of heat; but those which throw it away from themselves upon other bodies, though they feel very hot, yet philosophically speaking they contain very little heat.

16. What is called the quantity of heat contained in any substance, if we would speak with the strictest propriety, is only the apparent force of its action, either upon the parts of the body itself, or upon other bodies in its neighbourhood. The expansive force of the elementary fire contained in any body upon the parts of that body, is the quantity of latent heat contained in it; and the expansive force of the fire exerted upon other bodies which touch or come near it, is the quantity of sensible heat it contains.

17. If what we call heat consists only in a certain action of that fluid called elementary fire, namely, its expansion, or acting from a centre to a circumference, it follows, that if the same fluid acted in a manner directly opposite to the former, or pres by upon the particles of a body as from a circumference to a centre, it will then produce effects directly opposite to those of heat, i.e. it will then be absolute cold, and produce all the effects already attributed to cold. See that article.

18. If heat and cold then are only two different modifications of the same fluid, it follows, that if a hot body and a cold one are suddenly brought near each other, the heat of the one ought to drive before it a part of the cold contained in the other, i.e. the two portions of elementary fire acting in two opposite ways, ought in some measure to operate upon one another, as any two different bodies would when driven against each other. When a hot and a cold body therefore are brought near each other, that part of the cold body farthest from the hot one ought to become colder than before, and that part of the hot body farthest from the cold one ought to become hotter than before.

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19. For the same reason, the greatest degree of cold in any body ought to be no obstacle, or at least very little, to its conceiving heat, when put in a proper situation. Cold air, cold fuel, &c. ought to become as intensely heated, and nearly as soon, as that which is hotter.

The two last propositions are of great importance. When the first of them is thoroughly established, it will confirm beyond a doubt, that cold is a positive, as well as heat; and that each of them has a separate and distinct power, of which the action of its antagonist is the only proper limit; i.e. that heat can only limit the power of cold, and vice versa. A strong confirmation of this proposition is the experiment related by M. Geoffroy; an account of which is given under the article Cold. Another, but not so well authenticated, is related under the article Congelation.

—De Luc’s observation also, mentioned by Dr Clegborne, affords a pretty strong proof of it; for if the lower parts of the atmosphere are cooled by the passage of the sun’s rays at some distance above, and it has been already shewn, they do not attract the heat from the lower parts, it follows, that they must expel part of the cold from the upper regions.

The other proposition, when fully established, will prove, that heat and cold are really convertible into one another; which indeed seems not improbable, as we see that fires will burn with the greatest fierceness during the time of intense frosts, when the coldest air is admitted to them; and even in those diffused regions of Siberia, when the intense cold of the atmosphere is sufficient to congeal quicksilver, it cannot be doubted that fires will burn as well as in this country; which could not happen if heat was a fluid, and capable of being carried off, or absolutely diminished in quantity, either in any part of the atmosphere itself, or in such terrestrial bodies as are used for fuel.

§ 2. Of the general Effects of Heat.

Having said thus much concerning the nature of heat in general, we come now to a particular explanation of its several effects, which indeed constitute the whole of the active part of chemistry. These are,

1. Expansion, or increase of bulk in every direction. This is a necessitous consequence of the endeavour which the fluid makes to escape in all directions, when made to converge into a focus. The degree of expansion is unequal in different bodies, but in the same body is always proportionable to the degree of heat applied. There are two different instruments in use for ascertaining the degrees of expansion; and as we have already shewn, that the degree of heat can only be known by the expansion, these effects of heat upon the instrument are usually taken for the degrees of heat themselves. These instruments are called the Thermometer and Pyrometer. The former is composed of a glass tube, with a globe or rather oval tube at one end, and exactly closed at the other: it is most usually filled with mercury or spirit of wine; but mercury is generally preferred on account of its expansions being more equal than those of any other fluid. It has the disadvantage, however, of being subject to congelation; which is not the case with spirit of wine, when very highly rectified. Spirit-of-wine thermometers, therefore ought not to be entirely disused, but seem rather a necessary part of the chemical apparatus, as well as those made of mercury.

2. As no thermometer can be used with any fluid that can measure either the degrees of heat about the point at which it boils, or the degree of cold below which it congeals, instruments have been contrived by which the expansion of solid bodies, though much less than what is occasioned by an equal degree of heat in a fluid, may become visible. These were usually called Pyrometers; but Mr Wedgwood has lately contrived a method of connecting the two together, in which the highest degree of heat, exceeding even that of a glafs-house furnace, may be measured as accurately as the more moderate degrees by the common mercurial thermometer. See Thermometer.

Expansion in some cases does not appear to be the influence of the body, which has two remarkable instances. The first is the expansion of bodies by heat, when a piece of a fluid body is changed into a solid, and then heated to its conceiving heat, when very highly rectified. The ball, being made very strong, resisted the expanding force of the water twice, even though a considerable part of its thickness had been pared off when it was perceived to be strong at first. At the third time it burst; and by a calculation founded on the thickness of the globe and the tenacity of the metal, it was found that the expansive power of a sphere of water only one inch in diameter, was sufficient to overcome a resistance of more than 27,000 pounds, or 13 tons and a half.

A power of expansion so prodigious, little less than that of the most powerful steam-engines, and more than twice as strong as that of the best cannon, would have been sufficient to burst the body, or to make it expand to such an extent as to fill a room. Dr Black, however, has demonstrated, that these are only air extricated during the congelation; and to the extrication of this air he very justly attributes the prodigious expansive force exerted by freezing water. The only
only question, therefore, which now remains is, By what means this air comes to be extricated, and to take up more room than it naturally does in the fluid? To this we can scarce give any other answer, than that part of the heat which is discharged from the freezing water combines with the air in its undissipable state, and, by restoring its elasticity, gives it that extraordinary force, as we see also in the air suddenly extricated in the explosion of gunpowder. Thus expansion, even in the cafe of freezing, is properly an effect of heat; and must therefore be considered as a phenomenon uniformly and certainly attending the action of heat, and in all cafes to be ascribed to it.

The only way in which the element or fluid of fire can be supposed to act, and the way in which we have a rational idea of its being able to produce both heat and cold according to the diversity of its actions, has been already explained so fully, that it is needless at present to enter into any further discussion of the subject. It will easily appear, that the capacity for containing heat is nothing different from the action of heat upon that body in expanding, and at last altering its form in such a manner, as either to be able to intiminate itself among the particles in much greater quantity than before; still retaining its internal action, though the external one becomes imperceptible; or, if actuating them in such a manner, that it breaks forth in great quantity in its peculiar appearances of fire and light: in the former case producing vapour or smoke, and in the latter flame, as shall afterwards be more fully explained. It must likewise appear, that to determine the quantity of heat in any body is altogether impossible; and with regard to the lowest degree of heat, or total expulsion of that fluid, so far from being able to determine what it is, the probability must be, that nature does not admit of any such thing; for if heat confits in the expansive action of a certain fluid, and cold in its opposite or contraactive action, there is very little reason to suppose that the constitution of nature will allow any one of these actions entirely to cease, as it does not appear by what means it could again be renewed. Cold, as we have already seen, always tends to conjugate electricity; and the connexion between that and fire is so strong, that we cannot suppose the former to be carried to any great extreme without producing the latter. Whatever we may therefore suppose concerning the capacities of different bodies for containing heat, or concerning the point of total privation of heat, must be altogether void of foundation. A rule, however, has been given by Mr. Kirwan for finding the point of total privation, which, together with its demonstration, we shall subjoin; and as it is necessary for the better understanding of this, to call to remembrance what has been said concerning the difference between the temperatures and specific heats of different bodies, we shall infer an epitome of the doctrine from Mr. Nicholson.

If two equal bodies of different kinds and temperatures be brought into contact, the common temperature, will seldom, if ever, be the mean betwixt the two original temperatures; that is to say, the surplus of heat in the hotter body will be unequally divided between them, and the proportions of this surplus retained by each body will express their respective dispositions, affinities, or capacities for heat. If, therefore, a given substance, as for example fluid water, be taken as the standard of comparison, and its capacity for heat be called one, or unity, the respective capacities of their bodies may be determined by experiment, and expressed in numbers in the same manner as specific gravities usually are. And because it is established as well from reason as experiment, that the same capacity for heat obtains in all temperatures of a given body, so long as its state of fluidity, fluidity, or vapour is not changed, it will follow, that the whole quantities of heat in equal bodies of a given temperature will be as those capacities. And as the respective quantities of heat in bodies of equal weight and temperature give the proportions of their specific heats.

A greater capacity for heat, or greater specific heat, in a given body, answers the same purpose with respect to temperature as an increase of the mass; or the quantity of heat required to be added or subducted, in order to bring a body to a given temperature, will be as its capacity or specific heat.

The capacities not only differ in various bodies, but also in the same body, according as it is either in a solid, fluid, or vaporous state. All the experiments hitherto made confpire to show, that the capacity, and consequently the specific heat, is greatef in the vaporous, least in the fluid, and least in the solid state.

The quantity of heat that constitutes the difference between the several states, may be found in degrees of the thermometer. Thus if equal quantities of water at 162° and ice at 32° of temperature be mixed, the ice melts, and the common temperature becomes 32°; or otherwise, if equal quantities of frozen or fluid water, both at 32°, be placed in a like situation to acquire heat from a fire, the water will become heated to 162°, while the ice melts without acquiring any increase of temperature. In either case the ice acquires 130° of heat, which produces no other effect than rendering it fluid. Fluid water, therefore, contains not only as much more heat than ice, as is indicated by the thermometer, but also 130°, that is in some manner or other employed in giving it fluidity. As fluid water cannot become ice without partaking with 130° of heat besides what it had above 32° in its temperature, so also steam cannot become condensed into water without imparting much more heat to the matters it is cooled by, than water at the same temperature would have done.

The heat employed in maintaining the fluid or vaporous form of a body, has been called latent heat, because it does not affect the thermometer.

From the consideration of the specific heats of Mr. Kirwan's body in the two states of fluidity and solidity, and the difference between those specific heats, is rem for a deduced method of finding the number of degrees, which denote the temperature of any body immediately after congelation, reckoned from the natural zero, or absolute privation of heat. The rule is; multiply the degrees of heat required to reduce any solid to a fluid state, by the number expressing the specific heat of the fluid: divide this product by the difference between the numbers expressing the specific heat of the body in each state: the quotient will be the number of
The quantity of heat required to produce a given change of temperature in a body is as its capacity; and consequently the changes of temperature, when the quantity of heat is given, will be inversely as the capacities: therefore, \( n : m = \frac{\ln t}{\ln i} \),

which is the rule abovementioned.

"If the data \( i, m, \text{ and } n \) be accurately obtained by experiment, in any one instance, and the difference between the zero of Fahrenheit's scale and the natural zero be there found in degrees of that scale, this difference will serve to reduce all temperatures to the denomination which commences at the natural zero. So that \( s \) being known in all cases, if any two of the quantities \( i, m, \text{ or } n \) be given in any body, the other may be likewise had. For \( i = \frac{m - s}{n - i} \), and \( n = \frac{m - i}{s - i} \),

"To give an example of this curious rule, let it be required to determine how many degrees of refrigeration would absolutely deprive ice of all its heat? The degrees of heat necessary to melt ice are 130; and the specific heats of ice and water are as 9 to 10. The number 130 multiplied by 10, produces 1300, and divided by the difference between 9 and 10 gives 1300: therefore if ice were cooled 1300 degrees below 32°, or to \(-108\) of Fahrenheit's scale, it would retain no more sensible heat.

II. Fluidity is another effect of heat, and is capable of taking place in all bodies hitherto known, when the fire is carried to a certain pitch. Theories have been invented, by which fluidity was ascribed to the malleable and round figures of the particle whereof bodies were composed, and solidity to an angular or irregular figure. It has also been ascribed to a stronger degree of attraction between the parts of solids than of fluids. Dr Black, however, has shown, that in the case of melting ice, we are certainly to ascribe the acquired fluidity of the water to the absorption of heat. This was determined by a decisive experiment, in which he exposed a Florence-bottle full of water to the atmosphere in a warm room, when he found that the heat in the air evidently left it, to flow into the ice in the bottle, and reduced it to fluidity. The air thus deprived of its heat, he felt sensibly descending like a cold blast from the bottle, and continuing to do so as long as any of the ice remained unthawed; yet after it was all melted, the temperature of the fluid was no more than 32°. Different degrees of heat are requisite for converting different solids into fluids, for which see the Table of Degrees of Heat.

This theory receives an additional confirmation from General Theory.

The quantity of heat which is always known to be produced by the conversion of a fluid into a solid. And that this is really the case appears, 1. From what happens in the congelation of waters, it appears that ice is formed very slowly, and with several circumstances which support the theory. — Thus, if we suppose equal quantities of water to the air, which is perhaps 10 below frost, and add to one of these a small quantity of salt or spirit of wine, and observe the cooling of each, we shall find them both grow gradually colder, until they arrive at the temperature of frost; after which the water containing the salt will continue to grow colder, until it has arrived at the temperature of the air, at the same time that only a small quantity of the other water is converted into ice. Yet were the common opinion just, it ought all to have been congealed by this time; instead of which, it is scarce grown a degree colder during the whole time. Its remaining at the same temperature for so long a time, shows that it has been communicating heat to the atmosphere; for it is impossible that any body can remain in contact with another that is colder, without communicating heat to it. Whence then comes this heat? There must be some source adding to the sensible heat of the water, so as to keep its temperature to the freezing point: and this source of heat must be very considerable; for it will continue to act for a very long time before the water is changed into ice; during all which time, even to the last drop, the water is not a degree colder than 32° of Fahrenheit's thermometer. This, therefore, is the latent heat of the water, which had formerly entered into it during its transition from ice to a fluid state.

A still stronger argument is derived from the following experiment; which evinces that the fluidity of water really depends upon its latent heat, and that the sensible heat is only a mean or condition to its containing the latent heat. This experiment consists in exposing water contained in a covered beer-glasses to the air of a cold frosty night; and when the atmosphere is at the temperature of perhaps 16° or 12° below 32° of frost, the water will continue at that temperature without freezing; so that the fluidity of the water, which does not altogether depend on the quantity of sensible heat contained in it. The congelation, however, may be brought on by touching it with a bit of ice, with the extremity of a wire, by a shock upon the board, or otherwise disturbing it; and we then find the temperature suddenly raised up to 32°. This shows plainly, that the water has a disposition to retain the quantity of latent heat, upon which its fluidity must immediately and necessarily depend; and it retains it with a certain degree of force, so as to keep the water fluid in a temperature below that in which it usually parts with the latent heat and congeals. By disturbing it, however, we instantly bring on the congelation, which cannot take place without an excitation of the latent heat; which then, being changed into the ordinary or moveable heat, raises the thermometer as usual. The quantity of heat discharged from the first small portion of ice formed in the water is sufficient to prevent any more latent heat from separating, and consequently from any more ice being produced till more of the sensible heat is abstracted.

This doctrine extends not only to such bodies as are actually converted from a solid to a fluid, or from
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General Theory.

118 Heat the atmosphere, and enabled to rise in it. To account for the certain degree of heat below which every body is solid, the experiment being to show how far the evaporation of a fluid may be rendered specifically lighter than the surrounding fluid, the boiling point, but after the fluid gradually receives a sensible form, and keeps up the temperature, proving a source of specific heat, which is communicated to the neighbouring bodies as well as the surrounding air. The fixness and ductility of bodies depend on this also.

III. Evaporation. A third effect of the action of heat is that of converting bodies into vapour, by which they are rendered specifically lighter than the surrounding atmosphere, and enabled to rise in it. To account for this, many theories have been invented; but that of Dr Black, who accounts for it, as well as fluidity from the abstraction of latent heat, is now universally received. The circumstances by which he proves and illustrates his doctrine are the following:

1. When we attend to the phenomena of boiling water, in a tea kettle for instance, it may, when first put upon the fire, be at the temperature of 48° or 50°. In a quarter of an hour it will become heated to 212°. It then begins to boil, and has gained 162° of vapour in that time. Now, if the conversion of it into vapour depended on the quantity of sensible heat introduced, we might ask how long it will be necessary to raise it all in vapour? Surely another quarter of an hour should be sufficient; but this is far from being the case.

Dr Black made some experiments upon this subject in conjunction with another gentleman. Having the opportunity of what is called a kitchen-table or a thick plate of cast iron, one end of which was made sufficiently red-hot, they set upon this some iron vessels with circular flat bottoms, of about four inches diameter, and which contained a quantity of water. The temperature of the water was noted, as also when it began to boil; and when the whole of it was boiled away, it was found, that when set on the table its temperature had heat diminished very fast till it became opaque and almost in a latent state, for the iron plate contained equally hot, the whole time. The vessels were of different shapes, some of them cylindrical, some conical, others widening upwards; one of the designs of the experiment being to show how far the evaporation was retarded by the particular form of the vessels.

By suspending a thermometer in the mouth of one of the evaporating vessels, the heat of the steam was found to be exactly 212°; so that as the great quantity of heat absorbed was found neither to have remained in the water, nor to have been carried away by the steam in a sensible manner, we have nothing left to suppose, but that it flew off as one of the component parts of the steam in a latent state.

2. In an experiment to show the fixness of the boiling point of water, Dr Black inclosed some of that fluid in a strong vessel having a thermometer in it, and stopped close with a cork. By the application of heat to the cork he hoped now to be able to raise the thermometer some degrees above the boiling point, which would be the natural consequence of the confinement of the steam. When this was done, he pulled out the cork, and supposed that the water would now all fly out in vapour; but in this he was totally disappointed; a sudden and very tumultuous boiling ensued, which threw out some of the water; but though some quantity of steam like-wise flew, the quantity of water was not considerably diminished. The vessel had been heated to 20° above the boiling point, but almost instantly cooled down to 212°, when the cork was taken out.

3. Mr Watt, in making some experiments on the force of steam, had occasion to use Papin's digester, with a pipe proceeding from its side; the orifice of which was shut with a valve pressed down by one end of a lever. Thus he heated steam to 400° of Fahrenheit, and therefore had 5. Thus he heated steam to 420° above the boiling point, but almost instantly cooled down to 212°, when the cork was taken out.

4. The change of sensible into latent heat in the boiling water in vacuo, Mr Boyle took a quantity of water in vacuo determined by Mr Boyle's air-pump. In consequence of this it began again to boil, and continued boiling till it was only lukewarm, and it soon arrived at this temperature; so that in this case also the heat had disappeared during the conversion of the fluid into vapour. Others have repeated the experiment, as Boerhaave, Mufchenbroek, and Robison, Mr Robins, who lectures on chemistry in Glasgow, says that the heat diminishes very fast till it comes to 90° or 95°. Glen, which seems to be the boiling point of water in vacuo.

5. Thus also we may understand some curious experiments made by Dr Cullen upon ether and other volatile...
Theory.

General Effects of Heat.

Dr Cullen's experiments on cold produced by evaporation.

Mr Watt's experiments on the condensation of fluids in vacuo.

Heat expelled in great quantity by the condensation of vapour.

On this principle we may explain some curious experiments made by Mr Watt with regard to the evaporation of fluids in vacuo. That gentleman had formed a design of converting water into steam with less expense of fuel, which he imagined might be done by removing the preasure of the air from the water, which he thought would thus require a much smaller quantity of fuel to convert it into vapour. Dr Black, however, perceiving that only the small quantity ofensible heat the steam polysed could thus be carried off, informed him beforehand that his project would not be found attended with the advantages he imagined. The experiment, however, was made in the following manner: A still was procured of tinned iron, the body of which resembled that of a retort, with a vessel serving as a condenser; the whole apparatus being close, excepting a little hole in the extremity of the condensing vessel. He first exhausted this vessel of air by holding the condenser over the retort, in which some boiling water was contained, until it was entirely converted into steam. He then suddenly stopped the little hole, and removed the vessels from the fire; when, after they were cooled, there was a pretty perfect vacuum formed by the condensation of the steam. The retort was then put on the fire, and turned so that the pipe and condensing vessel should hang downward; and plunging them into cold water, he employed some persons to make experiments upon the cold produced by evaporation; and willing to repeat them himself in vacuo, he put some of the most volatile liquids under the receiver of an air-pump. One of these was ether. It was contained in a glass, in which there was also placed some water. When the air was extracted, the ether began to boil, and to be converted into vapour, till it became so very cold that it froze the water contained in the vessel, though the temperature of the room was about 50°. Here therefore there was a quantity of heat which disappeared all of a sudden; which it is plain could not be owing to its having any communication with that of the atmosphere or other cold bodies, as they could not render it colder than they were themselves. Either therefore is to be considered as a fluid so volatile, that were it not for the preasure of the atmosphere it would be perpetually in the state of vapour.

6. That this heat which enters into the vapour is not destroyed, but remains in a latent state, is easily proved; for we find that a great quantity of heat is expelled from vapour when it is condensed again to form the body it composed originally. This is easily ascertained by observing the quantity of heat communicated to the water in the refrigeratory of a still by any given quantity of liquid which comes over. Thus, if the refrigeratory contain 100 pounds of water, and the distillation be continued till only one pound has come over, suppose the water in the refrigeratory to have received 8° of heat; it is plain, that if the whole of the quantity thus received could be thrown into one pound of water, the latter would be heated to 800°; which is sufficient to make an equal space of iron red-hot. But that this quantity of heat is received by the water in the refrigeratory has appeared from several experiments, which show that water, by being converted into vapour, absorbs between 800° and 900° of heat.

Mr Watt's experiments on the evaporation of fluids in vacuo.

On this principle we may explain some curious experiments made by Mr Watt with regard to the evaporation of fluids in vacuo. That gentleman had formed a design of converting water into steam with less expense of fuel, which he imagined might be done by removing the preasure of the air from the water, which he thought would thus require a much smaller quantity of fuel to convert it into vapour. Dr Black, however, perceiving that only the small quantity ofensible heat the steam polysed could thus be carried off, informed him beforehand that his project would not be found attended with the advantages he imagined. The experiment, however, was made in the following manner: A still was procured of tinned iron, the body of which resembled that of a retort, with a vessel serving as a condenser; the whole apparatus being close, excepting a little hole in the extremity of the condensing vessel. He first exhausted this vessel of air by holding the condenser over the retort, in which some boiling water was contained, until it was entirely converted into steam. He then suddenly stopped the little hole, and removed the vessels from the fire; when, after they were cooled, there was a pretty perfect vacuum formed by the condensation of the steam. The retort was then put on the fire, and turned so that the pipe and condensing vessel should...
not mis of being made red hot. Dr Black has also frequently seen the vapour of water heated by throwing it into the alu- pit of a furnace, so as to produce a very large and transparent flame in rising up through the vent. There is reason therefore to conclude, that ignition is one of the more general effects of heat, only that some bodies are incapable of it until they be reduced to a state of vapour.

V. The last of the effects of heat here to be taken notice of is inflammation. It differs from ignition in this, that the bodies subject to the latter gradually grow cooler as soon as they are taken out of the fire, without undergoing any considerable change; while those subject to inflammation become continually hotter and hotter, communicating a vast quantity of heat to others, and undergoing a kind of decomposition themselves, infomuch, that by this means they have been thought to be reduced to their constituent principles or elements. Some substances indeed seem to be an exception to this, as in the open air they burn totally away, without leaving any residuum or producing any foot. These are spirit of wine, sulphur, and especially inflammable air; which last, by a proper mixture with dephlogificated air, may be totally consumed, that scarce a fifth part of the two will remain. On a careful examination of these substances, however, we find that there is by no means a total combination, or indeed, properly speaking, any combustion at all, at least if we measure the quantity of matter by the weight of the substance employed. Thus, if we are at pains to collect the vapour of burning spirit of wine, we will find, that an aqueous dew is collected, which sometimes equals the spirit of wine itself in weight. With regard to sulphur, the cace is still more evident; for the vapour of this, when collected, not only equals but greatly exceeds the weight of the sulphur employed; and on burning dephlogificated and inflammable air together, as much water is found to be produced as nearly equals the weight of both airs. In like manner, when we collect the ashes, water, foot, and oil, procured by burning any of the common inflammable substances, we will find, that they in general exceed the weight of the matter employed. The great waste of bodies by fire, therefore, is owing to the dissipation of the volatile principles they contain, which are carried off and rendered invisible by being mixed with the atmosphere.

The processes of inflammation have long been explained from the presence of a substance called phlogiston in those bodies which are subject to it, and which is supposed to be the same in all bodies belonging to this class; the differences between them arising from the principles with which it is combined. This doctrine, which was first introduced by Stahl, has given occasion to such various and discordant theories, that the existence of phlogiston has been lately denied altogether by M. Lavoisier, who brought in a new method of solving the phenomena of fire, heat, and ignition, without any allusion from this principle.

The foundation of M. Lavoisier’s doctrine is the increase of weight in metals by calcination. This increase he finds to be precisely, or very nearly so, proportional to the decrease of weight in the air in which they are calcined. His theory, therefore, is, that in the act of calcination, the pure part of the air, which he calls the acidifying or oxygenous principle, unites with the metal, and converts it into a calx. In effects of like manner, in substances truly inflammable, the heat and flame are supposed to proceed from the union of the pure air, or the oxygenous principle, with the substance, and converting it into those principles which are found to remain after inflammation. Thus the increased weight of the substance is easily accounted for; while the inflammation, in his opinion, is nothing more than a combination of the inflammable body itself with pure air, which has an attraction for it: and in confirmation of that it is urged, that when combustion is performed in empyreal or dephlogificated air, the whole of the latter is absorbed; but in common atmospheric air only one-fourth, being the quantity of pure air contained in it.

Other arguments in favour of this opinion are, that the calxes of the perfect metals may be reduced without addition by the mere emission of the oxygenous principle, (dephlogificated air); by an union with which it affumes the form of a calx. Thus he evades a very strong argument used by the opposite party; who adduced, as a proof of the existence of phlogiston, the calxes of perfect metals without addition. A dispute between M. Lavoisier and Dr Priestley concerning the reduction of the whole of a chemic calx, formed by an union with the nitrous acid without addition; the Doctor be- lieved that the whole could not be reduced by mere heat, but that a very perceptible quantity was always lost: but on a thorough examination of the subject, the truth seemed rather to lie on M. Lavoisier’s side. See AEREOLOGY.

Another theory, somewhat similar to that of Lavoisier’s, has been published by Dr Lubbock, in an Inaugural Dissertation in 1784. In this he supposes two kinds of matter to exist in the universe; one he calls the principle properum, the other the principle for- bile; and it is this latter, which, according to our author, is the principle of mutability, or which by being united in various proportions with the other, forms bodies of all the different kinds we see in nature. It is this principle, therefore, which he supposes to be ab- sorbed in the calcination of metals, and not empyreal air, as M. Lavoisier supposes; and he contends, that this same principle extends throughout the whole sy- stem of nature, even to the utmost celestial bounds.

It would exceed the limits of this treatise to give an account of the various theories which have been invent- ed, and the arguments used for and against them; nor is it in any measure do any of the preceding disqui-sites have reduced the dispute into a much narrower compass than before, and furnished the most decisive arguments in favour of the existence of phlogiston.

The greatest objection to the belief of this prin- ciple was, that it could neither be seen nor felt by our senses directly, nor discover itself indirectly by the weight it communicated to the bodies with which it was united; on the contrary, the latter always became lighter in proportion to the quantity they contained: so that it was imagined, instead of being pofterious of itself, any specific gravity of its own, to be a principle of po- gravity. This idea, such as that of heat or light may be rea- sonably supposed. This objection, however, is now entirely removed; and phlogiston in the abstract is found.
Theory of the effect of Heat.

Common charcoal and phlogiston the same.

Gwu:d man, certain its quantity with the union of spirit of wine with the metal), and which like produced by the charcoal, is enabled to been discovered by Dr PRIESTLEY. Still, it was inferred by the French philosophers and others, that no facts had been adduced against M. Lavoisier, nor any decisive proofs of this identity given by Mr Kirwan. It was sufficient at present to mention, that he has been able to convert the purest spirit of wine, and one of the hardest metals, viz. copper, as well as several others, into a substance entirely resembling charcoal; that by means of the heat of a burning glaas in vacuo, he has distilled this metallic charcoal, as well as the common kind, entirely into inflammable gas, which is the subject of water, and the aid of the charcoal, is enabled to resist conflagration in the common way. This inflammable air, when absorbed by metallic calces, again reduces them to their metallic form, and perhaps is the true solvent of it; and by a combination with the element of heat, with the aid of the charcoal, is enabled to resist conflagration in the common way.* This inflammable air, when absorbed by metallic calces, again reduces them to their metallic form: so that here is one fact by which the phlogiston not only appears to our senses, but we are able to ascertain its quantity with the utmost precision. Nor can it here be any objection, that the reduced metal is lighter than the calx; for this only proves that the metallic earth, which a calx is united to a heavy ingredient (the basis of dephlogisticated air), and in the latter to a light one, viz. charcoal, the basis of inflammable air.

Another case in which the existence of phlogiston is made equally evident to our senses, and where no such objection can occur, is related under the article AEREOLOGY, n° 112. It is there shown, that "by the loss of one grain of charcoal of copper (formed by the union of spirit of wine with the metal), and which like charcoal was consumed without having any residue, he reduced four ounce-measures of dephlogisticated air till only one-ninth remained unabsorbed by water; and, again, with the loss of one grain and a half of charcoal, and an half measures of dephlogisticated air were reduced till five and an half measures were pure fixed air."—Here, then, is an absolute and undeniable evidence, that fixed air is composed of dephlogisticated air, and charcoal or phlogiston, and elementary fire. There were no other ingredients present, and the charcoal must either have been annihilated or dissolved in the manner just mentioned: but the superior weight of the fixed air evidently shows that some ingredient had been added to the dephlogisticated air; and which increased was more than we can

Suppose to arise from the condensation of the dephlogisticated air during the operation, for this sometimes amounted to no more than one-thirtieth part.

The strongest objection which can be made against the doctrine of phlogiston may be drawn from the total consumption of pure air in certain cases of combustion, for instance, in the case of phosphorus, inflammable air, and iron. It must be observed, however, that in no case whatever is the air totally consumed; and in that of inflammable air water is produced by the union of the basis of the latter, that is charcoal, with the basis of dephlogisticated air, the oxygeneous principle of M. Lavoisier, and which appears to be one of the component parts of Water. In the case of phosphorus, the latter is converted into an acid; and in all probability a quantity of water is also produced, by which part of it is converted into crystalline flowers. The case of the iron, therefore, alone remains to be considered. Dr Priestley's experiments on this subject are related at length under the article AEREOLOGY, n° 67 et seq. In them the iron burnt briskly in dephlogisticated air, which, according to the common theory, should have indicated the expulsion of a great quantity of phlogiston; yet the whole residuum, of which the fixed air, produced by the supposed union of the phlogiston or principle of inflammability, was only a part, scarce amounted sometimes to one-fourteenth of the air originally employed.

The argument, however, instead of contradicting the existence of phlogiston, only shows, that in some cases the diffipation of a very small quantity of phlogiston is necessary to inflammation; or that the aerial principle may combine with the iron in its metallic state. In this case only a very little quantity of the phlogiston of the iron was diffipated; for it was not reduced to a calx, but to that kind of Scor!:e iron is not reduced to a calx by burning in red-hot with an hammer. A decisive proof of this was had by uniting iron thus combined with the basis of dephlogisticated air with inflammable air. By this the metal was indeed reduced to perfect iron again, but water was produced at the same time. Water produced from the union of the bases of the two airs, that is one of inflammable air being capable of furnishing a superfusum quantity, which united with the other into the form of a fluid.

The existence of phlogiston being thus proved, and its nature ascertained, we may now proceed to deter- heat produce the question, Whether the great quantity of heat produced by the combustion of inflammable bodies...
Heat may enflame and each other. Too great the same air has not only the rational idea of the manner in which inflammation is generally accomplished, but see why a fire may be put out both by too great a quantity of fuel, and by too great a quantity of air, which, by furnishing a greater quantity of phlogisticated bodies, affords an opportunity for the evolution of a greater quantity of heat. On the other hand, when the quantity of air is too great, the phlogisticated air is too much dispersed, the flame is higher and the fire goes out. From this theory, which is farther illustrated under the articles Fire, Flame, Heat, Phlogiston, &c, we may not only have a rational idea of the manner in which inflammation is generally accomplished, but see why a fire may be put out both by too great a quantity of fuel, and by too great a quantity of air. We may also see why the solar beams and electric fluid, which contain no phlogisticated matter, excite a much more powerful heat than any we can raise in our hot- telt furnaces. The difference between ignition and inflammation will now likewise appear; such bodies as are capable only of ignition containing little or no phlogiston, but inflammable bodies a great deal. The following table shows the most remarkable destinations of heat from the conglomeration of mercury to that of Wedgewood's hottest furnace.

| Mercury freezes at | 40 |
| Weak spirit of wine | 32 |
| Brandy at | 10 |
| Cold produced by snow and salt mixed | 0 |
| Strong wine freezes at | 20 |
| Vinegar freezes at | 27 |
| Water freezes at | 32 |
| Temperature of spring and autumn | 50 |
| Ordinary summer heat | 65 |
| Sultry heat | 75 |
| Heat of human blood | 97 to 100 |
| Feverish heat | 188 |
| Bees wax melts | 142 |
| Serum coagulates | 156 |
| Spirit of wine boils | 174 |
| Water boils | 212 |
| Tin melts | 408 |
| Bismuth melts | 460 |
| Oil of vitriol boils | 550 |
| Oil of turpentine boils | 561 |
| Lead melts | 585 |
| Quicksilver and linseed-oil boil | 600 |
| Iron begins to shine in the dark | 635 |
| Iron shies briskly in the dark | 750 |
| Iron shies in the twilight | 884 |

**CHEMISTRY.**

**Theory.**

Iron red-hot from a common fire 1050
Red heat fully visible in day light according to Mr Wedgwood 1077
Heat by which his enamel colours are burnt on 1837
Brass melts 3607
Swedish copper melts 4587
Fine silver melts 4717
Fine gold melts 5277
Least welding heat of iron 12777
Greatest ditto 13427
Greatest heat of a common smith's forge 17527
Cast iron melts 17977
Greatest heat of Wedgewood's small air-furnace 21877
Extremity of the scale of his thermometer 32277

**SECT. II. Of the Doctrine of Elective Attraction, and of the different Objects of Chemistry.**

Before we proceed to give a general theory of the Chemical changes which happen upon the mixtures of different attraction, bodies together, or expelling them singly to heat, we must observe, that all depend on certain qualities in bodies, by which some of them are apt to join together, and to remain united while they have an opportunity. The cause of these qualities is totally unknown; and therefore philosophers, after the example of Sir Isaac Newton, have expressed the apparent effect of this unknown cause by the word attraction. From them the word has been adopted by the chemists, and is now generally used in speaking of the phenomena which are observed in the mixture of different substances; but to distinguish it from other kinds, it is usually called Elective.

This attraction is not equally strong between all substances; in consequence of which, if any body is composed of two others, and another is preferred to it which has a greater attraction for one of the component parts than they have for one another, the substance will be compounded. A new compound is then formed by the union of that third substance with one of the component parts or elements (if we please to call them so) of the first. If the attraction between the body supersedes and either of the component parts of the other is not so strong as that between themselves, no decomposition will ensue; or if the third substance is attracted by both the others, a new composition will take place by the union of all the three.

The objects of chemistry, as we have already observed, are so various, that an enumeration of them all is impossible. To save the mind, therefore, when speaking of them, and render more useful any thing that is said or written on chemistry, it is necessary to divide them into different classes, comprehending in each class those bodies which have the greatest resemblance to one another, and to which one common rule applies pretty generally. — The division formerly used, was that of vegetables, animals, and minerals, but this has been thought improper, as there are many substances in each of those kingdoms which differ very widely from one another, and which are by no means subject to the same laws. The most approved method,
ChE M I S T R Y.

SECT. III. Salts.

SALTS are either fusible, that is, capable of abiding the fire, and melting in a strong heat, without being dis sipated; or volatile, that is, being dispersed in vapour with a small heat. Their other properties are, that they are soluble in water: not inflammable, unless by certain additions; and give a sensation of taste when applied to the tongue.

The most general characteristic of salts is, that they are all soluble in water, though some of them with much more difficulty than others. Most of them have likewise the property of forming themselves, in certain circumstances, into solid transparent maelies of regular figures, different according to the different salt made up of, and which are termed cRYSTALS of that salt. In this state they always contain a quantity of water; and therefore the utmost degree of purity in which a salt can be procured, is when it has been well crystallized, and the crystals are freed of their superfluous moisture by a gentle heat. They generally appear then in the form of a white powder.

In the solution of salts in water, the first thing observable is, that the water parts with the air contained in it; which immediately rises to the top in the form of bubbles. This, however, is most remarkable when the salt is in the dry form we have just now mentioned, because there is always a quantity of air entangled among the interfaces of the powder, which rises along with the rest; and this discharge of air is sometimes so great, as to be mistaken for an effervescence. From this, however, it is essentially different. See EFFERVESCENCE.

Another thing observable in the solution of salts is, that a considerable change happens in the temperature of the water in which they are dissolved; the mixture becoming either a good deal warmer or colder than either the salt or the water were before. In general, however, there is an increase of cold, and scarce any salt produces heat, except when it has been made very dry, and deprived of that moisture which it naturally requires; and thus the heating of salts by being mixed with water may be explained on the same principle with the heat produced by quicklime. See QUICKLIME.

After salt has been dissolved in a certain quantity by water, no more of that salt will be taken up unless the water is heated; and as long as the heat continues to increase, the salt will be dissolved. When the water boils, at which time it has attained its greatest heat, and will take up no more salt, it is then said to be SATURATED with that salt. This, however, does not prevent it from taking up a certain quantity of another salt, and after that perhaps of a third, or fourth, without letting go any of the first which it had dissolved. How far this property of water extends, has not yet been ascertained by experiments.

To the above rule there is only one exception known as yet; namely, common sea-salt: for water dissolves it in the very same quantity when cold as when boiling hot. It has been said by some, that all deliquescent salts, or those which grow moist on being exposed to the air, had the same property: but this is found to be a mistake.

This property of solubility, which all the salts possess in common, renders them easily miscible together; and the property by which most of them shoot into crystals, renders those easily separable again which have no particular attraction for one another. This is likewise rendered still more easy by their requiring different proportions of water, and different degrees of heat, to suspend them; for by this they crystallize at different times, and we have not the trouble of picking the crystals of one out among those of the other.

The manner in which the solution of salts in water is effected, is equally unaccountable with most of the other operations of nature. Sir Isaac Newton supposed that the particles of water got between those of the salt, and arranged them all at an equal distance from one another; and from this he also accounts for the regular figures they assume on passing into a crystalline form; because, having been once arranged in an orderly manner, they could not come together in disorder, unless something was to disturb the water in which they were suspended; and if any such disturbance is given, we find the crystals are by no means so regular as otherwise they would have proved. Others have thought that these figures depend on a certain PARITY in the very small particles into which the salt is resolved when in a state of solution. Those things, however, are merely conjectural; neither is it a matter of any consequence to a chemist whether they are right or wrong.

Though solution is that operation which salts undergo the most easily, and which should seem to affect them the least of any, a repetition of it proves never less injurious to them, especially if it is followed by quick evaporation; and the salt, instead of being crystallized, is dried with a pretty strong heat. Newman relates, that a pound of sea-salt was reduced, by 13 solutions and evaporation, to half an ounce; and even that was mostly earth. Where solution is required, therefore, it ought always to be done in close vessels, in which also the subsequent evaporation should be performed, (see Evaporation); and in all cases where crystallization is practicable, it ought to be preferred to violent evaporation.

The two great divisions of salts are into acids and alkalies. The former of these are known by their peculiar taste, which is called acid or sour. They are not found in a solid form; neither are any of them, except the acids of vitriol, of tartar, of phosphorus, and of borax, capable of being reduced to solidity. The others, when highly concentrated, that is, brought to the utmost degree of strength of which they are capable, always become an invisible vapour, permanently elastic, until it comes in contact with water, or some other sub stance with which they are capable of uniting. For such acids the name of salts seems less proper, as we can scarcely say that a vapour, which is already much more fluid than water, can be dissolved in that element.

The acids are divided into the mineral, the vegetable, and the animal; expressing their different origin, or where they are most commonly to be found. The mineral acids are commonly reckoned three: the vi-
In the vegetable kingdom affords only two distinct species of acids, at least without the assistance of some chemical operation. The one appears fluid, and when concentrated to the utmost degree becomes an invisible vapour. This is produced from fermented liquors, under the name of vinegar. An acid similar to this, and which is thought not to be essentially different from it, is extracted from mossy vegetables by distillation with a strong fire. The other is likewise a consequence of fermentation; and crusts on the bottom and sides of caffins in which wine is put to separate itself. In its crude state it is called tartar; and when afterwards purified, is called the cream, or crystals, of tartar. As for the various acids produced in the different chemical processes to be afterwards related, we forbear to mention them at present, it being justly suspected that some of them are artificial.

The animal acids, which have hitherto been discovered, are only two; the acid of ants and that of urine, which is also the acid of phosphorus. The first of these is volatile; and consequently must be supposed a vapour when in its strongest state; the other is exceedingly fixed; and will rather melt into glafs than rise in vapours. Besides these, it is said an acid is contained in blood, in wafps, bees, &c.; but no experiments have as yet been made on these to determine this matter with any degree of precision.

The alkalies are of two kinds; fixed and volatile. The fixed kind are subdivided into two; the vegetable, and mineral or fotal alkali. The vegetable is so called, because it is procured from the ashes of burnt vegetables; the fotal, because it is found native in some places of the earth, and is the basis of sea-falt, which in some places is dug out of mines in vast quantity. They are called fixed, because they endure a very intense degree of heat without being disipated in vapour, so as even to form a part of the composition of glafs. The volatile alkali is generally obtained by distillation from animal substances. In its pure state this alkali is perfectly invisible; but affects the sense of smelling to such a degree, as not to be approached with safety.

The acids and alkalies are generally thought to be entirely opposite in their natures to one another. Some, however, imagine them to be extremely similar, and to be as it were parts of one substance violently taken from each other. Certain it is, that when separated, they appear as opposite to one another as heat and cold. Their opposite action indeed very much resembles that of heat and cold, even when applied to the tongue; for the alkali has a hot, bitter, burning taste, while the acid, if not considerably concentrated, always gives a sensation of coldness. In their action too upon animal substances, the alkali dissolves, and reduces the part to a mucilage; while the acid, if not very much concentrated, tends to preserve it incorruptible.

If an alkaline salt, and moderately strong acid in a liquid state, be mixed together, they will immediately unite; and, provided the alkali has not been deprived of its fixed air, their union will be attended with a very considerable effervescence: (see Aerology.) If the alkali has been deprived of air, no effervescence will ensue, but they will quietly mix together; but if a due proportion of each has been added, the liquor will neither have the properties of an acid nor an alkali, but will be what is called neutral. The bringing the liquor into this state, is called saturating the acid or alkali, or combining them to the point of saturation.

If the liquor after such a saturation be gently evaporated, a saline mass will be left, which is neither an acid nor an alkali, but a new compound formed by the union of the two, and which is called a perfect neutral salt. The epithet perfect is given it, to make a distinction between the salts formed by the union of an acid and an alkali, and those formed by the union of acids, with earthy or metallic substances; for these will likewise unite with acids, and some of the compounds will crystallize into regular figures; but, because of their weaker union with these substances, the salts resulting from combinations of this kind are called imperfect.

All acids, the volatile sulphurous one excepted, change the blue infusions of vegetables, such as violet, to a red; and alkalies, as well as some of the mineral or fotal acids, as to as like aCts are changed by acids and alkalies.

Though between every acid and alkali there is a very strong attraction, yet this is far from being the same in all; neither is it the same between the same acid and alkali in different circumstances of the acid.

When the acids are in a liquid state, and as free as possible of inflammable matter, between which and the nitrous and vitriolic acids there is a very strong attraction, the vitriolic will expel any of the rest from an alkaline basis, and take its place. Thus, if you combine the acid of sea-falt, or marine acid, to the point of saturation, with the fotal alkali, a neutral salt will be formed, which has every property of common salt: but, if you pour on a certain proportion of the vitriolic acid, the acid of sea-falt will immediately be expelled; and the liquor, upon being evaporated, will contain not the neutral salt formed by an union of the marine acid with the alkali, but another consisting of the vitriolic acid joined with that alkali, and which has quite different properties from the former.

When the acids and alkalies are applied to one another in a liquid state, the vitriolic acid always shows itself to be the most powerful; but when applied in a solid form, and urged with a violent heat, the case is very much altered. Thus, the acid of horax, commonly called sal fationum, is so weak as to be disregarded from its basis by every acid applied in a liquid form, of that tartar alone excepted; but if even the vitriolic acid combined with an alkali be mixed with this weak acid, then exsiccated, and at last urged with a vehement fire, the vitriolic acid will be diffugaged from its basis, and rise in vapours, leaving the weaker acid in precision of the alkali. The same thing happens on adding the phosphoric or ursine acid,
Theory.

Chemistry.

SALTS.

Acids unite with phlogiston.

With metals and earth.

Elective attractions.

The acids have the property of uniting themselves to many other substances besides fixed alkalies, and forming neutral compounds with them. Of these the chief is the principle of inflammability or phlogiston. In the vitriolic, nitrous, and phosphoric acids, the attraction for this principle is very strong; so great, that the two former will even leave a fixed alkali to unite with it. In the marine acid it is less perceptible; in the liquid vegetable or animal acid still less; and in the acid of tartar, and salted evaporia, not at all.

Besides this, all acids will dissolve metallic and earthy substances: with these, however, they do not in general unite so firmly with alkaline salts; nor do they unite so strongly with metals as with earths. In general, therefore, we may expect, that after having dissolved a metal in any acid whatever, if we add an earthy substance to that solution, the acid will quit the metal, which it had before dissolved, to unite with the earth. In this case the solution will not be clear as before, but will remain muddy, and a quantity of powder will fall to the bottom. This powder is the metallic substance itself, but deprived of one of its component parts; and in this case it is said to precipitate in the form of a calx.

If to this new solution of the earthy substance in an acid liquor, a volatile alkaline salt, not deprived of its fixed air, is added, the acid will quit the earth, and unite with the alkaline salt. The earth thus disengaged will again precipitate, and lie at the bottom in fine powder, while the volatile alkali and acid remain combined together, and the liquor again becomes clear.

The attraction between volatile alkalies and acids is considerably less than between fixed alkalies and the same acids. If, therefore, a fixed alkali be now added to the liquor, the volatile alkali will be separated, and the acid will unite with the fixed alkali. The volatile alkali indeed, being perfectly soluble in water, cannot precipitate, but will discover its separation by the pungent smell of the mixture; and upon evaporating the liquor, the volatile alkali will be disdiluted, and a saline mafs, consisting of the acid and fixed alkali, will remain.

Lastly, if the acid employed was the nitrous, which has a strong attraction for the principle of inflammability, if the saline mafs be mixed with a proper quantity of inflammable matter, and exposed to a strong heat, the acid will leave the alkali with vast rapidity, combine with the inflammable matter, and be destroyed in flame in a moment, leaving the alkali quite pure.

Though the above-mentioned effects generally happen, yet we are not to expect that they will invariably prove the same whatever acid is made use of; or even that they will be the same in all possible circumstances in which the same acid can be used. The acid of tartar is one exception, where the general rule is in a manner reversed; for this acid will quit a fixed alkali for an earth, especially if calcined, and even for iron. If lead, mercury or silver, are dissolved in the nitrous acid, and a small quantity of the marine acid is added, it will separate the stronger nitrous acid, and fall to the bottom with the metals in form of a white powder. The vitriolic acid, by itself, has a greater attraction for earthy substances than for metals; and greater still for fixed alkaline salts than for either of these: but if quicksilver is dissolved in the nitrous acid, and this solution is poured into a combination of vitriolic acid with fixed alkali, the vitriolic acid will quit the alkali to unite with the quicksilver. Yet quicksilver by itself cannot easily be united with this acid. The reason of all these anomalies, however, is fully explained in the following section.

§ 1. Of the Operations of Solution and Precipitation.

The chemical solution of solid bodies in acid or other menstrua, is a phenomenon which, though our familiarity with it has now taken off our surprise, must undoubtedly have occasioned the greatest admiration and astonishment in those who first observed it. It would far exceed the limits of this treatise to speak particularly of all the various circumstances attending the solution of different substances in every possible menstrum. The following are the most remarkable, collected from Mr Bergman's Differtation on Metallic Precipitates.

1. On putting a small piece of metal into any acid, it is dissolved sometimes with violence, sometimes gently, according to the nature of the menstrum and of the metal to be dissolved.

2. The nitrous acid is the most powerful in its action.
Solution and Precipitation.

Nitrous acid, the most violent in its operation, has no solution by the nitrous acid, either by dilution or cold, or both. In other cases, however, as when put to gold or platina, the nitrous acid has no effect until it be united with the marine, when the mixture acts upon those metals, which neither of the acids singly would touch.

3. The action of the vitriolic acid, though in the highest degree of concentration, is more weak. It does not readily attack silver or mercury unless assiduously boiled, nor will even that be sufficient to make it act upon gold or platina.

4. The action of marine acid, unless on particular substances, is still more weak; but when depholotificated, or deprived of part of the phlogiston essential to its constitution as an acid, it acts much more powerfully, and diffuses all the metals completely.

5. The other acids, as those of flour, borax, with such as are obtained from the animal and vegetable kingdoms, are much inferior in their powers as solvents, unless in very few instances.

6. Metals vary very much in their degrees of solubility; some yielding to almost every menstruum, and others, as has been already observed, being scarce acted upon by the most powerful.

7. Zinc and iron are of the former kind, and gold and silver of the latter, eluding the marine; and gold, unless in one particular case, viz. when assiduously boiled in a close vessel, the action of the nitrous acid also.

These metals, however, which in their perfect state resist the action of the most powerful menstrua, may be diffolved much more readily when deprived of a certain quantity of their inflammable principle. But though the separation of this principle in some degree renders metals more soluble, the abstraction of too much of it, particularly in the case of iron and tin, renders these metals almost entirely insoluble. Manganese is the most remarkable instance of this power of the phlogitic principle, in depriving metals of their inflammability by its absence, or restoring it to them by its presence; for this substance, when reduced to blackness, cannot be dissolved by any acid without the addition of some inflammable matter; but when by the addition of phlogiston it has become white, may be dissolved in any acid.

8. The dissolution of metals by acids, even to their very last particle, is attended with a visible effervescence; this is more perceptible according to the quickness of the solution; but more obscure, and fearfully to be seen at all, when the solution proceeds slowly.

9. The elastic fluids extracted by these solutions are various, according to the nature of the acid and of the metal employed. With the nitrous, the fluid produced is commonly that called nitrous air; with vitriolic and marine acids the produce is sometimes inflammable, sometimes otherwise, according to the nature of the metal acted upon.

10. Heat in a greater or smaller degree is always produced during the dissolution of metals; and the degree of it is in proportion to the quantity of the matter and the quickness of the solution; hence, in small quantities of metal, and when the solution proceeds very slowly, the temperature of the metal is scarcely altered.

11. The calxes of metals either yield no air at all, or only the aerial acid, unles when urged by a violent heat almost to ignition; when, by means of vitriolic or nitrous acid, they yield a quantity of pure air, after other elastic fluids, such as vitriolic, nitrous, or phlogotitic air. None of the depholotificated air is usually produced by the marine acid in conjunction with metallic calxes.

12. The solutions of some metals are coloured, others are not. The colour of the former is only that which is proper to the calx, but rendered more vivid by the moisture. Thus solutions of gold and platina are yellow; those of copper, blue or green; solutions of nickel of a bright green; but those of cobalt are red, although the calx is black. We may observe that even this red colour may be heightened to blackness. Iron moderately calcined is green, but this rarely continues upon further depholotification. The white calxes of silver, lead, tin, bismuth, arsine, antimony, and manganese, are diffolved without colour; but solutions of lead, tin, and antimony, are somewhat yellow, unless sufficiently diluted. Mercury, however, forms a singular exception to this rule; for the orange-coloured calx of this metal forms a colourless solution. The metals yielding coloured solutions are gold, platina, copper, iron, tin, nickel, and cobalt; the reft, if properly depurated, give no tinge. A solution of silver is sometimes of a blue or green colour at first; although there be no copper present; the vitriolic acid becomes blue with copper; the nitrous may be made either blue or green at pleasure; the marine varies according to the quantity of water with which it is diluted. Manganese, when too much depholotificated, renders both the vitriolic and marine acids purple.

With regard to the cause of chemical solutions, our author observes, that though attraction must be looked upon as the fundamental cause, yet we may also lay it down as a maxim, that no metal can be taken up by an acid, and at the same time preserve the whole quantity of phlogiston which was necessary to it in its metallic state. A certain proportion of the principle of inflammability therefore may be considered as an obstacle which must be removed before a solution can be taken place. Thus, of all the acids, the nitrous attracts phlogiston the most powerfully, and separates it even from the vitriolic. A proof of this may be had by boiling sulphur slowly in concentrated nitrous acid.

At length all its phlogiston may be separated, and the vitriolic acid will remain, deprived of its principle of inflammability. The extraordinary solvency powers of this acid, therefore, is conformed to the peculiarity of its nature in this respect. For this menstruum dissolves metals for solution with the greatest ease, most commonly without any assistance from external heat; which in some instances would be hurtful, by separating too much of phlogiston, as appears in the case of iron, tin, and antimony; all of which may be far depholotificated by the nitrous acid, as to be rendered extremely soluble. The difficulty of solution for this reason it is very often soluble or necessary, as has already been observed, to temper the activity with heat.

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Solution and Precipitation.

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Theory.

CHEMISTRY.

Solution and precipitation.

197 Why the vitriolic acid cannot act on lead, silver, &c., without a boiling heat.

198 Why marine acid acts on some metals and not on others.

199 Why some metals are more fusible than others.

200 Why nitrous acid precipitates a solution of tin or antimony.

201 Different kinds of air produced during the diffusion of metals.

202 Pure vitriolic acid cannot be reduced into an aerial form but by a combination with phlogiston.

Activity of this menstruum by water. The vitriolic acid requires a boiling heat before it can act upon silver or mercury. The reason of this, that by means of the heat, the watery part of the menstruum is diminished, its power is thereby increased, and the connection of the metallic earths with the inflammable principle diminished. Marine acid, which contains phlogiston as one of its constituent principles, must necessarily have little or no effect on these metals which retain their principle of inflammability very obtrusively. But its watery part being diminished by boiling, it assumes an aerial form, and powerfully affects a larger quantity of phlogiston than before; so that in a vaporous state it will dissolve metals, particularly silver and mercury, which in its liquid form it would scarce be brought to touch. When dephlogisticated as much as possible, it attracts phlogiston with prodigious avidity, disolving all metals by its attraction for their phlogiston, and, uniting the inflammable principle to itself, resumes the ordinary form of marine acid. When dephlogisticated by means of nitrous acid in aqua regia, it dissolves gold and platina. On the same principle we account for its inferiority in power to the other acids.

It has already been observed that the metals differ much in their degrees of solubility, which is owing to the various degrees of force with which they retain their phlogiston. Those called perfect metals effectually react calcination in the dry way. In this operation, the fire on the one hand, the great cause of the volatility of bodies, and continually endeavours to expel the phlogiston; on the other hand, the bases of the dephlogisticated part of the atmosphere (the acidifying principle of M. Lavoisier, and the primum foraneum of Dr Lübbeck) attracts the calx strongly. Experience, however, shows, that these two forces united, cannot decompose gold, silver, or platina to any considerable degree. All the other metals yield to these forces when united, but not singly. Iron and zinc retain their inflammable principle so highly, that any acid immediately acts upon them; but if the other metals be properly prepared for solution by being calcined to a certain degree, the acid will immediately take them up. Any further privation, however, would be injurious, and precipitate what was before dissolved. Thus the nitrous acid, when added to a solution of tin or antimony in marine acid, by its extraordinary attraction for phlogiston carries off such a quantity of it, that the calxes of the metals are immediately precipitated.

The various elatic fluids which resemble air, and which are produced in plenty during the dissolution of metals, may be reduced to the following: the first extracted by the vitriolic, nitrous, and marine acids, fluoric acid, vinegar, alkaline salts, and hepatic sulphur. Pure vitriolic acid exposed to a violent heat, is indeed resolved into vapours, but of such a nature, that when the heat is gone, they condense again into an acid liquor of the same nature as before. But if any substance be added which contains phlogiston in a separable state, an elatic fluid is produced by means of fire, which is scarcely condensible by the most extreme cold, unless it comes in contact with water. This is called the volatile sulphurous acid, or vitriolic acid air, which may be totally absorbed by water. In this cafe the bond of union betwixt it and the phlogiston is so weak, that the latter soon flies off totally, and solution common vitriolic acid is regenerated.

The nitrous acid undergoes a similar change in a more obvious manner. Let a piece of silver, for instance be put into a dilute nitrous acid, and the surface face of the metal will instantly be covered with innumerable bubbles, which arling to the top of the liquor, there burst; and if collected, are found to be nitrous air. The nitrous acid faturates itself with phlogiston more completely than the vitriolic; therefore the elatic fluid produced, or nitrous air, does not unite with water, and scarce retains any vestige of an acid nite with nature. The vitriolic acid, however, differs from the nitrous in this respect, that the phlogiston is absorbed by the latter even beyond the point necessary to oblige its acid nature. In proof of this, this author adduces the decomposition of hepatic by means of nitrous air.

The marine acid exhibits different phenomena. Phlogiston, as it naturally contains phlogiston, and therefore can be exhibited by its means be resolved into a kind of air resembling similar to that produced by the vitriolic acid when artificially united to the same principle, and which has the same property, viz. that of remaining permanently elastic as long as it is kept from the contact of water. But as the acid we speak of naturally contains phlogiston, there is no necessity of adding more to produce this effect. In the mean time, the marine as well as nitrous air, when in its expanded state, attracts phlogiston, and with wonderful avidity.

When the marine acid is dephlogisticated, it yields of the another elatic fluid of a reddish brown colour, having phlogisticated an odour like that of warm aqua regia. This does not unite with water, or only in very small quantity; and by the addition of a proper proportion of phlogiston may be reduced again to common marine acid. It is said that the marine acid may be dephlogisticated by lead as well as by manganece, the nitrous acid, and arsenic.

The fluoric acid abounds with phlogiston, and therefore may, without any adventitious matter, be reduced to an elatic fluid. This air is easily distinguished from all others by its corroboration of glafs whilfht hot.

Vinegar also contains phlogiston; and for that reason, when well dephlegmated, may be reduced without gas or air being put into a permanently elatic fluid, called acetous air.

All these fluids seem to be nothing else, according to Mr Bergman, than the acids themselves expanded by phlogiston. "Perhaps (says he) the matter of Heat and heat also enters their composition." The experiments made on these subjects, however, have put beyond all doubt, that the expansive principle is phlogiston but heat; nevertheless, it seems highly probable, that these elatic fluids do really consist of the acid united to phlogiston, and expanded by heat. This is also the case with the caustic volatile alkali, now called alkaline air.

In the hepatic air, it has been shown by Mr Bergman, that sulphur exists which contains phlogiston; and there is little reason to doubt that the expansive power here is the same as in other cafes. See Hepatic Air.

The heat generated during the solution of metals is by Mr Bergman supposed to be owing to the matter.
of heat which had been fixed in the metals; but it may with much more reason be opposed to proceed from the acid. Dr Black has demonstrated, that heat universally the principle of fluidity, and all fluids, whether acid or not, are found to contain a great quantity of it. It is not probable that solids, even the most inflammable, contain an equal quantity; for it is always observed, that bodies in becoming fluid absorb heat, and throw it out again on becoming solid. Acids in all probability contain a much greater quantity than what is necessary to their fluidity; for we see that the nitrous acid, when poured upon snow, parts with as much heat as is necessary to dissolve the snow, at the same time that it still retains its fluidity. The caie is not so with common salt, which is a solid: for though, in a mixture of salt and snow, the latter absorbs as much heat from the salt as is necessary for its own liquefaction; yet the salt could not be held in solution by a liquid of this temperature, were it not that an additional quantity is perpetually absorbed from the adjacent bodies, particularly the atmosphere. But were it possible to prevent this adventitious increase of heat, there is not the least reason to believe that the salt would be dissolved; for the strongest brine, when reduced to the temperature of 0 of Fahrenheit, is decomposed, the salt falling to the bottom in powder, and the water being converted into ice. Add to this also, that the cold produced by spirit of nitre and snow is much more intense than that produced by common salt and snow; which undoubtedly shows, that a solid does not readily part with as much heat as a fluid, and consequently cannot be supposed to contain as much.

The solution of metals in acids also demonstrates, that the solid substance has not parted with heat, but absorbed it; for as soon as the solution becomes solid again, i.e., when it crystallizes, the temperature becomes higher than before.

The calxes of metals have not that quantity of phlogiston that is necessary for their metallic state, but yet are not entirely destitute of it; therefore, in their solution, scarce any elastic fluid is generated, unless the fire be continued after evaporation. Such as contain acetic acid, discharge it immediately in the same form as they had received it. It is remarkable, that Dr Prieftley mentions a calx of lead, which, with the acid of phosphorous, produced an inflammable air. By means of the nitrous acid and evaporation to dryness, a pure air is produced. Sometimes a small portion of vitriolic acid air is obtained by means of a proper degree of fire from vitriolic acid, but a far greater quantity of pure air.

The solutions made by the menruna abovementioned, contain a metallic calx intimately united with the acid, the quantity of phlogiston left being various according to the difference of the menruna and of the temperature: but the performance of the operation either with or without intense heat, frequently occasions a remarkable difference. That metals are less calcined by the marine than by the nitrous acid, appears from pouring concentrated nitrous acid on tin or antimony; but the difference, if actually does take place, is less visible in other metals.

Some modern chemists have denied this calculation of metals by solution. They have insisted, that the perfect metals ought to be excepted, as they do not yield to the most intense fire. On this subject, however, it may be observed, 1. That during their solution the nitrous air is always generated, and that of a very perfect kind, which cannot happen without phlogiston; but in this case there is nothing present which can yield phlogiston except the metals. Therefore 2. The metals, when precipitated from their menruna by fixed alkalis, both with respect to their external appearance and internal properties, appear to be calcined. Thus the precipitate of gold refuses to unite with mercury, and may be dissolved by marine acid and other simple menruna, and that without the production of any elastic fluid. 3. Glass may be stained by these calxes; but no metal in its perfect state can be taken up by glasses.

The common objection is, that the calxes of the perfect metals may be reduced by heat alone without the addition of charcoal. Many theories have been invented to solve this phenomenon. Some have suppos'd, that the matter of heat and light are the same with the phlogiston, and that thus the calxes are reduced in the same manner as by charcoal or other substances usually termed phlogistic. But in this case we ought to find the calxes of the imperfect metals also reduced by a long continuance of heat, as well as the more perfect; which, however, has never yet been known to take place. Some, among whose number is Dr Lewis, have imagined, that the porosity of the vessel, particularly that made of earthen ware, may be such as to admit the passage of phlogistic vapours through them; and he instances the revival of globules of lead in the middle of pieces of glass upwards of an inch in thickness, and that there was not the least appearance of a crack. But from an experiment of Mr Kirwan's to be afterwards related, it is much more probable that the reduction is effected by means of the phlogiston contained in one part of the calx attracted by another; by which means the latter is reduced to a perfect metal, while the former becomes somewhat more dephlogisticated. In consequence of this it appears, that the calxes of the perfect metals are never totally reduced: for if the operation be performed in a glass retort, the bottom of it is always stained; which indicates the existence of a calx, in however little quantity.

The following fact, Mr Bergman says, has been proposed to him as an inextricable dilemma. Silver cannot amalgamate with mercury except when in its metallic state; yet both calked and nitrated silver are taken up by mercury; it is therefore not calcined by the acids, but adheres to them in its metallic form. This, however, may be easily solved in the following manner.

It is well known that the calx of copper, dissolved in the vitriolic acid, is precipitated in its metallic form on the addition of iron, and that by means of a double elective attraction; for the iron, dissolving in the acid, would form an inflammable air by its phlogiston, were not the copper present which takes it up, and thereby becomes insoluble as long as it retains it; but mercury has a stronger attraction for acids than silver; if therefore calked or nitrated silver be triturated with mercury, the silver must be precipitated in a metallic state, and the mercury be calcined by being dissolved. This also takes place, provided there be moisture sufficient to suffer the elective attraction.

Some modern chemists have denied this calculation of metals by solution. They have insisted, that the perfect metals ought to be excepted, as they do not
Solution and Precipitation.

All metals may be precipitated by alkaline faults; vitriol; occasional of phlogiston, and why.

Thus nitrate or salted mercury, boiled in water together with the crude metal, can take up a certain proportion of it without dephlogitisation; and the latter of these facts, even in the oxa fissa, becomes a mercurius dulcis, which contains at the same time a crude and a calcined mercury.

Perfect solutions should in general be transparent; but some, as has been already mentioned, are distinguished by a peculiar colour. That phlogiston is the chief cause of colour appears from hence, that the black clax of manganetic tinges vitriolic acid of a red colour; but on the addition of sugar the tinge is entirely destroyed. Nitrous acid is rendered blue by copper; but when the metal is added in considerable quantity, it becomes of a very deep green. The marine acid, which dephlogitises the copper leaf, is yet more green; but by dephlogitisation, it may be so condensed as to become brown. Mr Bergman has sometimes seen a solution of silver green, without the presence of the smallest particle of copper. This depends on the absorption of nitrous air: for let smocking nitrous acid be diluted, on the addition of a certain quantity of water it will be of a deep green; by a greater, blue; and upon a still greater, becomes limpid. By means of water, the nitrous air is extended to a greater space: and this attenuation gradually increased varies the colours. Hence we see why nitrous acid is made green by a large quantity of copper.

Metals dephlogitised by acid solvents powerfully attract phlogiston; nay, nitrate silver and mercury, and salted antimony, corrode animal substances, in order, as our author supposed, to extract it. “This metallic causticity (says he), which is only to be moderated by phlogiston, ought to be carefully distinguished from the acid causticity, which is repulsed by alkali, and the alkaline, which is mitigated by acids. Colours vary according to the quantity of phlogiston present; and some experiments shew, that by a sufficient quantity all colour is entirely destroyed.

All metals may be precipitated by alkaline faults; which, by their superior power of attraction, separate them from their menstruum; but their difference with regard to their nature and preparation alters the nature of the precipitate. With the caustic fixed alkalii, the calces fall almost entirely pure, but loaded with water. The weight is found to be increased by the matter of water, but yet less than by the aerial acid. With the aerated fixed alkalii, by means of a double decomposition, the aerial acid unites to most calces. The volatile alkalii, which naturally contains phlogiston, sometimes phlogitises the precipitate. It throws down a black or white precipitate of mercury; nay, it makes the orange-coloured precipitate white. Gold receives its fulminating quality from this precipitant, as is afterwards to be explained. The alkalii, which is commonly called phlogistificated, generally precipitates metals with an increase of weight.
CHEMISTRY.

Neither the caustic nor aerated mineral alkali precipitate one half of platina dissolved in aqua regia; the precipitate is of an orange colour, which on dying becomes brown. An over-proportion of alkali dissolves the precipitate, and the liquor becomes more dark; nay, the precipitation is so imperfect, that the alkali matter seems to be dissolved even by neutral salts. The phlogisticated alkali does not precipitate the undepurated solution, nor even make it turbid, but heightens the colour in the same manner as an excess of alkali.

Solution of silver in nitrous acid lets fall a white precipitate by the aerated alkali; brown by the caustic, and of an obscure yellow. By the nitrous and of silver, marine acids it lets fall a white precipitate, which with the former consists of more distinct particles, which grow black more slowly with the light of the sun.

Salted mercury lets fall a red precipitate, or rather one of a ferruginous colour, by aerated alkali; cury, but of a more yellowish or orange colour by the caustic. Nitrated mercury prepared without heat, yields a ferruginous precipitate with mineral alkali; a black with caustic; and when prepared with heat, it yields to caustic alkali an orange or reddish yellow precipitate.

By phlogisticated alkali it is precipitated from all acids of a white colour; but turns of a brownish yellow when dry. Salted mercury is very sparingly precipitated by this alkali. The precipitate by phlogisticated alkali is again dissolved, if too much of the precipitant be made use of. Corroive sublimate must be very cautiously precipitated by caustic, as well as aerated fixed alkali; for the part separated may again be dissolved by a large quantity of water. When too much alkali is used, a new compound arises of a peculiar nature.

Solution of lead in spirit of nitre is precipitated down by aerated, caustic, or phlogisticated alkali. By using too much alkali, the precipitate by the phlogisticated kind is dissolved with a brownish yellow colour. Vitriol of lead and solution of lead in marine acid are precipitated white.

Blue solution of copper in spirit of nitre is precipitated of a bright green by aerated fixed alkali; by the caustic of a greyish brown, which grows reddish by age. By phlogisticated alkali copper is precipitated of a greenish colour, which grows afterwards of a brownish red, and upon exsiccation almost black. The aerial acid takes up a small quantity of copper during the precipitation, which is again deposited by the heat of boiling.

Aerated fixed alkali precipitates iron of a green colour from vitriolic and marine acid; but the precipitate becomes of a brownish yellow, especially on exsiccation; with the caustic alkali it approaches more to black. In the precipitation some part is held in solution by the aerial acid, when the mild alkali is used. With phlogisticated alkali a Prussian blue is formed.

Tin is precipitated of a white colour by every alkaline salt, even by the phlogisticated kind; but at length some blue particles appear in the mixture: so that the whole, when collected and dried, appears of a light blue colour. That these blue particles are occasioned by iron appears by calculation; for they become ferrous.


**Chemistry.**

**Theory.**

Solution and Precipitation.

Ferruginous, and obey the magnet. Our author has always found a proportion of iron in tin.

Bismuth is thrown down of a fine white by water and alkalies, particularly the former; phlogificated alkali throws down a yellow powder, which being mixed with blue particles occasioned by iron, at length appears green. This yellow sediment easily dissolves in nitrous acid.

Of nickel:

Nickel is precipitated of a whitish green by fixed alkalies; by the phlogificated alkali of a yellow; and by exsiccation it is condensed into a dark brown mass.

Of arsenic:

Arsenic dissolved in acids, which prevent too great phlogification, may, to a certain degree, be precipitated white by the fixed alkali, even when phlogificated, but the sediment is found soluble in water; yet nitrous acid, either alone, or joined with the marine, generally phlogifies the arsenical acid, which thereby becomes unfit for separation. Arsenic dissolved in marine acid, with the assistance of a little nitrous acid, deposited a white sediment on the addition of a large quantity of phlogificated alkali. The sediment was mixed with Prussian blue. This was dissolved in water, and freed by frequent filtration from the blue particles; and at length, on evaporating to dryness, yielded a semipellucid mass.

Of cobalt:

Cobalt dissolved in acids is thrown down by fixed alkali, whether aerated or caustic, of a reddish blue, which grows darker on exsiccation, especially when the former alkali has been used. Phlogificated alkali throws down a powder of almost the same colour, which, upon exsiccation, becomes of a reddish brown.

Zinc is precipitated white by aerated and caustic fixed alkalies, as also by the phlogificated alkali; but this last becomes of a citron colour on exsiccation: a small portion of aerial acid may easily escape during the precipitation.

Of antimony:

Antimony is precipitated white by alkalies. When the phlogificated alkali is used, some blue particles are always precipitated at the same time, though the regulus had been prepared without any iron. This operation should be cautiously conducted, lest some part be taken up by the alkaline salt.

Of manganese:

Manganese procured by reduction from common magnesia nigra, generally renders menstrua brown, and with aerated alkali yields a yellowish brown sediment; with the caustic, one still darker; with the phlogificated, first a blue, then a white, powder is separated, the mixture of which renders the masts a black green. To obtain a pure and white calx of manganese, we must dissolve in pure vinegar the precipitate thrown down by caustic alkali; for there still remains a quantity of iron which is taken up by the aerial acid. This acetous solution contains little or nothing of iron. That metal may also at first be separated by a small quantity of volatile alkali.

The common solution of the regulus is not perfectly precipitated by the aerated alkali; and upon evaporating the remaining liquor spontaneously to dryness, grains of a metallic splendor, and not unlike copper, are deposited on the glass. The nitrous acid attracts these readily, though they are only partially dissolved by it; but on the addition of zinc, nothing but the manganese, though at first it is a little reddish. With phlogificated alkali, we obtain a yellow precipitate like pure manganese, provided the solution has deposited the iron when too much phlogificated by age. But the new solution yields a precipitate almost like that which is obtained from common regulus. The yellow sediment may be dissolved in water.

The following is Mr. Bergman’s table of the quantities of precipitate of different metals, thrown down from various menstrua by the different alkalies. On comparing the weights (says he), a question occurs concerning the ease of such enormous differences; weight of and it is plain, that this ease must be sought for in precipitates themselves. The fixed alkali saturated with aerial acid, when added to the solution, is taken up by the more powerful menstrua; and the weaker is of course expelled, and is absorbed by the calx as it falls, in greater or lesser quantity according to circumstances. That this is actually the case is easily demonstrated:—Let a bottle containing a quantity of nitrous acid be accurately weighed. Let there be put into it, for instance, 132 parts of lead precipitated by aerated alkali; and not only an effervescence will be observed, which continues until the very last particle is dissolved, but when the solution is finished, a deficiency of weight is discovered, which amounts nearly to 21, and is undoubtedly owing to the extraction of aerial acid. But 132—21=111; a weight which still considerably exceeds that of the metal. Upon distillation nearly eight of water are discovered. There yet remain therefore three, which by violent heat are increased by seven; for 132 of the calx well calcined yield 110. The whole increment of weight then does not depend on the water and aerial acid. The same thing is evinced by considering the precipitate of lead by the caustic alkali; in which case there can be no aerial acid, nor does any effervescence accompany the solution. If we suppose the quantity of water equal in both cases, yet even on this supposition the whole excess of weight is not accounted for; for 116—8=108. It is therefore probable, that the matter of heat is attached to the calx (a).—In proof of this opinion, and that caustic alkalies contain the matter of heat, our author adduces several arguments, of which the following is the strongest. Let Argument the heat occasioned by the mixture of any acid and favours of calcium alkali be determined by a thermometer; let the weight of then an equal portion of the same menstruum be suffi- ptecites being rated with a metal; afterwards, on the addition of an equal quantity of caustic alkali, it will be found, clue to the heated that no heat is generated, or a degree very much by the mat- ter of heat. Some of the matter of heat there- fore is taken up and fixed, which also generally makes the colours of the precipitates more obscure; and in distillation with sal-ammoniac, communicates to the vol- lutate alkali the quantity that had been taken away.”

In this instance also, however, our author seems to be insufficient have been deceived. It has already been observed, that in all solutions generating heat, it most probably comes from the fluid. Acids contain a quantity suf-
CHEMISTRY.

Theory.

When the latter is dissolved in aqua regia, it ought to solution yield a Prussian blue on the addition of phlogiilicated alkali; which indeed is the case when common platina is employed, but not with that which is well depurated.

In the same manner, if iron, adhering very obstinately to platina is nickel, forms a great part of the latter, the precipitates obtained from it by alkali could not differ from metallic precipitates so much as they do in colour, weight, and other properties. The same holds true of cobalt and manganese. The regular obtained from the latter contains about 0.008 of iron, which affects the mixture in the following manner. An hundred pounds dissolved in an acid menstruum, yields, by treatment with phlogiilicated alkali, a powder consisting partly of blue, partly of brownish yellow particles, equal in weight to 150 pounds; but eight pounds of precipitate yield 48 of Prussian blue, nearly 1 of the whole mass of precipitate; whence it follows, that 100 parts of pure manganese yield to phlogiilicated alkali scarcely 3:1, i.e., nearly six times less than an equal weight of iron.

Lastly, by this method of examining precipitates, it may be possible to determine the unequal quantities of phlogiilicated in different metals; for a given weight of precipitating metal does not yield an equal quantity of precipitate: thus, for instance, copper is able to precipitate from nitric acid four times its weight of silver.

Yielded ton.

Table 259 of different precipitates.

$\begin{array}{|c|c|}
\hline
\text{Metal} & \text{Weight (ton)} \\
\hline
\text{Gold} & 106 \\
\text{Platina} & -106 \\
\text{Silver} & -106 \\
\text{Mercury} & -106 \\
\text{Lead} & -106 \\
\text{Copper} & -106 \\
\text{Iron} & -106 \\
\text{Tin} & -106 \\
\text{Bismuth} & -106 \\
\text{Nickel} & -106 \\
\text{Arsenic} & -106 \\
\hline
\end{array}$

$\text{Yielded precipitate:}$

$\text{Precipitated by}$

$\text{Gold,}$

$\text{plagiilicated}$

$\text{martial vitriol}$

$\text{aerated mineral alkali}$

$\text{calkie}$

$\text{plagiilicated}$

$\text{aerated mineral alkali}$

$\text{calkie}$

$\text{plagiilicated}$

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$\text{plagiilicated}$

$\text{aerated mineral alkali}$
Mr Kirwan has made a great number of experiments on the attractive powers of the mineral acids to various substances, and greatly illustrated the operations of both solution and precipitation. Chemical attraction, he observes, is that power by which the volatile particles of different bodies intermix and unite with each other so intimately, as to be inseparable by mere mechanical means. Thus it differs from the attraction of cohesion, as well as from that of magnetism and electricity, as not acting with the indifference observed to take place in these powers, but causing a body already united to another to quit that and unite with a third; whence it is called elective attraction. Hence attraction of cohesion often takes place between bodies that have no chemical attraction for each other; as for instance, blinthus and regulars of cobalt, which cannot be made to unite together by fusion, though they cohere with each other so strongly, that they cannot be separated but by the blow of a hammer.

To determine the degrees of attraction between different substances, M. Geoffroy laid it down as a general rule, that when two substances are united, and either of them is to unite with a third, which thus unites to the third must be paid to have a greater affinity to it than to the substance it has quitted in many cases, however, the seemingly single decomposition is in truth a double one. Thus, when the vitriolic acid expels the air from a fixed alkali, it does not necessarily follow, that the acid is more attracted by the alkali than the fixed air; for here though the latter resigns its place to the acid, yet the acid gives out its fire to the air; whence a decomposition might take place, even though the attractive powers of both the vitriolic and aerial acid to the alkali were equal. To attain to any certainty in this matter, therefore, it is necessary to determine the quantity and force of each of the attractive powers, and denote it by numbers. The necessity of this has been observed by Mr Morveau and Mr Wenkel, who have both proposed methods for answering the purpose; but Mr Kirwan has showed that both are defective; and he tells us, that the discovery of the quantity of real acid in each of the mineral acid liquors, with the proportion of real acid taken up by a given quantity of each basis at the point of saturation, led him unexpectedly to what seems the true method of investigating the quantity of attraction which each acid bears to the several bases to which it is capable of uniting: "for it was impossible

(fays he) not to perceive, 1. That the quantity of real Solution acid necessary to saturate a given weight of each basis is inversely as the affinity of each basis to such acid.

2. That the quantity of each basis requisite to saturate a given quantity of each acid is directly as the affinity of such acid to each basis. Thus 100 grains of each of the acids require for their saturation a greater quantity of fixed alkali than of calcareous earths, more of this earth than of volatile alkali, more of this alkali than of magnetia, and more of magnetia than of earth of alum.

"If an acid be united to less of any basis than is requisite for its saturation, its affinity to the deficient part of its basis is as the ratio which that deficient part bears to the whole of what the acid can saturate. Thus, if 100 grains of vitriolic acid, which can saturate 110 of calcareous earth, be united only to 55, its affinity to the deficient 55 parts should be estimated one half of its whole affinity; but its affinity to the retained part is as its whole affinity."

To explain the decompositions in which these acids Method of are concerned, we must consider, first, the powers explaining which result any decomposition, and tend to keep the decompositions bodies in their present state; and, secondly, the powers affected Method of by which tend to effect a decomposition and new union; acids alone. Quiescent Our author calls quiescent affinities, the last decomposition. A decomposition will therefore always take place when the sum of the divalent affinities is greater and divalent than the quiescent; and, on the contrary, no decomposition will happen when the sum of the quiescent affinities is greater than that of the divalent. All we have to do therefore is to compare the sums of each of these powers. The method our author takes to compare the affinities together is by the following table, in which the quantity of calcareous earth, &c. saturated by 100 grains of each of the mineral acids, is stated.

<table>
<thead>
<tr>
<th>Veg. fixed</th>
<th>Mineral</th>
<th>Calcareous</th>
<th>Vol. Mag. Earths</th>
<th>Quantity of</th>
<th>of acid taken up by various basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitriolic</td>
<td>215</td>
<td>165</td>
<td>110</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>Nitrous</td>
<td>215</td>
<td>165</td>
<td>96</td>
<td>87</td>
<td>75</td>
</tr>
<tr>
<td>Marine</td>
<td>215</td>
<td>138</td>
<td>89</td>
<td>79</td>
<td>71</td>
</tr>
</tbody>
</table>

These numbers he considers as adequate expressions of the quantity of each of the affinities. Thus the affinity of the vitriolic acid to fixed vegetable alkali is to the affinity with which it adheres to calcareous earth as 215 to 110; and to that which the nitrous acid bears to calcareous earth as 215 to 96, &c. Hence Expressive we sum up the powers of affinity betwixt any number of the quantity of different substances, and account for their decompositions, as in the following example of the double decomposition, which takes place when a solution of vitriolated tarrat and solution of lime or chalk in nitric acid are mixed together.

**Quiescent Affinities.**

| Vitriolic acid to vegetable fixed alkali, 215 | 110 |
| Nitrous acid to calcareous earth, 96 | 110 |

**Divalent Affinities.**

| Vitriolic acid to calcareous earth, 215 | 110 |
| Nitrous acid to vegetable alkali, 215 | 110 |

**Sum of quiescent affinities**

| 711 |

**Sum of divalent affinities**

| 725 |

Hence we see that a double decomposition must ensue. The same will be produced, if instead of vitriolated tarrat we make use of Glauber's salt; for the sum of the
the quiescent affinities is 261., of the divellent 275.; with vitriolic ammonia, by the sum of the quiescent is 186., of the divellent 195. &c. In mixing vitriolated tartar with solution of magnesia in nitrous or marine acids, a double decomposition takes place though invisibly, as the vitriolic Ephom salt is very soluble in water, and therefore cannot be precipitated like selenite. In the former case the sum of the quiescent powers is 290., of the divellent 295; in the second 296 and 295.

Other decompositions take place in the same manner; and from all the facts which our author had occasion to observe, he concludes, that the quantity of each affinity, as determined in the above table, coincides exactly with experience; and that these decompositions are perfectly consistent with the superior affinity which has been hitherto observed in the vitriolic and nitrous acids with fixed alkalies over the calcareous earths; nor do they infringe in the least the known laws of affinity, as has been intimated by some chemists.

One fact only, mentioned in Dr Crell’s Journal, seems to be repugnant to what is here advanced; and that is, that if solutions of one part of alum and two of common salt be mixed together, evaporated, and set to cryallize, a Glauber’s salt will be formed; though, in this case, the sum of the quiescent affinities is 233, and that of the divellent only 223. Mr Kirwan repeated this experiment without success; and Dr Crell himself owns that it will not succeed but in the most intense cold. If it does succeed at all, he says the decomposition must arise from a large excess of acid in the alum, which acted upon and decomposed the common salt; and this explanation is confirmed by the small proportion of Glauber’s salt found to be obtained by this process; for from 30 lb. of common salt and 16 of alum, only 1 lb. of Glauber’s salt were produced; whereas, if the whole of the alum had been decomposed, there should have been formed, according to Mr Kirwan’s computation of the quantity of acid in the different salts, 29 lb. or, according to Mr Bergman’s, 22 lb. of Glauber’s salt.

In some cases, the neutral salts have a power of uniting, without any decomposition, or with only a very small one, to a third substance; thus forming triple salts, and sometimes quadruple; which often causes anomalies that have not yet been sufficiently investigated. Volatile alkalies in particular are possessed of the power of uniting with neutral salts in this manner. Hence they seem to precipitate magnesia from Ephom salt, even when perfectly calcine; but this is owing to their combination with that salt, and forming a triple one, which is insoluble in water.

It seems extraordinary, that, according to Mr Kirwan’s table, the three mineral acids should have the same affinity to vegetable fixed alkalies, when it is well known that the vitriolic will expel either of the other two from an alkaline basis. In explication of this, Mr Kirwan observes, that nitre is decomposed by the marine acid; and that Glauber’s salt and vitriolic ammomiac are decomposed by that of nitre; and these salts, as well as cubic nitre and nitrous ammomiac, are decomposed by the marine acid.

Mr Kirwan is of opinion, that these decompositions are the effect of a double affinity, or at least of compound forces. He supposed that they arose from the different capacities of the acids for elementary fire; solution and to determine this matter, he made the following experiments, in which the decompositions were not discovered by crystallization, but by tests.

1. Having procured a quantity of each of the three mineral acids containing the same proportion of real nitre to acid, and reduced them to the temperature of 68° of Fahrenheit, 100 grains of vitriolic acid, containing 26.6 of real acid, was projected upon 480 grains of oil of tartar at the same temperature, by which the thermometer was raised to 138°.

2. An hundred grains of spirit of nitre, containing also 26.6, projected on 480 grains of oil of tartar, produced only 120° of heat.

3. An hundred grains of spirit of salt, the specific gravity of which was 1220, and which contained the usual proportion of real acid, raised the thermometer from 69° to 129°.

"Hence (says he) it follows, that the vitriolic acid Vitriolic acid contains more specific fire, or at least gives out more heat than either the nitrous or marine; and therefore when the vitriolic acid comes in contact with either nitre or salt of Sylvius, its fire and passes into these acids, which are thereby rarified to a fine.

Difficulty of and Dr Crell to be repugnant to what is here advanced; and that is, M. Kirwan's explanation, the marine acid, as giving out more specific heat, ought to expel the nitrous from an alkaline basis; which, however, is not the case. Something else, therefore, besides the mere quantity of specific heat, must here be taken into consideration. Mr Kirwan, however, goes on to prove the truth of his theory by the following experiments.

4. To 400 grains of vitriolic acid, whole specific gravity was 1.26, sixty grains of nitre were added; on the introduction of which the thermometer fell from 68° to 60°. During the time of this descent, the nitrous acid was not expelled; for some filings of copper, put into the mixture, were not acted upon in the least; but in five minutes afterwards they visibly effervesced, which showed that the nitrous acid began to be expelled; for the vitriolic acid does not act upon copper but by a boiling heat.

5. Sixty grains of nitre were put to 400 of oil of By the fame vitriol, whole specific gravity was 1.870; the thermometer infinitely rose from 68° to 105°, and the nitrous acid was expelled in a visible flame. These experiments (says Mr Kirwan) prove, 1. That neutral salts are not decomposed by mere solution in an acid different from their own. 2. That the nitrous acid, being converted into vapour, had imbibed a large quantity of fire. But as the vitriolic acid, on both these experiments, was used in much larger quantities than was necessary to saturate the alkali of the diluted nitre, sixty grains of the latter were put into 64 of the abovementioned dilute spirit of vitriol, which contained the same quantity of real vitriolic acid that the 60 grains of nitre did of the nitrous; with the addition of 40 grains of water and a few copper filings. Marine acid, in less than two hours the copper was acted upon, and consequently the nitrous acid was expelled.

6. To 400 grains of oil of vitriol, of the specific gravity of 1.870, 100 grains of common salt were added. An effervescence immediately ensued,
and the marine acid rose in white vapours. A thermometer held in the liquor rose only 4 degrees, but in the froth it ascended to 10°, and fell again upon being replaced in the liquor. Hence Mr Kirwan concludes, that the vitriolic acid gives out its fire to the marine; and that this latter received more than it could absorb even in the state of vapour, and therefore communicated heat to the contiguous liquor. It appears to him also, that the nitrous and marine acids receive fire from the vitriolic, and are thrown into a vaporous state, or at least rarefied to such a degree as to be expelled from their alkaline bases, though their affinity with that base may be equally strong with the vitriolic.

7. To ascertain the manner in which vitriolated tartar and Glauber's salt are decomposed by spirit of nitre, 60 grains of powdered tartar of vitriolic were put into 400 grains of nitrous acid, whose specific gravity was 1.355, and which contained about 105 grains of real acid. The thermometer was not affected by the mixture; but in 24 hours the vitriolic acid was in part disengaged, as appeared by the acid mixture acting upon a regular affinity, which neither pure nitrous acid nor pure vitriolic acid will do by themselves. On putting the same quantity of vitriolated tartar into 400 grains of spirit of nitre whose specific gravity was 1.4789, the thermometer rose from 57° to 79°; the vitriolated tartar was quickly disengaged, and the regular affinity showed that the vitriolic acid was disengaged. Hence it appeared that the nitrous acid, having the same affinity with the bases of vitriolated tartar as the vitriolic, but giving out, during the solution, more fire than was necessary to perform the solution, the vitriolic, receiving this fire, was disengaged: for as it cannot unite with alkalies without giving out fire; so when it receives back that fire, it must quit them. The reason why the nitrous acid, which specifically contains less fire than the vitriolic, gives out so much is, that its quantity in both these experiments is far greater than that of the vitriolic; it being in the first as 105 to 17, and in the last as 135 to 17.

8. To 60 grains of spirit of nitre, whose specific gravity was 1.355, Mr Kirwan added 1000 grains of water; and into this dilute acid put 60 grains of vitriolated tartar, containing exactly the same quantity of real acid that the 60 grains of nitrous acid did. In eight days the vitriolated tartar was almost entirely disengaged, and without any sign of its decomposition; and no nitre was found upon evaporating the liquor. Hence he concludes, that the nitrous acid can never decompose vitriolated tartar, without the assistance of heat, but when its quantity is so great that it contains considerably more fire, and by the action of solution is determined to give out this fire, its salt is also decomposed, in similar circumstances; by the marine acid; though still more slowly and with more difficulty than by the nitrous, as appears by the following experiments.

9. Into 400 grains of spirit of salt, whose specific gravity was 1.220, were put 60 grains of vitriolated tartar. The thermometer was not affected in the least, and the salt dissolved very slowly. Some pulverized bismuth was added to try whether the vitriolic acid was disengaged; and in 12 hours part of it was dissolved, so that it could not be precipitated by water. Solution and precipitation. This showed, that part of the vitriolic acid was disengaged; for this semi-metal cannot be kept in solution when much diluted with water, excepting by a mixture of marine and vitriolic acids.

In this experiment the quantity of marine acid was much greater than that of the vitriolic; and therefore it was capable of disengaging it. This circumstance alone, however, is not sufficient; the acid must be dissolved to give out by solution that quantity of fire which it is necessary the vitriolic should receive in order to its quitting the basis to which it is united; and therefore when Mr Cornette added two ounces of spirit of salt to half an ounce of vitriolated tartar already dissolved, in water, no decomposition took place. The reason of this was, that as the vitriolated tartar was already disengaged, no cold nor heat was generated by the mixture; and therefore the spirit of salt could not give out any fire. Glauber's salt is more easily decomposed by marine acid than vitriolated tartar; and thus the marine acid is more capable of disengaging the vitriolic, under the circumstances of this experiment.

Accordingly, during the solution of marine and vitriolic acids, the vitriolic ammoniac is also decomposed by means of marine acid; but in this case, the quantity of marine acid must greatly exceed that of the vitriolic acid contained in the salt to be decomposed; and it must be remarked, that according to the observations of Mr. Bergman, the decomposition of Glauber's salt or vitriolic ammoniac by this acid is never complete. On the same principles the marine acid decomposes salts which have the nitrous acid for their basis. Mr Cornette found, that cubic nitre was more easily decomposed by it than that which has vegetable alkaline bases for its bases. Accordingly, during the solution of prismatic nitre, only three degrees of cold were produced; but by the solution of cubic nitre; which shows that the spirit of salt gave out more fire in the latter case than in the former; and its quantity must always be greater than that of the nitrous acid contained in the mineral alkaline bases; because this basis requires for its saturation more of the marine than of the nitrous acid. The nitrous acid, however, in its turn decomposes salt of Sylvius and common salt; but it must always be in greater quantity than the marine to produce that effect.

10. Sixty grains of common salt being added to marine 400 of colourless spirit of nitre, whose specific gravity was 1.478, the mixture quickly effervesced and grew red, yet the thermometer rose but two degrees; because this acid had absorbed the greater part of the fire given out by that of nitre; the decomposition was likewise hastened by the superior affinity of the nitrous acid to the alkaline bases of the sea-salt; hence the decomposition of sea-salt by means of nitre takes place without any solution; but spirit of salt will not decompose cubic nitre until it has first disengaged it. This mutual expulsion of the nitrous and marine acids by each other, is the reason why aqua-regia may be made by adding nitre or nitrous ammoniac to spirit of salt, and spirit of salt to ammoniac to spirit of nitre. Selenite cannot be decomposed either by nitrous or marine.
### Theory

Marine acid; because it cannot be dissolved in either without the assistance of foreign heat. It must likewise be observed, that in all decompositions of this kind, when the liquor has been evaporated to a certain degree, the vitriolic acid expels in its turn the nitrous or marine acid to which it had already yielded its bals. The reason of this is, that the free part of the weaker acids being evaporated, the neutral salts begin to crystallize, and then giving out heat, the vitriolic absorbs it; and thus reaching upon them expels them from the alkali or earth to which they are united. Mr. Kirwan found much more difficulty in determining the attractive powers of the different acids to the metals than to alkaline salts or earths. Some of the difficulties met with in this case arose from the nature of metallic substances themselves. Their calxes when formed by fire always contain a quantity of air, which cannot be extracted from them without great difficulty, and is very soon re-absorbed; and if formed by solution, they as constantly retain a part of their solvent or precipitant; so that the precise weight of the metallic part can scarce be discovered. Our author, therefore, and because metallic calxes are generally inferior in this respect to the metals in their perfect state, and even here they must lose a part of their phlogiston before they can be dissolved in acids, and a considerable part remains in the solution of the acid and calx; which last quantity he endeavoured to determine.

A new difficulty now occurred, arising from the impossibility of finding the real quantity of acid necessary to saturate the metal, for all metallic solutions contain an excess of acid; the reason of which is, that the calxes formed by a due proportion of acid and calx are insoluble in water without a further quantity of acid; and in some cases this quantity, and even its proportion to the aqueous part of the liquor, must be very considerable, as is evidenced in solutions of bismuth. It was in vain attempted to deprive these solutions of their excess of acid by means of caustic alkalies and lime-water; for when deprived of only part of it, many of the metals were precipitated, and all of them would be so if deprived of the whole. As the solution of silver, however, can be very much saturated, Mr. Kirwan began with it and found that 617 grains of this solution contained 100 grains of silver, and 31.38 grains of real acid, after making the proper allowance for the quantity diffused in nitrous air. Nine grains of this solution tinged an equal quantity of solution of lime as red as one of a grain of real acid of spirit of nitre would have done; whence our author concluded that 9 grains of his solution of silver contained an excess of \( \frac{1}{4} \) of a grain of real silver: according to which calculation, the whole quantity ought to have contained 5.6 grains; which deducted from 31.38, leaves 25.78 grains for the quantity of acid saturated by 100 grains of silver.

As the vitriolic solutions of tin, bismuth, regulus of antimony, nickel, and regulus of arsenic, contain a large excess of acid, Mr. Kirwan saturated part of it with caustic volatile alkali before he tried them with the infusion of lime; and the same method was used with solutions of iron, lead, tin, and regulus of antimony in the nitrous and marine acids. The proportion of vitriolic and marine acid taken up by lead, silver, and mercury, were determined by computing the quantity of real acid necessary to precipitate these metals from their solutions in the nitrous acid; which seemed to be the most exact method of determining this point. The result of all the experiments was, that 100 grains of each of these acids take up at the point of saturation of each metallic substance, dephlogisticated such a degree as is necessary for its solution in each acid, the quantities marked in the following table.

<table>
<thead>
<tr>
<th>Quantities of the different metals taken up by acid</th>
<th>Iron</th>
<th>Copper</th>
<th>Tin</th>
<th>Lead</th>
<th>Silver</th>
<th>Merc.</th>
<th>Zinc</th>
<th>Bismuth</th>
<th>Nickel</th>
<th>Cobalt</th>
<th>Reg. of ant.</th>
<th>Reg. of arsen.</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 grains of Vitriolic acid</td>
<td>270</td>
<td>260</td>
<td>198</td>
<td>412</td>
<td>390</td>
<td>432</td>
<td>318</td>
<td>250</td>
<td>310</td>
<td>320</td>
<td>360</td>
<td>260</td>
</tr>
<tr>
<td>Nitrous acid</td>
<td>255</td>
<td>255</td>
<td>120</td>
<td>365</td>
<td>375</td>
<td>416</td>
<td>304</td>
<td>290</td>
<td>300</td>
<td>350</td>
<td>194</td>
<td>220</td>
</tr>
<tr>
<td>Marine acid</td>
<td>265</td>
<td>265</td>
<td>130</td>
<td>400</td>
<td>420</td>
<td>438</td>
<td>312</td>
<td>250</td>
<td>275</td>
<td>310</td>
<td>370</td>
<td>198</td>
</tr>
</tbody>
</table>

Though from this table, compared with the former, we might suppose that metals, having a greater attraction for acids than alkalies, could not be precipitated by them, yet Mr. Kirwan observes, that the common tables, which postpone metallic substances to alkaline calxes, are in reality just, though there can scarce be any reason to doubt that almost all metallic substances have a greater affinity with acids than alkalies have. The common tables, he says, are tables of precipitation rather than of affinity, as far as they relate to metallic substances. These precipitations, however, are constantly the result of a double affinity and decomposition; the precipitating metal yielding its phlogiston to the precipitated one, while the precipitated metal yields its acid to the other. Thus, though copper in its metallic form precipitates silver and mercury from the nitrous acid, yet the calx will precipitate neither.

The superior attraction the nitrous acid has to silver rather than fixed alkali, appears from the following experiment. If a solution of silver in nitrous acid be poured into a mixed solution of alkali and sea-salt, the silver will be precipitated by the sea-salt into a lunar cornua, and not by the loose alkali contained in the liquor. "Now (says Mr. Kirwan), if the nitrous acid had a greater affinity to the free alkali than to the silver, it is evident that the silver would be precipitated pure, and not in the state of lunar cornua; but from its being precipitated in this state, it is plain, that the precipitation was not accomplished by a single but by a double affinity. Hence also the marine acid appears to have a greater attraction to silver than the nitrous has to fixed alkalies. The result is similar when we make use of solutions of lead or mercury in the nitrous acid. Mr. Bayen has also shown, that vitriol of lead and corrosive sublimate mercury cannot be deprived of more than half their acid, even by caustic fixed alkalies.
Theory.

With regard to lead, if perfectly dry salt be projected on this metal heated to ignition, the common salt will be decomposed, and lead or calx formed. Nor can we attribute this to the volatilization of the alkali by heat; for the alkali is as fixed as the lead, and must therefore be caused by the superior attraction which the calx of this metal, even when dephlogisticated, has for the marine acid. Mr Scheele informs us, that if a solution of common salt be digested with litharge, the common salt will be decomposed, and a caustic alkali produced. It may also be decomposed simply by letting its solution pass slowly through a funnel filled with litharge; and the same thing happens to a solution of calcareous earth in marine acid; which shows that the decomposition takes place merely by the superior degree of attraction between the acid and metallic calx (A).

That acids have a greater attraction for metallic earths than volatile alkalis, is still more evident. Luna cornea is soluble in volatile alkalis; but if this solution be triturated with four times its weight of quicksilver, a mercurius dulcis, and not salt ammoniac, is formed. The reason why alkalis and earths precipitate all metallic solutions, is, that the metals are held in solution by an excess of acid. Even if the alkaline and earthy substanct did no more than absorb this excess of acid, a precipitation must necessarily ensue; but they not only take up this superabundant acid, but also the greater part of that which is necessary to saturate the metallic earth. This they are enabled to do by means of a double affinity; for during the solution of metals, only a small part of the phlogiston, comparatively speaking, escapes, the remainder being retained by the compound of acid and calx. When therefore an alkali or earth is added to a solution, the phlogiston quits the acid, and joins with the calx, while the greater part of the acid reunites to the precipitate. Norwithstanding this great affinity, however, of metallic earths to acids, there are but few instances of their decomposing those fats which have an alkali, or an earth for their bases; by reason of the inability of the acids, while combined with these bases, and thereby deprived of a great part of their specific fire, to volatilize the phlogiston combined with the metallic earths, which must necessarily be expelled before an acid can combine with them; and as to the metallic calces, they are generally combined with fixed air, which must also be partly expelled; but ammoniacal salts (containing much more fire, for they absorb it during their formation) for that reason act much more powerfully on metals. Allowing then the affinities of the mineral acids with metallic substances to be as above, all double decompositions, in which only fats containing these acids united to alkaline, terreene, or metallic bases, are concerned, admit of an easy explanation: may, says Mr Kirwan, I am bold to say, they cannot otherwise be explained. Thus, if a solution of tartar vitriolate, and of silver in the nitrous acid, be mixed in proper proportion, nitre and vitriol of silver will be formed; and this latter for the most part precipitated.

(4) These experiments have been repeated by many other chemists without success; and Mr Wiegebein informs, that none of those who have attempted to decompose sea-salt by means of lead, ever found their methods answer the purpose.
CHEMISTRY.

Solution and Precipitation.

315 Precipitation of corrosive mercury by oil of vitriol explained.

316 Table of the affinities to the different metals explained.

317 Of the quantity of phlogiston contained in the different metals.

318 Method of calculating this quantity exemplified in regulus of arsenic.

319 Table of the quantities of phlogiston in 100 grains of different metals.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Relative Quantity</th>
<th>Absolute Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>39</td>
<td>24.82</td>
</tr>
<tr>
<td>Copper</td>
<td>212</td>
<td>19.65</td>
</tr>
<tr>
<td>Cobalt</td>
<td>270</td>
<td>17.07</td>
</tr>
<tr>
<td>Iron</td>
<td>233</td>
<td>14.67</td>
</tr>
<tr>
<td>Zinc</td>
<td>182</td>
<td>11.49</td>
</tr>
<tr>
<td>Nickel</td>
<td>136</td>
<td>9.82</td>
</tr>
<tr>
<td>Regulus of</td>
<td>120</td>
<td>7.56</td>
</tr>
<tr>
<td>Antimony</td>
<td>114</td>
<td>7.18</td>
</tr>
<tr>
<td>Tin</td>
<td>109</td>
<td>6.86</td>
</tr>
<tr>
<td>Regulus of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsenic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silver</td>
<td>100</td>
<td>6.30</td>
</tr>
<tr>
<td>Mercury</td>
<td>74</td>
<td>4.56</td>
</tr>
<tr>
<td>Bismuth</td>
<td>57</td>
<td>3.59</td>
</tr>
<tr>
<td>Lead</td>
<td>43</td>
<td>2.70</td>
</tr>
</tbody>
</table>

This point he likewise endeavoured to ascertain by other experiments. As silver loses a certain quantity of phlogiston, which escapes and separates from it during its solution in nitric acid, he concluded, that if the solution was exposed to nothing from which it could reobtain phlogiston, and this was distilled to dryness, and entirely separated from the acid, as much silver should remain unaltered as corresponded with the quantity of phlogiston lost by it; and if this quantity corresponded with that in the above table, he then had good reason to conclude that the table was just.

For this purpose 120 grains of standard silver were distilled in dephlogitificated nitrous acid diluted with water, and he obtained from it 24 cubic inches of nitrous air. This solution was gently evaporated to dryness; and he found that, during the evaporation, Solution about a quarter of a grain of the silver had been volatilized. The dry residuum was then distilled, and kept an hour in a coated green-glass retort heated almost to a white heat. Abundance of nitrous acid passed off during the operation, and a green and white sublimate rose into the neck of the retort, some of it even pasting over into the receiver. On breaking the retort, the nitride was penetrated with a yellow and red stinge, and partly covered over with an exceedingly fine silver powder, which could scarcely be scraped off. The remainder of the silver was white, and perfectly free from acid, but not melted into a button. On being collected, it weighed 94 grains; consequently 26 grains had been lost either by sublimation or vitrification; but of these 26 grains 9 were copper; for 100 grains of standard silver contain 75 of copper, therefore only 17 grains of pure silver remained unaltered, being either volatilized or vitrified. The whole quantity of pure silver in 120 grains of standard silver amounts to 111 grains; then if 111 grains of pure silver lose 17 grains by being deprived of its phlogiston, 100 grains of the same should lose 15.8; and by the above table 15.3 grains of silver should contain 0.945 of a grain of phlogiston. Now, 100 grains of pure phlogiston contain 14 cubic inches of nitrous air, which, according to our author's calculation, contain 0.938 of a grain of phlogiston; and this differs from 0.945 only by 0.007 of a grain. "In this experiment (says Mr Kirwan) only as much of the silver sublimed as could not regain phlogiston; the remainder regained it from the nitrous air absorbed by the solution, and by that which remained in the acid and calx. If this were not so, I do not see why the whole of the silver would not sublime."

Dr Priestley having several times dissolved mercury in the nitrous acid, and revivified it by distilling over that acid, constantly found a considerable portion of it reduced. To try whether that proportion corresponded with his calculation, Mr Kirwan examined Dr Priestley's experiment concerning the revival of the peculiar property of mercury.

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Dr Priestley having several times dissolved mercury in the nitrous acid, and revivified it by distilling over that acid, constantly found a considerable portion of it reduced. To try whether that proportion corresponded with his calculation, Mr Kirwan examined Dr Priestley's experiment, viz. that having dissolved 17 penny-weights 13 grains (321 grains) of mercury in nitrous acid, 56 grains remained unaltered. According to Mr Kirwan's calculation 56 grains should have remained unaltered; for 100 grains of mercury afford 12 cubic inches of nitrous air; of consequence 521 grains should afford 38.12, which contain 2.58 of phlogiston; and if, as according to the table, 4.56 grains of phlogiston be necessary to metallize 100 grains of mercury, 2.58 grains will be necessary to metallize 56 grains of the same metal; and our author is satisfied from his own trials, that more than 50 grains would have remained unaltered, if dephlogitificated nitrous acid had been used in dissolving the mercury, and the solution performed with heat and a strong acid: but that which the Doctor used was of Why so much of the metal was revivified in the smoking kind, and consequently contained a considerable quantity of phlogiston already, which undoubtedly contributed to revive more of the metal than would otherwise have been done. It is true, the Doctor's experiment afterwards revived a great part of what experience had originally remained unaltered, but this happened merely, for it had been some time exposed to the free air, from which the cales of metals always attract phlogiston; as is evident in luna cornea, which blackens on being exposed to the air.

By another experiment of Dr Priestley's, it was found
whence all its air was extracted, that is, about 118 grains, absorbed 40 ounce-measures, or 75.8 cubic inches of inflammable air, containing 2.05 grains of phlogiston, by which they were reduced. An hundred grains of minium, therefore, require for their reduction nearly 2.25 grains of phlogiston. In another experiment made with more care, he found, that 480 grains of minium absorbed 108 ounce-measures of inflammable air; so that, according to this, 100 grains of minum requires for their reduction 1.49 grains of phlogiston; and in two succeeding experiments he found the quantity still less. On this Mr Kirwan remarks, 1. That the whole of the minium was not dephlogisticated; for it is never equally calcined, and besides much of it must have been reduced during the expansion of its air. 2. The quantity of phlogiston in the inflammable air may have been greater, as this varies with its temperature and the weight of the atmosphere; so that on the whole these experiments confirm the results expressed in the table.

Mr Kirwan next proceeds to consider the attraction of metallic calces to phlogiston. Inflammable air, when condensed into a solid substance, he supposes not only equal, but much superior, to any metallic calce in specific gravity; and therefore, if we could find the specific gravity of any calce free both from phlogiston and fixed air, we would thus know the density which phlogiston acquires by its union with such calce. It has, however, hitherto proved impossible to procure calces in such a state; as, during their dephlogistication, they combine with fixed air or some particles of the menestium, whence their absolute weight is increased, and their specific gravity diminished. Hence it appears, that the specific gravity of the calces differs much less from that of their respective metallics, than the specific gravity which the phlogiston acquires by its union with those calces from that which it possesses in its uncombined state. Hence, instead of deducing the quantity of affinity between phlogiston and metallic calces from the following proposition, that "the affinity of metallic calces to phlogiston is in a compound ratio of its quantity and density in each metal," he is obliged to deduce it from this other, that "the affinity of metallic calces to phlogiston is directly as the specific gravity of the respective metallics, and inversely as the quantity of calce contained in a given weight of these metallics." This latter proposition is an approximation to the former, founded on this truth, that "the larger the quantity of phlogiston in any metal is, the smaller the solution of calx in a given weight of that metal and precipitate; and, that it is the density which the phlogiston acquires is as the specific gravity of the metal." This latter proposition, however, is not entirely true; for this density is much greater; but its defect is only sensible with regard to those metals which contain a considerable quantity of phlogiston, as gold, copper, cobalt, and iron. With regard to the rest, it is of no importance. The specific gravity of the different metals, then, being as represented in the first column of the following table, the affinity of their calces to phlogiston will be as in the second; and the third expresses the affinities in numbers homogeneous with those which express the affinities of acids with their bases.

<table>
<thead>
<tr>
<th>Specific Gravity</th>
<th>Proportional Affinities</th>
<th>Real Affinities of Table of Calx to Phlogiston</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>19</td>
<td>0.25</td>
</tr>
<tr>
<td>Mercury</td>
<td>14</td>
<td>0.147</td>
</tr>
<tr>
<td>Silver</td>
<td>11.091</td>
<td>0.118</td>
</tr>
<tr>
<td>Lead</td>
<td>11.33</td>
<td>0.116</td>
</tr>
<tr>
<td>Copper</td>
<td>8.8</td>
<td>0.109</td>
</tr>
<tr>
<td>Bismuth</td>
<td>6.6</td>
<td>0.099</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7.7</td>
<td>0.092</td>
</tr>
<tr>
<td>Iron</td>
<td>7.7</td>
<td>0.090</td>
</tr>
<tr>
<td>Regulus of Arsenic</td>
<td>8.31</td>
<td>0.089</td>
</tr>
<tr>
<td>Zinc</td>
<td>7.2</td>
<td>0.081</td>
</tr>
<tr>
<td>Tin</td>
<td>7</td>
<td>0.075</td>
</tr>
<tr>
<td>Regulus of Antimony</td>
<td>6.86</td>
<td>0.074</td>
</tr>
</tbody>
</table>

From this table we may see why lead is useful in Why lead cupellation; namely, because it has a greater affinity is useful in phlogiston than the calces of any of the other imperfect metals; consequently after it has lost its own phlogiston, it attracts that of the other metals with which it is mixed, and thus promotes their calcination and vitrification.

The third point necessary for the explanation of the phenomena attending the solution of metals, and their phlogiston left by metallic calces during their precipitation, is to determine the proportion of phlogiston which they lose by solution in each of the acids, and the affinity which their calces bear to the part of the metal. Though our author was not able to determine this by any direct experiment, yet from various considerations he was led to believe that it was as follows:

<table>
<thead>
<tr>
<th>Quantity of Phlogiston separated</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Iron, Copper, Tin, Lead, Silver, Mercury, Zinc, Bismuth, Cobalt, Nickel, Reg. of Ant. Reg. of Art.</td>
</tr>
<tr>
<td>By the vitriolic acid</td>
</tr>
<tr>
<td>7/18 7/18 7/18 7/18 7/18</td>
</tr>
</tbody>
</table>

Thus we may easily construct a table of the affinities of the phlogiston of different metals for their calces and metals during their precipitation.

Quadrent
of the ex- 334 cess of acid in solutions proper for making the experi- 335 ments.

\begin{center}
\begin{tabular}{|l|l|}
\hline
Quiescent Affinities. & Diluent Affinities. \\
Nitrous acid to silver & Nitrous acid to copper \\
Calx of copper to phlogiston & Calx of silver to phlogiston \\
Sum of the quiescent affinities & 375 & 255 \\
& 263 & 491 \\
Sum of the diluent affinities & 738 & 746 \\
\hline
\end{tabular}
\end{center}

336 Of the ex- cess of acid in solutions proper for making the experiments.

337 Why the metals are more depophilogiticated by mutual precipitation than by direct solution.

338 Why copper is dissolved by solution of silver, mercury, or iron.

339 Why iron and zinc are dissolved by vitriolic acid.

340 Nitrous acid decomposes all metals, and when concentrated.

341 In what cases the marine acid can dissolved metals, and when it cannot.

342 Why the metals are more depophilogiticated than by direct solution in their respective menstrua; and are even dissolved by menstrua which would not otherwise affect them. The reason of this is, that their phlogiston is acted upon by two powers instead of one: and hence, though copper be directly soluble in the vitriolic acid only when in its concentrated state, and heated to a great degree; yet if a piece of copper be put into a solution of silver, mercury, or even iron, though dilute and cold, and exposed to the air, it will be dissolved; a circumstance which has justly excited the admiration of several eminent chemists, and which is inexplicable on any other principles than those just now laid down. From this circumstance we may see the reason why vitriol of copper, when formed by nature, always contains iron. Mr. Kirwan now proceeds to consider the solutions of metallic substances in all the different acids.

Vitriolic acid, he observes, diarronizes only iron and zinc of all the metallic substances, because its affinity to their calxes is greater than that which they bear to the phlogiston they must lose before they can unite with it.

Nitrous acid has less affinity with all metallic substances than either the vitriolic or marine; yet it diarrones them all, gold, silver, and platinum excepted, though it has even less affinity with them than they have with that portion of phlogiston which must be lost before they can dissolve in any acid. The reason of this is, that it unites with phlogiston, unless when in too diluted a state; and the heat produced by its union with phlogiston is sufficient to promote the solution of the metal. On the other hand, when very concentrated, it cannot diarrone them: because the acid does not contain fire enough to throw the phlogiston into an aerial form, and reduce the solid to a liquid.

The marine acid depophilogiticates metals less powerfully than any other. It can make no solution, or at least can operate but very slowly; without heat, in those cases where the metallic calx has a stronger affinity with that portion of the phlogiston which must be lost, than the acid; nor can it operate briskly even where the attraction is stronger, provided, the quantity of acid be small; because such a little quantity of acid does not contain fire enough to volatilize the phlogiston: and hence heat is necessary to afford the marine acid in dissolving lead. When depophilogiticated, it acts more powerfully.

It has been observed, that copper and iron mutually precipitate one another. If a piece of copper be put into a saturated solution of iron fresh made, no solution will ensue for 12 hours, or even longer, if the liquor be kept close from the air; but if the liquor be exposed to the open air, the addition of volatile alkali will show, in 24 hours, that some of the copper has been dissolved, or foined, if heat be applied, and a calx of iron is precipitated. The reason of this will be understood from the following state of the affinities.

\begin{center}
\begin{tabular}{|l|l|}
\hline
Quiescent. & Diluent. \\
Vitriolic acid to calx of iron & Vitriolic acid to copper \\
Copper to its phlogiston & Calx of iron to phlogiston \\
\end{tabular}
\end{center}

344 In this case no decomposition can take place, because the sum of the diluent affinities is less than that of the quiescent; but in the second, when much of the phlogiston of the iron has escaped, the affinity of the calx of iron to the acid is greatly diminished, at the same time that the affinity of the calx to phlogiston is augmented. The state of the affinities may therefore be supposed as follows.

\begin{center}
\begin{tabular}{|l|l|}
\hline
Quiescent. & Diluent. \\
Vitriolic acid to calx of iron & Vitriolic acid to copper \\
Copper to its phlogiston & Calx of iron to phlogiston \\
\end{tabular}
\end{center}

345 The increase of affinity of the calx of iron to phlogiston is not a mere supposition; for if we put some fresh iron to a solution of the metal far depophilogiticated as to refuse to crystallize, so much of the phlogiston will be regained that the impoverished solution will now yield crystals. The reason why the increased quantity of phlogiston does not enable the acid to precipitate on the metal, is, because it is neither sufficiently large, nor attracted with a sufficient degree of force, to which the access of air and heat employed contribute considerably. The diminution of attraction in calxes of iron for acids is evident, not only from this but many other experiments; and particularly from the necessity of adding more acid to a turbid solution of iron in order to re-establish its transparency.

A depophilogiticated solution of iron is also precipitated by the calxes of copper. The same thing happens when copper is dissolved by a solution of iron in nitrous acid; only as the acid is more depophilogiticated as to refuse to crystallize, so much of the phlogiston is precipitated, and the solution becomes turbid, and precipitated from solution of iron in the marine acid, though exposed to the open air for 24 hours.

Solution of copper in the vitriolic acid is instantly precipitated by iron; the reason of which is plain from the common table of affinities; and hence the foundation of the method of extracting copper, by means of the triol, from some mineral waters. The precipitated solution affords a vitriol of iron, but of a paler kind than that commonly met with, and less fit for dyeing; it is only fit for dyeing, if being more depophilogiticated; the reason of which is, that copper contains more phlogiston than iron; for dyeing than old iron is also used which has partly lost its phlogiston, and induced.
Why a saturated solution of silver can scarcely be precipitated by iron.

Zinc cannot precipitate iron, as Mr Bergman has shown, until the solution of the latter loses part of its phlogiston. Hence we may understand why Newmann denied that iron can be precipitated by means of zinc. Mr Kirwan, however, has found, that zinc does not precipitate iron from the nitrous acid; but on the contrary, that iron precipitates zinc. In a short time the acid redissolves the zinc and lets fall the iron, owing to the calx of iron being too much dephlogisticated. Iron, however, will not precipitate zinc either from the vitriolic or marine acids. Most of the metallic substances precipitated by iron from the nitrous acid are in some measure redissolved shortly after; because the nitrous acid soon dephlogisticates the iron too much, then lets it fall, reacts on the other metals, and dissolves them.

Dr Lewis observes, that silver is sometimes not precipitated by copper from the nitrous acid which happens either when the acid is suphafurated with silver by taking up some in its metallic form, or when the silver is not much dephlogisticated. In this case, the remedy is to heat the solution and add a little more acid; which dephlogisticates it further; but the nitrous acid always retains a little silver.

It has commonly been related by chemical authors, that blue vitriol will be formed by adding filings of copper to a boiling solution of alum. Mr Kirwan, however, has shewed this to be an error; for after boiling a solution of alum for 20 hours with copper filings, not a particle of the metal was dissolved; the liquor standing even the left of the volatile alkali. The alum indeed was precipitated from the liquor, but still retained its saline form; so that the precipitation was occasioned only by the division of the superfusious acid.

No metal is capable of precipitating tin in its metallic form; the reason of which, according to Mr Kirwan, is, because the precipitation is not the effect of a double affinity, but of the single greater affinity of its metal to every other metallic earth. Me. and precipitations from the nitrous acid by tin are afterwards redissolved, because the acid soon quites the tin by reason of its becoming too much dephlogisticated.

Lead precipitates metallic solutions in the vitriolic and marine acids but slowly, because the first portion of lead taken up forms falls very difficult of solution which covers its surface, and prevents it from falling in the solution. At the same time it contains precipitated phlogiston, that a great quantity of it must be dissolved before it will disolve other metals. A solution of lead very much sufactuated cannot be precipitated by iron but with difficulty, if at all. Mr Kirwan conjectures that this may arise from some of the lead also being taken up in its metallic form, as is the case with mercury and silver. Iron will not precipitate lead from marine acid; for though a precipitate appears the acid is still adhering to the metal. On the contrary, iron is precipitated from its solution in this acid by lead, though very slowly.

Mercury is quickly precipitated from the vitriolic acid by copper, though the difference between the fusibility of the quick composing the metallic form; which Mr Kirwan observes, that silver does not precipitate mercury from the nitrous acid, though the difference between the fusibility of the usual dwellers powers, but by reason of the attraction of mercury and silver for each other; for they form partly an amalgam and partly a vegetation, scarcely any thing of either remaining in the solution.

Silver does not precipitate mercury from the solution of corrosive sublimate; but, on the contrary, mercury precipitates silver from the marine acid: and if a solution of luna cornea in volatile alkali is triturated with mercury, calomel will be formed; yet on distilling silver and mercury together, the mercury will fall in its metallic form, and luna cornea will be formed. The same thing happens on distilling silver and corrosive sublimate, the affinity of calx of mercury to phlogiston increasing with heat.

Bismuth precipitates nothing from vitriol of copper by the dry in 16 hours; nor does copper from vitriol of bismuth, way.

The two metallic substances, however, alternate to precipitate one another from the nitrous acid, which proceed from their different degrees of dephlogistication.

Nickel will scarcely precipitate any metal except it be reduced to powder. A black powder is precipitated by means of zinc from the solution of nickel precipitated by zinc.
in the vitriolic and nitrous acids, which has been shown by Bergman to consist of arsentic, nickel, and a little of the zinc itself. The latter, however, precipitates nickel from the marine acid.

The solutions of iron and nickel in the vitriolic acid mutually act upon these metals; but neither of them will precipitate the other in 24 hours, though on remaining longer at rest iron seems to have the advantage. Iron, however, evidently precipitates nickel from the nitrous acid, and though nickel seems to precipitate iron, yet this arises only from the gradual dephlogitisation of the iron.

Copper is precipitated in its metallic form from the vitriolic, nitrous, and marine acids, by nickel. The vitriolic and nitrous solutions of lead seem to act upon it without any decomposition, the calces uniting to each other. Lead seems for some time to be acted upon in the same manner by the vitriolic and nitrous solutions of nickel, but at last nickel seems to have the advantage; but a black precipitate appears which ever of them is put into the solution of the other. However, nickel readily precipitates vitriolic and nitrous solutions of bismuth, but it is the material that both these semimetals are soluble in the solutions of each other: yet nickel precipitates bismuth very slowly, and only in part; while bismuth precipitates a red powder, supplied by Mr Kirwan to be ochre, from the solution of nickel.

Cobalt is not precipitated by zinc either from the vitriolic or nitrous acids, though it seems to have some effect upon it when dissolved in that of sea-fall. Iron precipitates cobalt from all the three acids, yet much of the semimetal is retained in the vitriolic and nitrous solutions of it, particularly the latter; which, after letting fall the cobalt, takes it up again, and lets fall a dephlogiticated calx of iron. Nickel also, though it does not precipitate cobalt itself, as appears by the remaining redness of the solution, yet constantly precipitates some heterogeneous matter from it. Solution of cobalt in the marine acid becomes coloured by the addition of nickel. Bismuth is soluble in the vitriolic and nitrous solutions of cobalt, and throws down a small white precipitate, but does not affect the metallic part. Nor can we attribute these solutions in vitriolic acid to any excess in that acid, for they are dilute and made without heat. Copper also precipitates from the solution of cobalt a white powder supplied to be arsentic.

The regulus of antimony has no effect on solution of copper in vitriolic acid, nor is precipitated by it from the same acid; but it dissolves slowly in vitriol of antimony. With solution of vitriol of lead it becomes red in 16 hours, but is scarcely precipitated by lead from the vitriolic acid. Powdered regulus also precipitates vitriol of mercury very slightly. Bismuth neither precipitates nor is precipitated by the regulus in 24 hours from the vitriolic acid. Tin precipitates the regulus from the nitrous acid; but if regulus be put into a solution of tin in the same acid, neither of the metals will be found in the liquid in 16 hours, either by reason of the dephlogitisation or of the union of the calces to each other.

Iron does not precipitate regulus of antimony entirely from the marine acid; but seems to form a triple salt, consisting of the acid and both calces.
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Contents, &c. of the Salt.

and that the weight so lost is just the same as that of an equal bulk of water; and consequently, that their specific gravity is equal to their weight in air, or absolute weight divided by their loss of weight in water.

3. That if a solid, specifically heavier than a liquid, be weighed first in air and then in that liquid, the weight it loses is equal to the weight of an equal volume of that liquid; and consequently, if such solid be weighed first in air, then in water, and afterwards in any other liquid, the specific gravity will be as the weight lost in it by such solid, divided by the loss of weight of the same solid in water. This method of finding the specific gravity of liquids, our author found more exact than that by the aerometer, or the comparison of the weights of equal measures of such liquids and water, both of which are subject to several inaccuracies.

4. That where the specific gravity of bodies is already known, we may find the weight of an equal bulk of water; it being as the quotient of their absolute weight divided by their specific gravities: and this he calls their loss of weight in water.

Thus where the specific gravity and absolute weight of the ingredients of any compound are known, the specific gravity of such compound may easily be calculated; as it ought to be intermediate between that of the lighter and that of the heavier, according to their several proportions: and this Mr Kirwan calls the mathematical specific gravity. But in fact the specific gravity of compounds, found by actual experiment, seldom agrees with that found by calculation; but is often greater, without any diminution of the lighter ingredient. This increase of density, then, Mr Kirwan supposes to arise from a closer union of the component parts to each other than either had separately with its own integral parts; and this more intimate union must, he thinks, proceed from the attraction of these parts to each other: for which reason he supposes, that this attraction might be estimated by the increase of density, or specific gravity, and was proportionable to it; but soon found that he was mistaken in this point.

Weights of different kinds of air. With regard to the absolute weights of several sorts of air, our author adheres to the computations of Mr Fontana, at whose experiments he was present; the thermometer being at 35°, and the barometer at 29; inches, or nearly so. These weights were as follow:

Cubic inch of common air, - 0.385
fixed air, - 0.654
marine air, - 0.390
nitrous air, - 0.788
vitreous acid air, - 0.2
alkaline air, - 0.2
inflammable air, - 0.3

Mr Kirwan begins his investigations with the marine acid; endeavouring first to find the exact quantity of pure acid it contains at any given specific gravity, and then by means of it determining the weight of acid contained in all other acids. For if a given quantity of pure fixed alkali were saturated, first by a certain quantity of spirit of salt, and then by determined quantities of the other acids, he concluded, that each of these quantities of acid liquor must contain the same quantity of acid; and this being known, the remain-

4. Method of finding the specific gravity of spirits of salt.

Two bottles were filled nearly to the top with distilled water, of which they contained in all 1399.7 grains, and successively introduced into two cylinders filled with marine air; and the process was renewed until the water had imbibed, in 18 days, about 794 cubic inches of the marine air. The thermometer did not rise all this time above 55°; nor sink, unless perhaps at night, above 50°; the barometer standing between 29 and 30 inches. This dilute spirit of salt then weighed 1920 grains; that is, 520.1 more than before; the weight of the quantity of marine air absorbed. The specific gravity of the liquor was found to be 1.225. Its loss of weight in water (that is, the weight of an equal bulk of water) should then be 1567.466 nearly; but it contained only, as we have seen, 1399.7 grains of water: subtracting this therefore from 1567.466, the remainder (that is, 167.466) must be the loss of 520.1 grains of marine acid; and consequently, the specific gravity of the pure marine acid, in such a condensed state as when it is united to water, must be 1.225, or 3.100.

Still, however, it might be suspected, that the density of this spirit did not entirely proceed from the mere density of the marine acid, but in part also from the attraction of this acid to water; and though the length of time requisite to make the water imbibe this quantity of marine acid air, naturally led to the supposition that the attraction was not very considerable, yet the following experiment was more satisfactory. He exposed 1440 grains of this spirit of salt to marine acid air for five days, the thermometer being at 50°, or below; and then found that it weighed 1562 grains, and consequently had imbibed 122 grains more. Its specific gravity was then 1.253, which was precisely what it should have been by calculation.

Being now satisfied that the proportion of acid in this spirit of salt was discovered, our author determined to find it in other acids also. For this purpose he took 180 grains of very strong oil of tartarper deignum, and found that it was saturated by 180 grains of spirit of salt, whose specific gravity was 1.225; and by calculation.

3 G
calculation it appeared, that 180 grains of this spirit contained 48.7 grains of acid, and 131.3 of water. Hence he drew up a table of the specific gravities of acid liquors containing 48.7 grains of pure acid, with different proportions of water, from 50 to 410 parts; the liquor with the first proportion having a specific gravity of 1.497, and the latter weighing only 1.074.

Mr Baume had determined the specific gravity of the strongest spirit of salt made in the common manner to 1.187, and Bergman 1.190; but we are told in the Paris Memoirs for 1790, that Mr Hubbem had produced a spirit whose specific gravity was 1.300; and that made by Dr Priestley, by saturating water with marine acid air, must have been about 1.500. The spirit of salt, therefore, whose specific gravity is 1.261, has but little attraction for water, and therefore attracts none from it; for which reason also it does not heat the ball of a thermometer, as the vitriolic and nitrous acids do; though Mr Cavallo found that this also had some effect upon the thermometer. Common spirit of salt, Mr Kirwan informs us, is always adulterated with vitriolic acid, and therefore unfit for these trials.

Mr Kirwan now set about investigating the quantity of acid, water, and fixed alkali in digestive salt, or a combination of the marine acid with vegetable alkali. For this purpose he took 100 grains of a solution of tolerably pure vegetable alkali, that had been three times calcined to whiteness, the specific gravity of which was 1.097; diluting also the spirit of salt with different portions of water; the specific gravity of one part being 1.015, and of another 1.068. He then found that the above quantity of solution of the vegetable alkali required for its saturation 27 grains of that spirit of salt whose specific gravity was 1.098, and 23.35 grains of that whose specific gravity was 1.115. Now, 27 grains of spirit of salt, whose specific gravity is 1.098, contain 3.55 grains of marine acid, as appears by calculation. The principles on which calculations of this kind are founded, our author gives in the words of Mr Cotes.

"The data requisite are the specific gravities of the mixture and of the two ingredients. Then, as the difference of the specific gravities of the mixture and the lighter ingredient is to the difference of the specific gravities of the mixture and the heavier ingredient; so is the magnitude of the heavier to the magnitude of the lighter ingredient. Then, as the magnitude of the heavier, multiplied into its specific gravity, is to the magnitude of the lighter multiplied into its specific gravity; so is the weight of the heavier to the weight of the lighter. Then, as the sum of these weights is to the weight of either ingredient; so is the weight given to the weight of the ingredient fought."

Thus, in the present case, 1.098<1.000<1.098 is the magnitude of the heavier ingredient, viz. the marine acid, and 0.983<1.000<3.038 is the weight of the marine acid; and on the other hand, 3.100<1.000<2.002, the magnitude of the water; and 2.002<1.000<2.002 its weight; the sum of these weights is 3.038; then if 2.358 parts of spirit of salt contain 0.308 parts of acid, 27 grains of this spirit of salt will contain 3.55 grains of acid. In the same manner it will be found, that 23.35 grains of spirit of salt, whose specific gravity is 1.115, contains 3.55 grains of acid.

Our author describes very particularly his method of making the saturation of the alkali with the acid; which, as it is always difficult to hit with precision, we shall here transcribe. "It was performed by putting the glass cylinder which contained the alkali solution on the scale of a very sensible balance, and at the same time weighing the acid liquor in another pair of scales; when the loss of weight indicated the escape of the nearly equal quantities of fixed air contained in the solution. Then the acid was gradually added by dipping a glass rod in it, to the top of which a small drop of the solution was stirred, and very small drops taken up and laid upon bits of paper stained blue with radish juice. As soon as the paper was in the left redden, the operation was completed; so that there was always a very small excess of acid, for which half a grain was constantly allowed; but no allowance was made for the fixed air, which always remains in the solution. But as on this account only a small quantity of the alkali solution was used, this proportion of fixed air must have been inconsiderable. If one ounce of the solution had been employed, this inappreciable portion of fixed air, would be sufficient to cause a sensible error; for the quantity of fixed air lost by the difference between the weight added to the 20 grains of fixed air, and the actual weight of the compound was judged of; and when this difference amounted to 2.2 grains, the whole of the fixed air was judged to be expelled: and it was found to be so; as 100 grains of the alkaline solution, being evaporated to dryness, in the heat of 500°, left a residuum which amounted to 104 grains, which contained 2.2 grains of fixed air."
proportion of acid in spirit of nitre to that in spirit of salt.

To find the specific gravity of the pure nitrous acid, we see that 11 grains of spirit of nitre, whose specific gravity is 1.419, contain the same quantity of acid with 27 grains of spirit of salt, whose specific gravity is 1.098, or 3.55 grains. The remainder of 11 grains, or 7.45 grains, is therefore mere water; and of consequence, if the density of the acid and water had not been increased by their union, the specific gravity of the pure nitrous acid should be 11.8729. But the specific gravity of the nitrous, as well as of the vitriolic acid, is augmented by its union with water; and therefore the loss of its weight in water is not exactly, as it would appear by calculation from the above premises, according to the rules already laid down. To determine therefore the real specific gravity of the acid in its natural state, the quantity of accreted density must be found, and subtracted from the specific gravity of the spirit of nitre, whose true mathematical specific gravity will then appear. This our author endeavoured to effect by mixing different portions of spirit of nitre and water, remarking the degree of diminution they sustained by such union; but was never able to attain a sufficient degree of exactness in the experiment. He had recourse therefore to the following method, as affording more satisfaction, though not altogether accurate. Twelve grains of the spirit of nitre, whose specific gravity by observation was 1.389, contained, as our author supposed from the former experiment, 3.55 grains of real acid, and 8.45 of water: then if the specific gravity of the pure nitrous acid were 1.572, that of this compound acid and water should be 1.771; for the loss of 3.55 should be 0.299, and the loss of the water 8.45, the sum of these losses is 8.749. Now, \( \frac{12}{8.749} = 1.371 \):

but the specific gravity, as already mentioned, was 1.380: therefore the accreted density was at least 0.018, the difference between 1.389 and 1.371. This calculation indeed is not altogether exact: but our author concludes, that 0.18 is certainly a near approximation to the degree of density that accrues to 3.55 grains of acid by their union to 7.45 grains of water: therefore, subtracting this from 1.419, we have nearly the mathematical specific gravity of that proportion of acid and water, namely, 1.401.

Again, since 11 grains of this spirit of nitre contain 3.55 grains of acid, and 7.45 of water, its loss of weight should be \( \frac{11}{1.401} = 7.855 \); and subtracting the loss of the aqueous part from this, the remainder 0.45 is the

fraction of the 3.55 grains acid; and consequently the true specific gravity of the pure and mere nitrous acid is

\[ \frac{3.55}{0.405} = 8.7654. \]

This being settled, the mathematical specific gravity and true increase of density of the above mixtures will be found. Thus the mathematical specific gravity of 12 grains of that spirit of nitre, whose specific gravity, by observation, was 1.380, must be 1.355; supposing it to contain 3.55 grains acid and 8.45 of water. For the loss of 3.55 grains acid is 3.55 = 0.405, and the loss of water 8.45; the

sum of these losses is 8.855. Then \( \frac{12}{8.855} = 1.355 \); and subsequently the accreted density is 1.389 - 1.355 = 0.034.

In the same manner it will be found that the mathematical specific gravity of 12.08 grains of that spirit of nitre, whose specific gravity by observation was 1.362, must be 1.315; and consequently its accreted density 0.047.

The whole of this, however, still rests on the supposition that each of these portions of spirit of nitre contain 3.55 grains of acid. To verify this supposition, our author examined the mathematical specific gravities of the first mixture he had made of spirit of nitre and water in large quantities; for if the mathematical specific gravities of these agreed exactly with those of the quantities he had supposed in smaller portions of each, he could not but conclude that the suppositions of such proportions of acid and water, as he had determined in each, were just.

This being determined by proper calculations, Mr. Table of Kirwan next proceeded to construct another table of specific gravities for the spirit of nitre, how constructed.

He had recourse therefore to the following method, as affording more satisfaction, though not altogether accurate. Twelve grains of the spirit of nitre, whose specific gravity by observation was 1.389, contained, as our author supposed from the former experiment, 3.55 grains of real acid, and 8.45 of water: then if the specific gravity of the pure nitrous acid were 1.572, that of this compound acid and water should be 1.771; for the loss of 3.55 should be 0.299, and the loss of the water 8.45, the sum of these losses is 8.749. Now, \( \frac{12}{8.749} = 1.371 \):

but the specific gravity, as already mentioned, was 1.380: therefore the accreted density was at least 0.018, the difference between 1.389 and 1.371. This calculation indeed is not altogether exact: but our author concludes, that 0.18 is certainly a near approximation to the degree of density that accrues to 3.55 grains of acid by their union to 7.45 grains of water: therefore, subtracting this from 1.419, we have nearly the mathematical specific gravity of that proportion of acid and water, namely, 1.401.

Again, since 11 grains of this spirit of nitre contain 3.55 grains of acid, and 7.45 of water, its loss of weight should be \( \frac{11}{1.401} = 7.855 \); and subtracting the loss of the aqueous part from this, the remainder 0.45 is the

fraction of the 3.55 grains acid; and consequently the true specific gravity of the pure and mere nitrous acid is

\[ \frac{3.55}{0.405} = 8.7654. \]

This being settled, the mathematical specific gravity and true increase of density of the above mixtures will be found. Thus the mathematical specific gravity of 12 grains of that spirit of nitre, whose specific gravity, by observation, was 1.380, must be 1.355; supposing it to contain 3.55 grains acid and 8.45 of water. For the loss of 3.55 grains acid is 3.55 = 0.405, and the loss of water 8.45; the

sum of these losses is 8.855. Then \( \frac{12}{8.855} = 1.355 \); and consequently the accreted density is 1.389 - 1.355 = 0.034.

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This being determined by proper calculations, Mr. Table of Kirwan next proceeded to construct another table of specific gravities for the spirit of nitre, how constructed.
CHEMISTRY.

Contents of acid, water, and fixed alkali in nitre, in a manner similar to what he had already done with digestive salt; and found that 100 grains of perfectly dry nitre contained 28.48 grains of acid, 5.2 grains of water, and 66.32 grains of fixed alkali.

Some experiments of the same kind had been made by Dr. Homberg; the results of which our author compared with those of his own. The specific gravity of the spirit of nitre which M. Homberg made use of was 1.249; and of this, he says, one ounce two drachms and 36 grains, or 621 troy grains, are required to saturate one French ounce (472.5 troy) of dry salt of tartar. According to Mr. Kirwan's computation, however, 63 grains of that whose specific gravity was 1.525, 7.465 of water, and 93.97 of fixed alkali, were required to saturate one French ounce of nitre. It was natural to expect the former proportion, since, Mr. Kirwan observes, that the proportion of fixed alkali with such a quantity of phlogiston as quite alters its properties.

It was next attempted to find the specific gravity of the pure vitriolic acid in a manner similar to that specific gravity by which the gravity of the nitrous acid was found; as it cannot be had in the state of air, unless when united with such a quantity of phlogiston as quite alters its properties. The loss of 6.5 grains of oil of vitriol, whose specific gravity is 1.819, is $\frac{6.5}{6.5} = 3.572$; but as there 6.5 grains contained, before 3.55 of acid, 2.95 of water, the loss of this must be subtracted from the entire loss; and then the remainder, or 0.622, is the loss of the pure acid part in that state or density to which it is reduced by its union with water. The specific gravity, therefore, of the pure vitriolic acid, in this state of density, is $\frac{3.55}{0.622} = 5.707$. But to find its natural specific gravity, we must find how much its density is increased by its union with this quantity of water: and in order to observe this, he proceeded as before with the nitric acid. 6.96 grains of oil of vitriol, whose specific gravity was 1.771, contained 3.55 of acid and 3.41 of water; and its specific gravity by calculation should be 1.726; for the loss of 3.55 grains of acid is $\frac{3.55}{5.707}$; the loss of 3.41 grains of water is 3.41; the sum of these is 0.622; the loss of 3.41 grains of water is 3.41; therefore the accurate density is 1.771. 4.032, 1.726; 0.45. Taking this therefore from 1.819, its mathematical specific gravity will be 1.774. Then the loss of 6.5 grains of oil of vitriol, whose specific gravity by observation is 1.819, will be found to be $\frac{6.5}{1.774} = 3.667$; but of this, 2.95 grains are the loss.
Theory.

Contents, &c. of the salts.

of the water it contains, and the remainder 0.714 are the loss of the mere acid part. Then \[ \frac{3.55}{0.714} \] is nearly

ly the true specific gravity of the pure vitriolic acid. The specific gravity of the most concentrated oil of vitriol yet made, is, according to M. Baume and Bergman, 2.125.

Mr. Kirwan now constructed a table of the specific gravities of vitriolic acids, of different strengths, in a manner similar to others constructed for spirit of salt and spirit of nitre; but for which, as well as the others, we must refer to Phil. Trans. vol. 71. He then proceeded to find the proportion of acid, water, and fixed alkali, in vitriolated tartar as he had before done in the same acid and nitre. He found the salts resulting from the saturation of the same oil of tartar, with portions of oil of vitriol, of different specific gravities, to weigh at a medium 12.45 grains. Of this weight only 11.83 grains were alkali and acid. The remainder, therefore, was water, 0.62 of a grain. Consequently 100 grains of perfectly dry tartar vitriolate contain 21.58 grains acid, 4.82 of water, and 66.67 of fixed vegetable alkali. In drying this salt, a heat of 240 degrees was made use of, to expel the adhering acid more thoroughly. It was kept in this heat for a quarter of an hour.

According to Mr. Homberg, one French ounce, or 472.5 grains troy, of dry salt of tartar, required 297.5 grains troy, of oil of vitriol, whose specific gravity was 1.674, to saturate it: but by Kirwan’s calculation, this quantity of fixed alkali would require 325 grains; a difference which, considering the different methods they used for determining the specific gravities (Homberg’s method by menurination, giving it always less than Mr. Kirwan’s) the different defecation of their alkalis, &c. may be accounted inconsiderable.

The salt produced, according to Mr. Homberg, weighed 182 grains troy above the original weight of the fixed alkali; but by Kirwan’s experiment, it should weigh but 87.7 grains more. “It is hard to say (adds Mr. Homberg) how Mr. Kirwan could find this great excess of weight, both in nitre and tartar vitriolate; unless he meant by the weight of the salt of tartar the weight of the mere alkaline part distinct from the fixed air it contained: and indeed one would be tempted to think he did make the distinction; for in that case the excess of weight would be nearly such as he determined it.”

From Mr. Homberg’s calculations, he inferred that one ounce (472.5 grains) of oil of vitriol contains 291.7 grains of acid. Mr. Kirwan computes the acid only at 213.3 grains; but Homberg made no allowance for the water contained in tartar vitriolate; and imagined the whole increase of weight proceeded from the acid that is united in it to the fixed alkali. Now the aqueous part in 560 grains of tartar vitriolate amounts to 36 grains; the remaining difference may be attributed to the different degrees of defecation, &c.

On the acetic acid Mr. Kirwan did not make any experiment; but by calculating from those of Homberg, he finds that the specific gravity of the pure acetic acid, free from superfluous water, should be 2.30. “It is probable (says Mr. Kirwan), that its affinity to water is not strong enough to cause any irregular increase in its density; at least what can be expressed by three decimals: and hence its proportion of acid and water may always be calculated from its specific quantity and absolute weight.”

An hundred parts of vitriolated tartar, or, as it should rather be called, acetous tartar, contain, when well dried, 32 of fixed alkali, 19 of acid, and 49 parts of water. The specific gravity of the strongest vitriolated vinegar made is 1.069. It is more difficult to find the point of saturation with the vegetable than with the mineral acids, because they contain a nurse that prevents their immediate union with alkalis; and hence they are commonly used in too great quantity: they should be used moderately hot, and sufficient time allowed them to unite.

From all the experiments above related, Mr. Kirwan concludes, 1. That the fixed vegetable alkali takes up an equal quantity of the three mineral acids, and probably all pure acids; for we have seen that 8.2 grains of pure vegetable alkali, that is, free from fixed air, take up 3.55 grains of each of these acids; and consequently 100 parts of caustic fixed alkali would require 42.4 parts of acid to saturate them. But Mr. Bergman has found that 100 parts of caustic fixed vegetable alkali take up 47 parts of the aerial acid; which, considering that his alkali might contain some water, differs but little from that already given. It should seem, therefore, that alkalis have a certain determined capacity of uniting to acids; that is, to a given weight of acids; and that this capacity is equally satisfied by a given weight of any pure acid indiscriminately. This weight is about 2.33 of the vegetable alkali.

2. That the three mineral acids, and probably all quantities of pure acids, take up 2.253 times their own weight of the alkali, pure vegetable alkali, that is, are saturated by that quantity.

3. That the density accruing to compound substances, from the union of their compound parts, and exceeding its mathematical ratio, increases from a minimum, when the quantity of one of them is very small in proportion to that of the other; to a maximum, when their qualities differ less: but that the attraction, on the contrary, of that part which is in the smallest quantity to that which is in the greatest, is at its maximum when the accrued density is at its minimum; but not reciprocally: and hence the point of saturation is probably the maximum of density and the minimum of the decomposition operated by means of a substance that has a greater affinity with one part of a compound than with the other, and than these parts have with each other. It can be complete, unless the minimum affinity of the third substance be greater than the maximum affinity of the parts already united. Hence also few compositions are complete, unless a double affinity intervenes; and hence the last portions of the separated substance adhere so obstinately to that with which it was first united, as all chemists have observed. Thus, though acids have a greater affinity to phlogiston than the earths of the different metals have to it, yet they can never totally dephlogisticate these earths but only to a certain degree; so, though atmospheric air, and particularly dephlogisticated air, attracts phlogiston more strongly than the nitrous acid gitates does, yet even dephlogisticated air can deprive the metallic nitrous acid totally of its phlogiston; as is evident from the
the red colour of the nitrous acid, when nitrous air and dephlogisticated air are mixed together. Hence mercury precipitated from its solution in any acid, even by fixed alkalis, constantly retains a portion of the acid to which it was originally united, as Mr Bayen has shown. Thus also the earth of alum, when precipitated in like manner from its solution, retains part of the acid; and thus several anomalous decompositions may be explained.

4. That concentrated acids are in some measure phlogisticated, and evaporate by union with fixed alkalis.

5. That, knowing the quantity of fixed alkali in oil of tartar, we may determine the quantity of real pure acid in any other acid substance that is difficultly decomposed; as the feditive acid, and those in vegetables and animals. For 10.5 grains of the mild alkali will always be saturated by 3.55 grains of real acid; and reciprocally, the quantity of acid in any acid liquor being known, the quantity of real alkali in any vegetable alkaline liquor may be found.

Having thus determined the quantity of acid contained in the liquids of that kind usually employed in chemistry, as well as the specific gravities of the acids themselves, Mr Kirwan became desirous of investigating the gravity of fixed and volatile alkalis. But as these substances are not easily preserved from uniting themselves with fixed air, he was led to consider the gravity of this in its fixed state, as an element necessary for the calculation of the quantities of the alkalis.

To find the specific gravity of the fixed vegetable alkali, our author proceeded in a manner similar to that already described, excepting that he weighed it in ether instead of spirit of wine. The results of his experiments are.

1. That 100 grains of this alkali contain about 6.7 grains of earth; which, according to Mr Bergman, is fucicicous. It Palmer the filter along with it when the alkali is not saturated with fixed air; so that it seems to be held in solution in the same manner as in the liqour fucicum.

2. The quantity of fixed acid in oil of tartar and dry vegetable fixed alkali is various at various times, and in various parcels of the same salt; but in the purer alkalis it may be reckoned at a medium 21 grains in 100; and hence the quantity of this alkali is nearly guised at in any solution, by adding a known weight of any dilute acid to a given weight of such a solution, and then weighing it again; for as 21 is to 100, so is the weight lost to the weight of mild alkali in such solution. The specific gravity of mild and perfectly dry vegetable fixed alkali, four times calcined, free from fucicous earth, and containing 21 per cent. of fixed acid, was found to be 5.0527. When it contains more fixed air the gravity is probably higher, except when it is not perfectly dry; and hence the specific gravity of this alkali, when calcus, was supposed by Mr Kirwan to be 4.234. For this reason the fixed alkali, when united to pure acid, solution is more than when united either to the vitriolic or nitrous. Thus Mr R. Watfon, in the Philosophical Transactions for 1770, informs us, that he found the specific gravity of dry salt of tartar, including the fucicous earth it naturally contains, to be 2.761; whereas the specific gravity of vitriolated tartar was only 2.356, and that of nitre 1.923. The reason why nitre is so much lighter than tartar vitriolate, is, that it contains much more water, and the union of the acid with the water is less intimate.

Impure vegetable fixed alkalis, such as pearl-ash, potashes, &c. contain more fixed air than the purer kind. According to Mr Cavendish, pearl-ash contains 28.4 or 20.7 per cent. of fixed air. Hence in lye made from these salts, of equal specific gravities with those of a purer alkali, the quantity of saline matter will probably be in the ratio of 28.4 or 20.7 to 21; but this additional weight is only fixed air. Much also depends on their age; the oldest containing most fixed air. Our author also gives a table of the specific gravities of different solutions of vegetable fixed alkali, in a manner similar to what he had done before with the acids. He begins with 64.92 grains of a solution containing 21.23 grains of salt, and 36.67 of water. The accreted density he finds to be 0.50, the mathematical specific gravity 1.145, and the specific gravity by observation 1.145. By continually diluting the solution containing the same quantity of salt, he brings the absolute weight of it at last to 241.04 grains, of which 317.49 are water; the accreted density 0.01, the mathematical specific gravity 1.061, and the specific gravity by observation 1.062.

In a subsequent paper on this subject, Philosophical Transactions, vol. 72, p. 179, our author corrects a small mistake concerning the quantity of acid taken up by 10.5 grains of mild vegetable alkali. In his former computations he had made no allowance for the small quantity of earth contained in this quantity of alkali; which, though inconsiderable in itself, becomes of consequence where the quantities are large. The error, however, occasioned by this omission, is solvable by his calculations concerning the quantities of acid alkali, &c. contained in the neutral salts, as well as in that concerning the vegetable alkali. When the correction is properly made, he says, it will be found that 100 grains of such alkali, free from earth, water, and fixed air, take up 46.77 grains of the mineral acids, that is, of the mere acid part; and 100 grains of common mild vegetable alkali take up 36.23 grains of real acid. An hundred grains of perfectly dry tartar vitriolate contain 30.37 of real acid, 64.61 of fixed alkali, and 5.18 of water. Crystallized tartar vitriolate loses only one percent. of water in a heat in which its acid is not separated in any degree; and therefore contains 6.18 of water. An hundred grains of nitre, perfectly dry, contain 30.86 of acid, 66 of alkali, and 3.14 of water; but in crystallized nitre the proportion of water is somewhat greater; for 100 grains of those crystals being exposed to a heat of 180° for two hours, lost three grains of their weight without exhalting any acid fume; but when exposed to a heat of 200 degrees, the fume of the nitrous acid is distinctly perceived. Hence 100 grains of crystallized nitre contain 29.89 of mere acid, 6.47 of alkali, and 6.14 of water. An hundred grains of digestive salt perfectly dry, contain 26.68 of marine acid, 65.47 of alkali, and 6.85 of water. One hundred grains of crystallized digestive salt lose but one grain of their weight before the fume of the marine acid is perceived; and hence they contain 7.85 grains of water.

Another mistake, more difficult to be corrected, was his supposing the mixtures of oil of vitriol and water, and spirit of nitre and water, had attained their maximum of density when they had cooled to the temperature...
Theory.

Alteration of the density of acids by various degrees of heat.

The mixture with oil of vitriol had been suffered to stand six hours; but when the acid was so much diluted as to occasion little or no heat, it was allowed to stand only for a very little time. Several months afterwards, however, many of these mixtures were found much denser than when he first examined them; and it was discovered, that at least twelve hours rest was necessary before concentrated oil of vitriol, to which even twice its weight of water is added, can attain its utmost density; and still more when a smaller proportion of water is used. Thus when he made the mixture of 2519.75 grains of oil of vitriol, whose specific gravity was 1.819, with 180 of water, he found its density six hours after 1.771, but after 24 hours it was 1.798: and hence, according to the methods of calculating already laid down, the accurred density was at least .064 instead of .045. But by using oil of vitriol still more concentrated, whose specific gravity was 1.8846, he was enabled to make a still nearer approach; and found, that the accurred density of oil of vitriol, whose specific gravity is 1.819, amounts to 0.104, and consequently its mathematical specific gravity is 1.715. Six grains and a half of this oil of vitriol contained, as has been already observed, 2.55 of mere acid, and the remainder was water. The weight of an equal bulk of water is 5.79 grains; and subtracting from this the weight of the water that enters into the composition of the oil of vitriol, it will be found, that the weight of a bulk of water equal to the acid part is 0.84; and consequently the specific gravity of the mere acid part is 4.226. Thus, by constantly allowing the mixtures to rest at least 12 hours, until the oil of vitriol was diluted with four times its weight of water, and then only six hours before the density of the mixtures was examined, he confructed another table, in which 1000 grains of liquid contained 612.05 of pure acid, 387.95 of water, the accurred density being .07, and the mathematical specific gravity 1.877. Increasing the quantity of water till the acid weighed 7000 grains, and the water 6287.95, he found the accurred density .075, and the mathematical specific gravity 1.669. By a similar correlation of his experiments on the acid of nitre, he found its density to be 5.320; a similar table was constructed for it, for which we refer our readers to the 72d volume of the Philosophical Transactions.

The total expansion of this spirit of nitre, therefore, from 30 to 120 degrees, that is, by 90° of heat, was 0.0527; for 1.4535=1.4123=.0407. By which we infer, that the dilatations are nearly proportional to the degrees of heat; for beginning with the first dilatation from 30 to 46 degrees, that is, by 16 degrees of heat, we find that the difference between the calculated and observed dilatations is only 0.0004; a difference of no confquence in the present case, and which might arise from the immixture of the cold glass-ball filled with mercury in the liquor. In the next case the difference is still less, amounting only to 0.0000. With another, and somewhat stronger spirit of nitre, the specific gravities were as follow:

<table>
<thead>
<tr>
<th>Degrees of heat</th>
<th>Specific gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>1.4750</td>
</tr>
<tr>
<td>49</td>
<td>1.4653</td>
</tr>
<tr>
<td>150</td>
<td>1.3792</td>
</tr>
</tbody>
</table>

Here also the expansions were nearly proportional to the degrees of heat; for 116° of heat, the difference between 34 and 150, produce an expansion of 0.0958; and 15° of heat, the difference between 34 and 49, produce an expansion of 0.0097; and by calculation 0.0123: which last differs from the truth only by 0.0001.

From this experiment we see, that the stronger the spirit of nitre is, the more it is expanded by the same degree of heat than it is expanded by heat than the former, its dilatation, by 116 degrees of heat, weak, and should be 0.0679; whereas it was found to be 0.0958.

As the dilatation of the spirit of nitre is far greater than that of water by the same degree of heat, and as it confits only of acid and water; it clearly follows, that its superior dilatability must be owing to the acid part: and hence the more acid that is contained in any quantity of spirit of nitre, the greater is its dilatability. We might therefore suppose, that the dilatation of nitre was intermediate between the quantity of water it contains and that of the acid. But there exists another power also which prevents this simple result, viz. the attraction of the acid and water to each other, which makes them occupy less space than the sum of their joint volumes; and by this condensation our author explains his phrase of accurred density. Taking this into the account, we may consider the dilatation of the spirit of nitre as equal to those of the quantities of water and acid it contains, minus the condensation they acquire from their mutual attraction; and this rule holds as to all other heterogeneous compounds.

To find the quantities of acid and water in spirit of nitre, whose specific gravity was found in degrees of quantities temperature different from those for which the table of specific gravity of nitre was constructed, viz. 54°, 55°, or 56° of Fahrenheit, there is a certain method of finding how much that spirit of nitre is expanded or condensed by a greater or lesser degree of heat; and then, by the rule of proportion, find what its density would be at 55°. But if this cannot be done, we shall approach pretty near the truth if we allow for every 15° degrees of heat above or below 55° of Fahrenheit, when the specific gravity is between 1.400 and 1.500, and .5, when the specific gravity is between 1.600 and 1.800. The dilatations of oil and spirit of vitriol were found to be exceedingly irregular, probably by reason of a white foreign matter, which is more or less suspended or dissolved in it, according to its greater or lesser dilution:
and this matter our author did not separate, as he intended to try the acid in the state in which it is commonly used. In general he found that 15° of heat caused a difference of above $+\frac{3}{4}$, in its specific gravity, when it exceeds 1.000, and of $+\frac{1}{4}$, when its specific gravity is between 1.400 and 1.500.—The dilatations of spirit of salt are very nearly proportional to the degrees of heat, as appears by the following table.

<table>
<thead>
<tr>
<th>Degrees of heat.</th>
<th>Specific gravity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>1.1916</td>
</tr>
<tr>
<td>50</td>
<td>1.1860</td>
</tr>
<tr>
<td>65</td>
<td>1.1820</td>
</tr>
<tr>
<td>100</td>
<td>1.1631</td>
</tr>
</tbody>
</table>

Hence $+\frac{1}{4}$ should be added or subtracted for every 21° above or below 55°, in order to reduce it to 55°, the degree for which its proportion of acid and water was calculated. The dilatability of this acid is much greater than that of water, and even than that of the nitrous acid of the same density.

Our author next proceeds to consider the quantity of pure acids taken up at the point of saturation by the various substances they unite with.—He begins with the mineral alkali. Having rendered a quantity of this caustic in the usual manner, and evaporating one ounce of the caustic solution to perfect dryness, he found it to contain 20.25 grains of solid matter. It was observed, that the watery part alone alkali during evaporation, as the quantity of fixed air contained in it was very small, and to dissipate this a much greater heat would have been requisite than that which he used. This dry alkali was dissolved in twice its weight of water; and saturating it with dilute vitriolic acid, he found it to contain 2.25 grains of fixed air; that being the weight which the saturated solution wanted of being equal to the joint weights of water, alkali, and spirit of vitriol employed.

The quantity of pure vitriolic acid necessary to saturate 100 grains of pure mineral alkali was found to be 60 or 61 grains; the saturated solution thus formed being evaporated to perfect dryness weighed 56.5 grains; but this weight only 28.58 were alkali in one of the experiments; the remainder, that is, 8.12 grains, therefore

<table>
<thead>
<tr>
<th>Quantity of vitriolic acid necessary to saturate it.</th>
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<tr>
<td>60 or 61 grains</td>
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</tbody>
</table>

Hence 100 grains of Glauber’s salt, perfectly dried, contained 20.12 of pure vitriolic acid, 48.6 of mere alkali, and 22.28 of water. But Glauber’s salt crystallized contains a much larger proportion of water; for 100 grains of these crystals heated red hot lost 55 grains of their weight; and this loss Mr Kirwan supposes to arise merely from the evaporation of the watery part, and the remaining 45 contained alkali, water, and acid, in the same proportion as the 100 grains of Glauber’s salt perfectly dried abovementioned. Then these 45 contained 13.19 grains of vitriolic acid, 21.87 of fixed alkali, and 9.94 of water; consequently 100 grains of crystallized Glauber’s salt contains 13.19 of vitriolic acid, 21.87 of alkali, and 6.404 of water.

On saturating the mineral alkali with dephlogitized nitrous acid, it was found that 100 grains of the alkali took up 57 of the pure acid in the experiment he most depended upon; though in some others this quantity varied by a few grains: he concludes, therefore, that the quantity of alkali taken up by this acid is nearly the same as that taken up by the vitriolic.

Supposing this quantity to be 57 grains, then 100 grains of cubic nitre, perfectly dry, contain 50 of acid, 52.18 of alkali, and 17.82 of water: but cubic nitre crystallized contains something more water; for 100 grains of these crystals lose about four by gentle drying; therefore 100 grains of the crystallized salt contain 28.8 of acid, 50.09 of alkali, and 21.11 of water.

An hundred grains of mineral alkali require from 63 to 66 or 67 grains of pure marine acid to saturate it; but Mr Kirwan supposes that one reason of this variety is, that it is exceeding hard to hit the true point of saturation. Allowing 66 grains to be the quantity required, then 100 grains of perfectly dry common salt contain nearly 55 grains of real acid, 53 of alkali, and 13 of water; but 100 grains of the crystallized salt lose five by evaporation; so that 100 grains of these crystals contain 33.5 of acid, 50 of alkali, and 16.7 of water.

The proportion of fixed air, alkali, and water, was thus investigated: 200 grains of these crystals were fixed air, dissolved in 240 of water; the solution was saturated alkali, and by such a quantity of spirit of nitre as contained 40 water, insoluble vitriolic acid, and 35 of its water; whence it was inferred that these 200 grains of salt of soda contained 70 of pure alkaline salt. The saturated solution weighed 40 grains less than the sum of its original weight, and that of the spirit of nitre added to it; consequently it lost 40 grains of fixed air. The remainder of the original weight of the crystals therefore must have been water, viz. 90 grains. Consequendy 100 grains of these crystals contained 55 of alkali, 20 of fixed air, and 45 of water. This proportion differs considerably from that assigned by Mr Bergman and Lavoisier, which our author imputes to their having made use of soda recently crystallized; but Mr Kirwan’s had been made for some months, and probably lost much water and fixed air by evaporation, which altered the proportion of the whole. According to the calculations of Bergman and Lavoisier, 100 grains of this alkali take up 80 of fixed air. The specific gravity of the crystallized mineral alkali, weighed in ether, found to be 1.421.

The proportion of the different ingredients in volatile alkalies can only be had from the experiments lately made by Dr Priestley concerning alkaline air. He informs us, that $\frac{4}{5}$ of a measure of this, and one measure of fixed air, saturate one another. Then supposing the measure to contain 100 cubic inches, 185 cubic inches of alkaline air take up 100 of fixed air; but 185 cubic inches of alkaline air weigh at a medium 42.53 grains, and 100 cubic inches of fixed air weigh 57 grains; therefore 100 grains of pure volatile alkali, free from water, take up 134 of fixed air.

On expelling its aerial acid from a quantity of this volatile alkali in a concrete state, and formed by sublimation, he found, that 53 grains of it were fixed air; according to the preceding calculation, 100 grains of it should contain 39.47 of real alkali, and 7.53 of water, the rest being fixed air.—On saturating a quantity with the vitriolic, nitrous, and marine acids, 100 grains of the mere alkali were found to take up 106 of mere vitriolic acid, 115 of the nitrous, and 130 of the marine acid. The specific gravity of the volatile alkali
Theory.  

In making experiments on calcareous earth, it was first dissolved in nitrous acid; and after allowing for the loss of fixed air and water, 100 grains of the pure earth was found to take up 104 of nitrous acid; but only 91 or 92 of mere vitriolic acid were required to precipitate it from the nitrous solution.

Of the marine acid 100 grains of the pure calcareous earth require 112 for their solution. The liquor at first is colourless, but acquires a greenish colour by standing.

Natural gypsum varies in its proportion of acid, water, and earth; 100 grains of it containing from 32 to 34 of acid and like wise of earth, and from 26 to 27 of water. The artificial gypsum contains 32 of earth, 29.44 of acid, and 38.56 of water. When well dried, it loses about 24 of water; and therefore contains 42 of earth, 39 of acid, and 19 of water, per hundred.

In nitrous felenite.

In marine felenite.

Calcined magnesia will not dissolve in acids without heat.

An hundred grains of this earth, deprived of the fixed air, require 112 of the pure vitriolic acid to dissolve them. The solution was made in a very dilute spirit of vitriol, whose specific gravity was 1.003, and in which the proportion of acid to the water was nearly as 1 to 10. It contained a slight excess of acid, turning the vegetable blues to a brownish red; but it crystallized when cold, and the crystals were of the form of alum. Our author, therefore, is of opinion, that this is the true proportion of acid and earth to be used in the formation of that salt, though there was not water enough to form large crystals. Perceiving this fault—that the liquor contained an excess of acid, more way was contained an excess of acid.

In the experiments made by our author on metals, the acids employed were far dephlogisticated as 10 grains of carbonic acid were added, but thus it was found impossible to prevent it from turning vegetable blue of a red colour until a precipitation was formed: and even when this was the case, though one part of the salt fell in the form just mentioned, yet the rest would still redden vegetable blues as before; though here our author doubts whether this be a mark of acidity. An hundred grains of alum, when dried, contain 42.74 of acid, 3.21 of earth, and 25.02 of water; but crystallized alum loses 44 per cent. by dehydration: therefore 100 grains of it contain 23.94 of acid, and 58.06 of water. An hundred grains of this pure earth take up, as near as can be judged, 153 of pure nitrous acid. The solution still reddened vegetable blues; but after the above quantity of earth was added, an infoluble salt began to precipitate. The solution, when cold, became turbid, and could not be rendered quite clear by 500 times its quantity of water. An hundred and seventy-three grains of pure calcareous earth are required for the dilution of 100 grains of earth of alum, but the liquor still reddened vegetable blue. After this an infoluble salt was formed; but it is difficult to ascertain the beginning of its formation, particularly both in this and the preceding cases. The specific gravity of pure argillaceous earth, containing 25 per cent. of fixed air, is 1.0091.

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The air produced by this solution is entirely inflammable, and generally amounts to 115 cubic inches. By the affinities of a strong heat, iron is also soluble in the concentrated vitriolic acid, though in smaller quantity; and instead of inflammable air, a large quantity of vitriolic air is produced, and a little sulphur is sublimed towards the end. The reason of this is, that the concentrated vitriolic acid, containing much less specific fire than the dilute kind, cannot expel the phlogiston in the form of inflammable air (which absorbs a vast quantity of fire), but unites with it when further dephlogismated by heat, and thus forms both vitriolic air and sulphur. An hundred grains of iron dissolved without heat afford more than 400 of vitriol; and 100 grains of vitriol, when crystallized, contain 25 of iron, 20 of real acid, and 55 of water. When calcined nearly to redness, these crystals lose about 40 per cent. of water.

The calxes of iron are soluble in the vitriolic acid according to the quantity of phlogiston they contain; the more phlogisticated being more readily soluble, and those which are dephlogisticated least of. The latter not only require more real acid for their solution, but afford only a thick liquor or magma by distillation, instead of crystals like the others. Hence also solutions of iron, when newly made, diminish, and consequently phlogisticate, the superincumbent air by their gradual emulsion of phlogiston; at the same time that the calx, becoming more and more dephlogisticated, gradually falls to the bottom, unleas more acid be added to keep it in solution.

An hundred grains of iron require for their solution in nitrous acid 1/2 grains of real acid, so diluted that its proportion to water should be as 1 to 13 or 14; and when this last proportion is used, the heat of a candle may be employed for a few seconds, and the access of common air prevented. Thus about 18 cubic inches of nitrous acid are produced, the rest being absorbed by the solution, and no red vapours appear. But if the proportion of acid and water be as 1 to 8 or 10, a much greater quantity of metal will be dephlogisticated by the application of heat, though very little of it be held in solution. Thus, from 100 grains of iron Mr Kirwan has obtained 83.87 cubic inches of nitrous acid; and by distilling the solution, a still greater quantity may be obtained which had been absorbed.

The reason that nitrous solutions of iron or other metals yield no inflammable air is, because this acid has less affinity to water, and more to phlogiston, than the vitriolic, and likewise contains much less fire than that or the marine (see p. 278); and therefore unites with phlogiston, instead of barely expelling it. Hence also the vitriolic acid, though united with 30 times its weight of water, will still visibly act on iron, and separate inflammable air in the temperature of 55°, whereas nitrous acid, diluted with 15 times its weight of water, has no perceptible effect on the metal in that temperature. The calxes of iron, if not too much dephlogisticated, are also soluble in the nitrous acid.

Two hundred and fifteen grains of real marine acid are required for the solution of 100 grains of iron. When the proportion of water to the acid is as four to one, it effervesces rather too violently with the metal; and heat is rather prejudicial, as it volatile isot the acid.

Theory.

An hundred and eighty-three grains of real vitriolic acid are required to dissolve an hundred grains of copper; the proportion of acid to that of water being as 1 to 1.5, or at least as 1 to 1.7; and a strong heat must also be applied. Mr Kirwan says he never could dissolve the whole quantity of copper; but to dissolve a given quantity of it, a still greater heat must be employed in the proportion of 28 to 100; but this residuum also is soluble by adding more acid. Copper dephlogisticated in this manner is soluble by adding warm water to the mass.

By treating 128 grains of copper in this manner, we obtain 11 cubic inches of inflammable air and 65 of vitriolic acid. When inflammable air was obtained, our author tells us the acid was a little more aqueous. The reason why copper cannot be dephlogisticated by dilute vitriolic acid, or even by the concentrated kind without the assistance of heat, is its vitriolic acid attraction to phlogiston, and the great quantity it contains.

An hundred grains of vitriol of copper contain 25 of metal, 30 of acid, and 43 of water; 28 of which last are lost by evaporation or slight calcination. An hundred grains of copper, when dissolved, afford 376 cubic inches of blue vitriol.

An hundred grains of copper require 130 of pure nitrous acid for their dissolution. If the acid be so far diluted that its proportion of water be as 1 to 14, the affinity of heat will be necessary, but not otherwise. This solution affords 675 cubic inches of nitrous triacid.

The calxes of copper are soluble in the nitrous acid, though less easily than in the nitrous.

The vitriolic acid dissolves tin but in small quantity; an hundred grains of the metal requiring for its solution 872 of real acid, whose proportion to water should not be less than 1 to 0.9. A strong heat is also required. When the action of the acid has ceased, some hot water should be added to the turbid solution, and the whole again heated. The metal is soluble in a more dilute acid, but not in such quantity. The solution above-mentioned affords 70 cubic inches of inflammable air. — The calxes of tin, excepting that precipitated from marine acid by fixed alkalies, are insoluble in the vitriolic acid.

An hundred grains of tin require 1200 of real nitrous acid, whose proportion of water should be at least 25 to 1, and the heat employed not exceeding 60°. The quantity of air afforded by such solution is only 10 cubic inches, and it is not nitrous. The solution...
Mr Kirwan has never been able to dissolve silver in the marine acid, though Dr Kaye says he effected the dissolution of three grains and a half of it by digested for some days with two ounces of strong spirit of wine, and immersed it in a solution of the nitrous acid. It is dissolved, however, by the dephlogisticated spirit of salt, as well as by the phlogisticated acid when reduced to a state of vapour. An hundred grains of luna coneia contain\(75\) grains of silver, \(18\) of acid and \(7\) of water.

Mr Kirwan found that kind of aqua regia to succeed best kind best in the dissolution of gold, which was prepared by of aqua re-

mixing together three parts of the real marine acid for dissol-

ving with one of the nitrous acid. Both of them ought also to be as concentrated as possible; though, when this is the case, it is almost impossible to prevent a great quantity from escaping, as a violent effervescence takes place for some time after the mixture. Aqua regia made with common salt or sal ammoniac and spirit of nitre, is much less aequous than that proceeding from an immediate combination of both acids; and hence it is the fittest for producing crystals of gold. Very little air is produced by the solution of this metal, and the operation goes on very slowly. It is, however, better promoted by allowing it sufficient time, than by applying heat. An hundred grains of gold require for their solution \(487\) grains of real acid, the two acids being in the proportion abovementioned. An hundred grains of real acid contain \(77\) of gold, \(18\) of acid, and \(7\) of water.

With spirit of nitre, \(78\) grains of real acid are required for the solution of \(100\) grains of lead, with the assistance of heat towards the end. The proportion of acid to that of water may be about \(1\) to \(11\) or \(12\). This solution produces but eight cubic inches of air, which is nitrous. The calces of the metal are soluble in this acid, but less so when much dephlogisticated. An hundred grains of minium require \(81\) of real acid. An hundred grains of nitrous falt of lead contain about \(60\) of the metal.

With nitrous acid. An hundred grains of the real marine acid are required for the solution of \(100\) grains of lead; the specific gravity of the acid being \(1.141\), though more would be dissolved by a stronger acid. The calces of lead are more soluble in this acid than the metal itself. An hundred grains of minium require \(327\) of real acid; but white lead is much less soluble. The same quantity of plumbum corneum, found by precipitation, contain \(72\) of lead, \(18\) of marine acid, and \(10\) of water. An hundred grains of silver require \(520\) of real vitriolic acid to dissolve them; the proportion of acid to water being not less than \(1\) to \(10\); and when such a concentrated acid is used, it acts slightly even in the temperature of \(60^\circ\); but a moderate heat is required in order to procure a copious solution. The calces of silver formed by precipitation from the nitrous acid with fixed alkalis are soluble even in dilute vitriolic acid without the assistance of heat. An hundred grains of vitriol of silver, formed by precipitation, contain \(74\) grains of metal, about \(17\) of real acid, and \(9\) of water. An hundred grains of the purest silver require for their solution \(36\) of nitrous acid, diluted with water in the proportion of one part of real acid to six of water, applying heat only when the solution is almost saturated. If the spirit be much more or much less dilute, it will not act without the assistance of heat. The last portions of silver thus taken up afford no air. Standard silver requires about \(38\) grains of real acid to dissolve the same proportion of it; and the solution affords \(20\) cubic inches of nitrous air; whereas 100 grains of silver revived from luna cornea afford about \(14\) cubic inches of air.

Silver with nitrous acid. In spirit of nitre, \(100\) grains of mercury are dissolved by \(28\) of real acid, whose proportion to the water it contains is \(21\) to \(1\). In this acid the solution takes place without heat; but it may also be dissolved in a much more dilute acid, provided heat be applied. About \(12\) cubic inches of air are produced when heat is not applied; but M. Lavoisier found the produce much greater. This, says Mr Kirwan, was evidently caused by his using red or yellow spirit of nitre, which already contains much phlogiston. Precipitate per \(fe\) is still less soluble. An hundred grains of vitriol of mercury, produced by precipitation, contain \(77\) of metal, \(19\) of acid, and \(4\) of water.

With nitrous acid.
Zinc with vitriolic acid;

A weak quantity of the nitrous air is produced. An hundred grains of vitriol of zinc contain 100 grains of real nitrous acid. The calces of zinc, if not too much dephlogistered, are also soluble in this acid.

A hundred and twenty-five grains of real nitrous acid, whose proportion to water is that of 1 to 12, are required for the solution of 100 grains of this semimetal, applying heat slightly from time to time. A concentrated acid dissolves less of the metal, as a great quantity of black powder remains in all cases undissolved. An hundred cubic inches of inflammable air are produced. An hundred grains of vitriol of zinc contain 20 of zinc, 22 of acid, and 38 of water. The calces of zinc, if not exceedingly dephlogistered, are also soluble in this acid.

Three grains of bismuth were dissolved by 200 cubic inches of vitriolic acid. The calces of bismuth are also soluble in this acid.

Only three grains of bismuth were dissolved by 200 cubic inches of vitriolic acid, whose specific gravity was 1.863, though a strong heat was used at the same time. A greater quantity was indeed less dephlogistered; but when the gravity of the acid was reduced to 1.220, only a single grain of the metal was dissolved by 400 of it. The calces of this semimetal are much more soluble. Four cubic inches of vitriolic acid were afforded by the solution of three grains of bismuth.

In spirit of nitre, 100 grains of real acid are only required to dissolve 100 grains of the metal. The proportion of water to the acid ought to be as 8 or 9 to 1, in which case a gentle heat may be applied. The solution affords 44 cubic inches of nitrous airs. The calces of bismuth are also soluble in this acid.

Only three or four grains of it were dissolved in a large cubic inch of spirit of salt, in which case a gentle heat may be applied. A moderate heat is necessary for the dissolution of the metal; but a concentrated acid acts so rapidly, that much of it is dissolved. Only four or five grains of nickel are dissolved by 200 cubic inches of spirit of salt whose specific gravity was 1.220. An acid of this degree of strength acts without the assistance of heat, though a weaker acid requires it, and dissolves still less of the metal. The calces of nickel are also soluble with difficulty in this acid.

Four hundred and fifty grains of real vitriolic acid, whose proportion to water is not less than 1 to 7, are required for the dissolution of 100 grains of the metal, all of which is dissipated during the operation. A solution is obtained by pouring warm water on the dephlogistered mass. The calces of cobalt, however, are more soluble; so that even a dilute acid will serve.

In spirit of nitre, the like quantity of cobalt requires 220 grains of real acid, whose proportion to water is as 1 to 4; giving a heat of 180 towards the end. The calces of the metal are soluble in the nitric acid.

An hundred grains of spirit of salt, whose specific gravity is 1.78, dissolve, with the assistance of heat, two grains and a half of cobalt; and a greater quantity will be dissolved by an acid more highly concentrated. The calces of cobalt are more soluble.

An hundred grains of regal of antimony require 75 grains of real vitriolic acid, whose proportion to water is as 1 to 7, affixed by a heat of 400°. A large quantity of regal should be put into the acid; and the resulting salt requires much water to dissolve it, as the concentrated acid lets fall much when water is added to it. A less concentrated acid will likewise dissolve this semimetal, but in smaller quantity. The calces of antimony, even on diaphoretic antimony, are somewhat more soluble. Nine with nitrous acid, solution of 100 grains of regal of antimony require 150 grains of real nitrous acid are required for the solution of 100 grains of regal, the proportion of acid to the water of the solvent being as 1 to 12, and affixed by a heat of 110°; but the solution becomes turbid in a few days. The calces are much less soluble in this acid. Only one grain of the regal is dissoluble in the marine acid, which is only 1.178 dissolves fifty lefs; but Mr. Kirwan is of opinion that the concentrated acid would, in a long time, and by the assistance of a gentle heat, dissolve much more. The calces dissolve more easily in the marine acid.

Eighteen grains of regal of arsenic are dissolved of regal of in a heat of 250° by 200 grains of real vitriolic acid, whose specific gravity is 1.871. About seven of these parts crystallize on cooling, and are soluble in a large quantity of water. The calces of arsenic are more soluble in this acid. An hundred and forty grains of regal of real nitrous acid are requisite for the solution of 100 grains of regal of arsenic; the proportion of acid to the water being as 1 to 11. The solution affords 102 cubic inches of nitrous air, the barometer being at 26° and the thermometer at 60°. Calces of arsenic are likewise soluble in this acid.

An hundred grains of spirit of salt, whose specific gravity is 1.220, dissolve a grain and half of regal of arsenic; but the marine acid, in its common state, that is, when its gravity is under 1.17, does not at all affect it. The arsenical calces are less soluble in this than in the vitriolic or nitrous acids.
quantity of different ingredients contained in the compounds resulting from their union, we ought next to give an account of our author’s experiments on phlogi
ton; but as his sentiments on that subject are taken notice of elsewhere, we shall content ourselves with briefly mentioning the very ingenious methods by which he discovers the quantities of it contained in various kinds of air and in sulphur.

Having proved that inflammable air, in its concrete state, and phlogiston are the same thing, Mr Kirwan proceeds to estimate the quantity contained in nitrous air in the following manner.

"An hundred grains of filings of iron, dissolved in a sufficient quantity of very dilute vitriolic acid, produced, with the assistance of heat gradually applied, 155 cubic inches of inflammable air; the barometer being at 29.5, and the thermometer between 50 and 60°. Now, inflammable air and phlogiston being the same thing, this quantity of inflammable air amounts to 5.42 grains of phlogiston.—Again, 100 grains of iron dissolved in dephlogisticated nitrous acid, in a heat gradually applied and raised to the utmost, afford 83.87 cubic inches of nitrous air. But as this nitrous air contains nearly the whole quantity of phlogiston which iron will part with (it being more completely dephlogisticated by this than any other means), it follows, that 83.87 cubic inches of nitrous air contain at least 5.42 grains of phlogiston. But it may reasonably be thought, that the whole quantity of phlogiston which iron will part with is not expelled by the vitriolic acid, but that nitrous acid may expel and take up more of it. To try whether this was really the case, a quantity of green vitriol was applied and raised to the heat in a heat produced by vitriolic acid and phlogiston are the same thing, Mr.

Dr Priestley, in the fourth volume of his Observations, p. 306, has satisfactorily proved, that nitrous air parts with as much phlogiston to common air, as an equal bulk of inflammable does when fixed in the same proportion of common air. Now, when inflammable air unites with common air, its whole weight unites to it, as it contains nothing else but pure phlogiston. Since, therefore, nitrous air phlogisticates common air to the same degree that inflammable air does, it must part with a quantity of phlogiston, equal to the weight of a volume of inflammable air, similar to that of nitrous air. But 100 cubic inches of inflammable air weigh three grains and a half; therefore 100 cubic inches of nitrous air part with 3.5 grains of phlogiston, when they communicate their phlogiston to as much common air as will take it up. In this process, however, the nitrous air does not part with the whole of the phlogiston it contains, as appears by the red colour it constantly assumes when mixed with common or dephlogisticated air; which colour belongs to the nitrous acid, combined with the remainder of its phlogiston, whence the acid produced is always volatile.

"One measure of the purest dephlogisticated air and two of nitrous air occupy but 1/3 of one measure, as Dr Priestley has observed. Suppose one measure to contain 100 cubic inches, then the whole, very nearly, of the nitrous air will disappear (its acid uniting to the water over which the mixture is made), and 97 cubic inches of the dephlogisticated air, which is converted into fixed air by its union with the phlogiston of the nitrous air; therefore 97 cubic inches of dephlogisticated air take up all the phlogiston which 200 cubic inches of nitrous air will part with; and this we have found to be seven grains: therefore a weight of fixed air equal to that of 97 cubic inches of dephlogisticated air, and 7 of phlogiston, will contain seven grains of the latter. Now, 97 cubic inches of dephlogisticated air weigh 40.74 grains; to which adding 7, we have the whole weight of the fixed air, 47.74 grains; 83.755 cubic inches; and consequently 100 cubic inches of fixed air contain 8.357 grains of phlogiston, the remainder being dephlogisticated air. An hundred grains of fixed air, therefore, contain 14.663 of phlogiston, and 8.339 of elementary or dephlogisticated air. Hence also 100 cubic inches of dephlogisticated air are converted into fixed air by 7.2155 grains of phlogiston, and will be then reduced to the bulk of 86.34 cubic inches.

To find the quantity of phlogiston in vitriolic acid air, our author pursued the following method.

1. He found the quantity of nitrous air afforded by a given weight of copper, when dissolved in the dephlogisticated nitrous acid, and by that means how much phlogiston it part with.

2. He found the quantity of copper which a given quantity of the dephlogisticated vitriolic acid could dissolve; and observed, that it could not entirely saturate itself with copper without dephlogisticating a further quantity which it does not dissolve.

3. He found how much it dephlogisticates what it thoroughly dissolves, and how much it dephlogisticates what it barely calcines.

4. How much inflammable air a given quantity of copper affords when dissolved in the vitriolic acid to the greatest advantage.

5. He deduces from the whole quantity of phlogiston expelled by the vitriolic acid the quantity of it contained in the inflammable air; the remainder shows the quantity of it contained in the vitriolic acid air.

The conclusion deduced from experiments, conducted after this manner is, that 100 cubic inches of vitriolic air contain 6.6 grains of phlogiston, and 71.2 grains of acid; and 100 cubic inches of this air weighing 77.8 grains, 100 of it must contain 8.48 grains phlogiston, and 91.52 of acid.

To find the quantity of phlogiston in sulphur, Mr Kirwan proposed to estimate that of the fixed air produced during its combustion. For this purpose he firmly tied and cemented to the open top of a glass bell a large bladder, designed to receive the air expanded by combustion, which generally escapes when this
This precaution is not used. Under this bell, containing about 3000 cubic inches of air, a candle of sulphur, weighing 347 grains, was placed; its wick, which was not contained, weighing half a grain. It was supported by a very thin concave plate of tin, to prevent the sulphur from running over during the combustion, and both were supported by an iron wire fixed in a shelf in a tub of water. As soon as the sulphur began to burn with a feeble flame, it was covered with the bell, the air being squeezed out of the bladder. The inside of the bell was soon filled with white fumes, so that the flame could not be seen; but in about an hour after all the fumes were thoroughly subducted, and the glass become cold, as much water entered the bell as was equal to 87.2 cubic inches; which space our author concludes to have been occupied by fixed air, and which must have contained 7.287 grains of phlogiston. The candle of sulphur being weighed was found to have lost 20.75 grains; therefore 20.75 grains of sulphur contain 3.414 grains of phlogiston, besides the quantity of phlogiston which remained in the vitriolic air. This air must have amounted to 20.75 — 7.287 = 13.463 grains, which, as already shewn, contain 1.41 grains of phlogiston. Therefore the whole quantity of phlogiston in 20.75 grains of sulphur is 8.428; of consequence 100 grains of sulphur contain 59.39 of vitriolic acid, and 40.61 of phlogiston.

The quantity of phlogiston contained in marine acid air was found by the following method. — Eight grains of copper dissolved in colourless spirit of salt afforded but 4.9 inches of inflammable air; but when the experiment was repeated over mercury, 91.28 cubic inches of air were obtained. Of these only 49 cubic inches were inflammable; and consequently the remainder, 86.32 inches, were marine air, weighing 56.49 grains. — Now as spirit of salt certainly does not dephlogisticate copper more than the vitriolic acid does, it follows, that these 49 cubic inches of inflammable air, and 86.38 of marine air, do not contain more phlogiston than would be separated from the same quantity of copper by the vitriolic acid; and since 100 grains of copper contain 3.28 grains of phlogiston, 8.5 grains of copper would yield 0.367 grains of phlogiston. This therefore is the whole quantity extracted by the marine acid, and contained in 91.28 cubic inches of air; and, deducting from this the quantity of phlogiston contained in 49 cubic inches of inflammable air 0.171 grains, the remainder, viz. 0.367 - 0.171 = 0.196, is all the phlogiston that can be found in 86.38 cubic inches of marine air. Then 100 cubic inches of it contain but 0.227 of a grain of phlogiston, 65.173 grains being acid. — Hence we may see why it acts so finely on oils, spirit of wine, &c. and why it is not dissolved from any body by uniting with phlogiston, as the vitriolic and nitrous acids are, its affinity to it being incomparably.

§ 4. Remarks on the Doctrines of the Quantity and Specific Gravities above delivered.

To this doctrine of the specific gravity and quantity of acid contained in different substances, Mr Kirwan has made several objections. 1. Mr Kirwan supposes, that marine acid gas is the pure and solid marine acid, divedfed of all water and other matter. Its apparent dryness in this respect, however, is no argument that it really contains no water; for water itself, reduced to a state of vapour, possesses no moistening property. On the contrary, there is great reason to believe that water is a constituent part of some gases, and it is certain that all of them are capable of holding it in solution. As moist materials, therefore, are employed in the preparation of marine acid air, there seems no reason to believe, that in any way in which Mr Kirwan could obtain it, there was reason to suppose it perfectly free of water; in which case the density of the acid would be greater, and its quantity smaller than he supposes.

2. A considerable part of the density of the acid absorbed in the experiment, probably arose from the condensation which always accompanies the union of a concentrated acid with water. Mr Kirwan allows this to be the case with the nitrous and vitriolic acids, but thinks it too inconvenient to deferve notice in the marine. His reasoning, however, does not appear satisfactory, or his experiments on the subject conclusive. He observes, that the length of time taken up in effecting an union between the marine gas and water, is no argument against their attracting one another strongly when once united; and it is certain that part of this acid gas is very quickly absorbed by water. He also finds fault with his accuracy in calculation; and afferts, that if matters are fairly stated, the real density of the marine acid gas will be considerably less than Mr Kirwan makes it.

3. A great obstacle even to an approximation towards the real density of the acid, arises from the condensation which the water, as well as the acids, must suffer in the process; and in this case, where a general condensation takes place, he asks, "How shall we determine the part of the condensation that belongs to the water, and the part of the acid sustains?" This, with other considerations, makes Mr Keir "doubt of the possibility of solving the question concerning the actual density of pure and solid acids." The investigation of the question, indeed, he does not consider as a matter of great conquence, as every useful application may be obtained, by first investigating the comparative strengths of the acids, and the marine acid rendered more or less dilute; and then by finding out the strength of the vitriolic, nitrous, and marine acids of known densities, so that they may be compared together. "Homer (says he) has the merit of making the first essay towards this investigation. Bergman and Wenzal have supplied the defects of Homer, by taking into consideration the gas united with alkaline substances; and Mr Kirwan, by using determinate quantities of acid liquors of known densities, has considerably improved the method of Bergman: and whoever succeeds in these able chemists five, in this inquiry, may avail himself greatly of their labours, particularly those of Mr Kirwan." He concludes with stating the results of the inquiries made by the chemists abovementioned; on which he makes the following remarks.

"The discrepancy of these results is very striking, and gives but an humiliating representation of the precautions in collision of our present knowledge in chemistry. A great part of the difference ariseth undoubtedly from the different views in which these authors considered the dry, different nesses or purity of the acids. Mr Kirwan, as we have seen, endeavoured to find their density and quantity in
a state of perfect dryness and purity; which he supposed to exist in the marine acid gas; with which he compared, and inferred the densities and quantities of the nitrous and vitriolic acids, upon the supposition that equal quantities of these several acids are saturated by a given weight of fixed alkali. Besides the uncertainty of his principles, from which he deduces the density and quantity of the marine acid, his applications from thence to deduce the densities of the pure nitrous vitriolic acids, being founded on the above supposition, must partake of its defects. The alkali which he happened to fix on as the standard by which he compared the strengths of the different acid liquors, in order to determine the quantity of real acid they contained, and thence to determine their density in a solid state, was the fixed vegetable. Having found that 100 grains of his real marine acid could saturate 215 grains of this alkali, he infers, that the same proportion is applicable to the other acids; and accordingly we find that 100 grains of each of the pure and real mineral acids are saturated by an equal quantity, viz. 215 grains of this alkali. But if we examine the other columns of his table, we shall at once see, that in other substances soluble by acids, this equality does not exist; and that every such substance has a ratio peculiar to itself, with respect to the proportions of these acids necessary for its saturation. It is evident, therefore, that if Mr Kirwan had fixed on the mineral alkali, the volatile alkali, lime, or any other substance, as a standard, instead of vegetable alkali, his determination of the densities of the real vitriolic and nitrous acids would have been different; and as no reason can be assigned why the vegetable alkali or any other substance should have the preponderage over the rest, it is obvious that there can be no such general standard, but that each substance points solely to the capacity of determining the proportions of the several acids necessary for its saturation.

The other chemists were contented to consider as the pure and dry acid, that which actually remains in the neutral salt, after this has been rendered as dry as possible by exposure to a red heat; and having made their alkalies as dry as they could, they supposed these alkalies to retain the same weight in the dried neutral salt; and that the augmentation of the weight gained by the alkali during the formation of the neutral salt showed the weight of the dry acid. The uncertainty which affects this method arises from the different capacities which different neutral salts may possess of retaining more or less water, either as a constituent part of the dry salt, or merely by the strength of adhesion or affinity. Nevertheless, this method being founded solely on experiment, without any theoretical inductions, seems to furnish some approximation, not perhaps of the absolute quantity of the acids in their driest possible state, but of the acids as they actually exist in these salts comparatively with each other. Though the disagreements between Bergman's and Wenzel's results are little in comparison of the difference between them and Kirwan's, yet their experiments were made nearly in the same manner, and upon the same grounds, there seems to be sufficient reason to wish for a careful repetition of their experiments, or of others with the same view, and least liable to objections.

"The only difference in the methods employed by remarks these two celebrated chemists consisted in the mode of the for- saturation. Bergman probably used the common method, but Wenzel employed a very peculiar one. He added to his alkali a greater quantity of acid than was necessary for the saturation; and after the alkali was dissolved, he added a lump of zinc, or of oyster-shell, in order to saturate completely the superfluous acid. By observing how much of the zinc or oyster-shell the acid dissolved, and knowing how much of these substances was soluble in his acid by former experiments, he inferred the quantity of acid left for the saturation of the alkali. Having thus ascertained the quantity necessary to saturate the alkali, he mixed together the proper proportions of these, and formed his neutral salt by evaporating the mixture and drying the salt with a red heat. Perhaps the difference in the results obtained by these two chemists might arise from their different modes of saturation. The common method of ascertaining the point of saturation by means of limus or other blue vegetable juices, appears sufficiently exact, is simpler, and therefore preferable to that used by Wenzel.

"The standard for comparing the strengths of acids, and likewise of alkalies with one another, may be either an acid or an alkaline substance; and if we had one of each, the proportion of whose quantities requisite for their mutual saturation were well ascertained, the convenience in making the experiments would be obvious, and the certainty greater. Alkaline, and the earthy substances that are soluble in acids, are seldom pure enough for this purpose. They generally contain quantities, which are not constant, of fixed air, siliceous earth, magnesia, neutral salts, and inflammable matter, which render any of those that are commonly met with unfit for the purpose without a very skilful and careful purification. The chemists who have made experiments to determine the proportions of acids and alkalies requisite for each other's saturation, have scarcely been explicit enough in explaining the means of purifying the alkalies which they employed; and those in commerce are quite uncertain in strength and purity; and as to the general rules of making allowances for any heterogeneous substances they may contain, they are quite inapplicable to delicate experiments. No other method seems proper for ascertaining the purity of alkalies but that of crystallization: of which both the vegetable and mineral alkalies are susceptible, especially the latter, which on account of its being more easily reducible into crystals, is therefore preferable. These alkaline crystals, however, are not fit to be used as a standard, because they either are apt to be sufficiently dried, or, upon exposure to air, to lose a part of the water of their crystallization, and to fall into powder. Even if they should be taken, as is possibly with due care, at the exact state of dry but entire crystals, another uncertainty arises from a property which seems to be common to them all, namely, that of retaining a greater or smaller quantity of water, according to the degree of heat in which they were crystallized; the colder the weather the greater quantity of water entering into the composition of the crystals. It seems possible, however, to make a pretty method of an accurate standard of mineral alkali in the following manner: Let the alkali be purified by repeated solution.
tion and crystallization, using only such as are formed first, and rejecting the remaining liquors. Let the pure crystals be exposed to a dry air until they have completely effloresced or fallen into a dry white powder; which alteration may be facilitated by bruising the crystals and changing the surface of the powder. Let this powder be then exposed for a certain and determined time to a constant heat, as that of boiling water for 12 hours; letting the surface exposed be in some given proportion, suppose of a square inch to an ounce of the powder of crystals, and let it be stirred every two hours. When thus dried, let them be put while hot into a bottle, and well stopped. This powder I have found to be an uniform and constant standard for ascertaining the strength of acids; and also, by comparison with means of acids, of other alkaline substances.

With regard to an acid standard, our author recommends oil of vitriol; which, he says, as it comes from the hands of the British manufacturers, is of the specific gravity of about 1.846, but soon becomes weaker, unless carefully kept from the external air; and in general he rates it at 1.850. One part of this acid mixed with nine of water, is of a very convenient strength for use; and as every ten grains of the mixture contain one of the standard acid, the computations are thus rendered easy: and by these standards, the strength of all acids, alkalies, and substances soluble in acids, may be measured and compared together.

To determine the specific gravity of liquors with accuracy, our author recommends the method of weighing them in a phial fitted with a glass-stopper, which can only enter a certain length into the neck. In this way, he observes, no other inconvenience can ensue than the slightest, that the glass-stopper, by very frequent use, is apt to wear itself and the neck of the phial also; so that after a great number of experiments, it will at last diminish, in some measure, the capacity of the phial itself. This, however, is but very trifling, and may be corrected at any time. Mr. Keir has besides found, that after some hundreds of experiments, the error amounted only to one quarter of a grain in 101 grains.

The methods hitherto practised (says he) for ascertaining the quantities of acids and alkalis contained in neutral salts, seem to be liable to several objections besides those above-mentioned, arising from the different proportions of water remaining in a neutral salt, after exposure to a red-heat, which heat is also very indefinite. In boiling the saturated mixture of acid and alkali to dryness, and afterwards in exposing this salt to a red-heat, it has been supposed that nothing but water is expelled; and some chemists, who have given the results, have also determined the weight of the alkali which enters into the neutral mixture, by evaporating to dryness an equal quantity of the alkaline solution which had been employed in the saturation, and weighing the dry solution, on the supposition that nothing is expelled but water. It is certain, however, that in the evaporation both of alkalies and neutral salts, a considerable portion of the saline matter is elevated towards the end, when the liquor becomes concentrated and acquires a degree of heat considerably above that of boiling water. The following method appears best for determining the relative quantities of acid and alkali, or other substance existing in neutral salts.

To a given number of grains, suppose 100 of the standard vitriolic acid, or to a proportional quantity of any other acid, add as much of the alkali or other soluble substance as is requisite for the saturation, and note the quantity required, which suppose to be 150 grains. We have thus a solution of the neutral salt, which is the object of the experiment; the quantities of acid and bases contained in which are known, and the general proportion of the quantity of the acid to its bases in the neutral salt determined, viz. as 100 to 150. The next thing to be discovered is the weight of the dry neutral salt contained in this solution, in order to know the proportion of the dry neutral salt to its acid and bases. For this purpose, let a given quantity of the same neutral salt, either in the state of crystals or dried to any given degree, be dissolved in water. Let this solution be brought to the same density as the former, by adding water to the heavier of the two: then, by knowing the weight of each solution, and the quantity of dry neutral salt which was actually dissolved in one of them, the quantity contained in the other may be deduced; and hence the quantities of standard acid, or of other acid proportioned to it, and of the alkali employed, or other soluble substance contained in a given quantity of the neutral salt, are determined; also the quantity of water contained in the neutral salt, that is greater or less than what is contained in the quantity of acid employed, will be known, over and above any water that may have been contained in the alkali or other bases of the neutral salt; the quantity of which water, if any, cannot be determined.

By this method may be ascertained the proportion of the acid, of the bases, and of the neutral salt, to each other; not indeed the quantity of acid and of alkali deprived of all water, but the quantity of acid, equal in intensity of acidity to a known portion of the standard acid; and also the quantity of such alkali or other soluble substance as was employed; the relative strength of which is known from its ratio to the standard acid.

The translator of Wiegles's System of Chemistry totally disagrees with Mr. Kirwan's calculation of the quantity of phlogiston contained in sulphur; but as his objection seems to arise rather from an inclination to the antiphlogistic doctrine that a real diffusion of the subject, this can have but little weight. It is possible indeed that Mr. Kirwan may have over-rated the quantity of phlogiston this substance contains, which is indeed larger than that allowed by other chemists.

"Brandt (says the translator), who has been most generally followed, reckons it only at 7/9; and it has always appeared to me, that the weight of phlogiston in sulphur is almost infinitely small."

His objection proceeds on a maxim which he thinks he has demonstrated, viz. that sulphur is composed, not of the vitriolic acid and phlogiston, but of the base of vitriolic acid and phlogiston. No experiments hitherto made, however, have been able to show this base distinctly from the acid; nor have we any reason to suppose that the increase of weight in the vitriolic acid above the sulphur from
The other species of earths, viz. the flinty, fusible, and taly, being no other way the subjects of chemistry than as they are subservient to the making of glasses, all that can be said of them will most properly come under that article. For their different species, see Mineralogy.

Besides the abovementioned species of earths, there are others which may be called anomalous, as having some resemblance of the calcareous and argillaceous, and yet being essentially different from them. These are the earth called magnesia alba, the earth of burnt vegetables, and that produced from burning animal substances.

Magnesia alba was at first prepared from the thick liquor remaining after the crystallization of nitre; and is now found to be contained in the liquor called bittern, which is left after the separation of common salt from sea-water. In the former case it was united with the nitrous, in the latter with the vitriolic, acid. It is also found naturally in the soft kind of stone called flinty or 'soap-flint,' and in the concrete used for taking spots out of cloaths, called French chalk. It differs from the calcareous earths in not acquiring any hardness when deprived of its air, of which it contains so large a quantity as to lose two-thirds of its weight when calcined. From the argillaceous it differs in not burning hard when mixed with water, nor forming a tough ductile paste. It is easily fusible in all the acids, even the vitriolic; with which it forms the bitter purging salt called Esphom salt, from its being first discovered in the waters of Epsom. With all the other acids it likewise forms purgative compounds, which are either very difficult or not at all crystallizable. Like other pure earths, it cannot be melted by itself; but, on proper additions, runs into a beautiful green glass.

The earth of burnt vegetables is thought by Dr. Lewis to be the same with magnesia alba; but on try, and animaling the common wood ashes, they were found to be very different. This kind of earth is fusible, by reason of the alkaline salts contained in it. Animal earth is both very difficult of solution in acids, and imposible to be melted in the strongest fire. It dissolves, however, in acid liquors, though slowly; but the nature of the compounds formed by such an union are as yet unknown. The softer parts of animals, such as blood, flesh, &c. are said to yield a more fusible earth than the others. Animal earth has lately been supposed to be compounded of calcareous earth and phosphoric acid; but this opinion is shewn to be erroneous under the article Bones. The phosphoric acid produced from these, is with reason supposed to be only the vitriolic acid changed.

Sect. V. Inflammable Substances.

These comprehend all vegetable, animal, and some Phenomeno-mineral substances. They are distinguished from all others, burning.
Inflammable Substances.

On distillation.

Treated with different acids.

Singular Productions.

Neither the nature of these flowers, however, nor that Metallic of the falt of amber, is fully known.

Metals forming inflammable substances.

These are distinguished from all other bodies by their great specific gravity, exceeding that of the most dense and compact stones. The heaviest of the latter do not exceed the specific gravity of water in a greater proportion than that of 4 to 1; but tin, the lightest of all the metals, exceeds the specific gravity of water in the proportion of 7 to 1. They are also the most opaque of all known bodies, and reflect the rays of light most powerfully.

Metallic bodies possess the quality of dissolving in and uniting with acid salts, in common with earths and alkalies; but, in general, their union is less perfect, and they are more readily separable. They effervesce with acids, as well as calcareous earths and alkalies; but their effervescence is attended with very different appearances. In the effervescence of acids with alkalies, or with calcareous earths, there is a discharge of the fluid called fixed air, which is so far from being inflammable, that it will immediately extinguish a candle or other small flame immersed in it. The mixture also is notably diminished in weight. When a metallic substance is dissolved in an acid, the weight of the mixture is never very much diminished, and sometimes it is increased. Thus, an ounce of quicksilver being slowly dropped into as much aquafortis as sufficient to dissolve it, and the solution managed so as to take up almost a whole day, the whole was found to have gained seven grains. There is also a remarkable difference between the nature of the vapour discharged from metals and that from alkalies; the former, in most cases, taking fire and exploding with violence; the latter, as already observed, extinguishing flame.

The metallic substances, at least such as we are able to decompose, are all composed of a certain kind of phlogiston. The earthy part by itself, in whatever way it is procured goes by the name of calx. The other principle has already been proved to be the same with charcoal. When these two principles are separated from one another, the metal is then said to be calcined. The calx being mixed with any inflammable substance, such as tannin and powdered charcoal, and urged with a strong fire, vivification melts into metal again; and it is then said to be reduced, or revivified: and this takes place whether the metal has been reduced to a calx by dissolving in an acid or by being exposed to a violent fire. If, however, the calcination by fire has been very violent and long continued, the calx will not then so readily unite with the phlogiston of the charcoal, and the reduction will be performed with more difficulty. Whether, by this means, viz. a long continued and violent calcination, metallic earths might entirely lose their property of combining with phlogiston, and be changed into tho' of another kind, deserves well to be inquired into.

When a metallic substance is dissolved in any kind of Calcina- acid, and an alkali or calcareous earth not deprived of its fixed air is added, the alkali will immediately create of weight by acids.
Exactly 12 ounces of quicksilver (says he) were put into a matras, and 12 ounces of spirit of nitre poured on it. Immediately a spontaneous effervescence ensued, attended with heat. The red vapours of the nitrous acid arose from the mixture, and the liquor assumed a greenish colour. I did not wait till the solution was entirely accomplished before I weighed it; it had lost one drachm 18 grains. Three hours after, the mercury was nearly all dissolved; but having again weighed the solution, I was much astonished to perceive that it had increased instead of being diminished in weight; and that the loss, which was one drachm 18 grains at first, was now only 54 grains. The next day the solution of the mercury was entirely finished, and the loss of weight reduced to 18 grains; so that in 72 hours the solution, though confined in a narrow necked matras, had acquired an augmentation in weight of one drachm. I added some distilled water to my solution, to prevent it from crystallizing; the total weight of it was then found to be 48 ounces 1 drachm and 18 grains.

I weighed separately, in two vessels, 8 ounces 71 grains of the above solution, each of which portions, according to the preceding experiment, ought to contain 2 ounces of nitrous acid and 2 ounces of quicksilver. On the other side I prepared 6 drachms 36 grains of chalk, and 4 drachms 36 grains of lime; these proportions having been found by former experiments just necessary to saturate two ounces of nitrous acid. I put the chalk in the one vessel, and the lime in the other.

An effervescence attended the precipitation by chalk, but without heat; the mercury precipitated in a light yellow powder, at the same time the chalk was dissolved in the nitrous acid. The precipitation by the lime was effected without effervescence, but with heat; the mercury was precipitated in a brownish powder. When the precipitates were well sublimed, Metallic Substances I decanted off the liquors from them, and carefully dried them. After which, I caused them to be dried in a heat nearly equal to that in which mercury boils.

"The precipitate by the chalk weighed 2 ounces 2 drachms 45 grains; that by the lime weighed 2 ounces 1 drachm 45 grains."

"Sixteen ounces of the nitrous acid, the same as employed in the former experiments, were placed in a matras, and some iron filings gradually added. The effervescence was brisk, attended with great heat, red vapours, and a very rapid discharge of elastic fluid: the quantity of iron necessary to attain the point of saturation was 2 ounces 4 drachms; after which, the loss of weight was found to be 4 drachms 19 grains. As the solution was turbid, I added as much distilled water as made the whole weight of the solution to be exactly 6 pounds."

"I took two portions, each weighing 12 ounces of the above solution, and containing 2 ounces of nitrous acid, and 2 drachms 36 grains of iron filings. I placed them in two separate vessels. To one were added 6 drachms 36 grains of chalk; and to the other 4 drachms 36 grains of slaked lime, being the quantities necessary to saturate the acid."

"The precipitation was effected by the chalk with effervescence and tumefaction, that by the lime without either effervescence or heat. Each precipitate was a yellow brown rust of iron. They were washed in several parcels of distilled water, and then dried in an heat somewhat superior to that used in the last experiment."

"The precipitate by the chalk, when dried, was a greyish rust of iron, inclining even to white by veins. It weighed 6 drachms 35 grains. That by the lime was rather yellower, and weighed 4 drachms 69 grains."

"The result of these experiments (says M. Lavoisier) are, 1. That iron and mercury dissolved in aquafortis the nitrous acid acquire a remarkable increase of weight, whether they be precipitated by chalk or by lime. 2. That this increase is greater in respect to iron than mercury. 3. That one reason for thinking that the elastic fluid contributes to this augmentation is, that it is constantly greater when an earth is employed saturated with elastic fluid, such as chalk, than when an earth is used which has been deprived of it, as lime. 4. That it is probable that the increase of weight which is experienced in the precipitation of lime, although not so great as that by chalk, proceeds in part from a portion of the elastic fluid which remains united to the lime, and which could not be separated by the calcination."

But though we are naturally enough inclined to think that the increase of weight in the precipitates founded by lime proceeds from some quantity of elastic fluid or fixed air which remained combined with the lime, it is by far too great to be accounted for in this way, even according to the experiments mentioned by M. Lavoisier himself, and which, from the manner in which they are told, appear to have been performed with the greatest accuracy. He found, that 1 ounce 3 drachms and 36 grains of flaked lime contained 3 drachms and 3 quarters of a grain of water,
and only 16 grains and an half of elatic fluid were separable from it. In the experiments above related, where only 4 drachms and 36 grains were employed, the quantity of elastic fluid could not exceed 6 or 8 grains. Yet the salt was increased in mercury by no less than 103 grains, and in iron by 203 grains; a quantity quite unaccountable from the elastic fluid or fixed air which we can suppose to be contained in the liquid made use of. It is much more probable, that the increased weight of metallic precipitates, formed by lime, arises from an adhesion of part of the acid.

Metals are found to be compounded of a kind of earth mixed with the inflammable principle or phlogiston; and by a dissipation of the latter, all metallic bodies, gold, silver, and platina excepted, are capable of being reduced to a caulk, but very different degrees of heat are required for calcining them. Lead and tin begin to calcine as soon as they are melted, long before they are made red-hot. The same happens to the semifmetals bismuth and zinc; the latter indeed being combustible, cannot bear a greater heat in open vefiils than that which is barely sufficient to melt it. Iron and copper require a red heat to calcine them; though the former may be made partly to calcine by being frequently wetted in a degree of heat considerably below that which is sufficient to make it red.

When metals undergo a kind of spontaneous calcination in the open air, which is called their rusting; and which has given occasion to various conjectures. But M. Lavoisier has shown, that this arises from the fixable part of the atmosphere attaching itself to their earthy part, and discharging the phlogiston. According to him, no metallic body can rust but where there is an absorption of air; and consequently metals can be but imperfectly rusted when kept under a receiver.

If two metals are mixed together, the compound generally turns out more fusible than either of them was before the mixture. There are indeed great differences in the degrees of heat requisite to melt them. Thus, lead and tin melt below that degree of heat which is required to make quicksilver or linseed-oil boil. Silver requires a full red heat, gold a low white heat, copper a full white, and iron an extreme white heat, to make it melt. The semifmetals called bismuth melts at about 460° of Fahrenheit’s thermometer, and tin at about 422°. When mixed in equal quantities, the compound melted at 283°.

When the tin was double the bismuth, it required 334° to melt it; with eight times more tin than bismuth, it did not melt under 392°. If to this compound lead is added, which by itself melts in about 450°, the fusibility is surprizingly incrased. Mr Homberg proposed for an anatomical injection a compound of lead, tin, and bismuth, in equal parts; which he tells us keeps in fusion with a heat so moderate that it will not tinge paper. Sir Isaac Newton contrived a mixture of the abovementioned metallic substances, in such proportions that it melted and kept fluid in a heat still smaller, not much exceeding that of boiling water. A compound of two parts of lead, three parts of tin, and five of bismuth, did but just effluent at that very heat, and so would have melted with very little more; and when the lead, tin, and bismuth, were to one another in the proportions of 1, 4, and 5, the compound melted in 246°. We have seen, however, a piece of metal compounded of these three, the proportions unknown, which melted, and even underwent a flight degree of calcination, in boiling water, and barely fifteen minutes in a degree of heat so gentle that the hand could almost bear it.

A slight degree of calcination seems to give the substances a greater power over metallic substances; a greater makes them less fusible; and if long and violently calcined, they are not acted upon by acids at all. Of all the acids, the marine has the greatest attraction for metallic cedres, and volatilizes almost every one of them.

 Sulphur readily unites with most metals, destroys their malleability, and even entirely dissolves them. On gold and platina, however, it has no effect, till united with a fixed alkaline salt, when it forms the compound called halper fulphurate, which is a very powerful solvent, and will make even gold and platina themselves fusible in water, so as to pass the filter. This preparation is thought to be the means by which Mofes dissolved and gave the Israelsites to drink the golden calf which they had idolatrously set up.

When a metal is dissolved in an acid, it may be precipitated, not only by means of calcareous earth and alkalies, but also by some other metals; for acids do not attract all metals with equal strength; and it is remarkable, that when a metal is precipitated by another, the precipitate is not found in a calcined state, but in a metallic one. The reason of this is, that the precipitating metal attracts the phlogiston which is expelled from that which is dissolving, and immediately unites with it, so as to appear in its proper form. The various degrees of attraction which acids have for the different metals, is not as yet fully determined. The best authenticated are mentioned in the Table of Affinities or elective attractions (Sec. IX.)

Metalline substances are divided into metals and semifmetals. The metals which are distinguished from the semifmetals by their malleability or fusibility, are in number seven; metals.

Great fusibility of compounds of tin and bismuth.

One fusible by the heat of boiling water.

Properties of arsine.

Sulphur readily unites with most metals, destroys their malleability, and even entirely dissolves them. On gold and platina, however, it has no effect, till united with a fixed alkaline salt, when it forms the compound called halper fulphurate, which is a very powerful solvent, and will make even gold and platina themselves fusible in water, so as to pass the filter. This preparation is thought to be the means by which Mofes dissolved and gave the Israelsites to drink the golden calf which they had idolatrously set up.

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<th>Chemical Character or Symbol</th>
<th>Chemical</th>
<th>Base</th>
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<tr>
<td>△ Fire</td>
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<td>Regulus of Arsenic</td>
<td></td>
</tr>
<tr>
<td>△ Water</td>
<td>Cobalt</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>△ Earth</td>
<td>Nickel</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Fixable Air</td>
<td>Sulphate</td>
<td>Potash</td>
<td></td>
</tr>
<tr>
<td>Mephitic Air</td>
<td>Vitriol</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Calcareous Earth</td>
<td>Sea Salt</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Calcined</td>
<td>Salpeter</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Quicklime</td>
<td>Borax</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Vitrifiable or Siliceous Earth</td>
<td>Aquafortis</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Vitriifiable or Siliceous Earth</td>
<td>Aqua Regia</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Phosphoric Acid</td>
<td>Spirit of Wine</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Wine</td>
<td>Ether</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Lime Water</td>
<td>Oil</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>Fixed Oil</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Sulphur</td>
<td>Oil</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Superfusible Sulphur</td>
<td>Phlogiston</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Phlogiston</td>
<td>Soap</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Verdigris</td>
<td>Oil</td>
<td>(-)</td>
<td></td>
</tr>
<tr>
<td>Glaß</td>
<td>Crude Mercurium</td>
<td>(-)</td>
<td></td>
</tr>
</tbody>
</table>

**Plate cxxxii**

- A Powder
- E. After
- B. A Bath
- B.M., B. Water bath
- A. B. Sand bath
- V. B. Vapor bath
- A. D. An Hour
- A. Night
- M. A. Month
- L. A. Adulcam
- D. Distill
- To Sublime
- To Precipitate
- A. Retort
- XX. An Alumbic
- Crucible
- Copper
- Silver
- Lead
- Mercury
- Iron
- Zinc
- Antimony
- Bismuth
- Mild Vol. Alkali
- Caustic Vol. Alkali
- M. Vol. Alkali
- Volatile Alkali
- Fixed Alkali
- M. Fixed Alkali
- Antimony
- Red Alkali
- Black Alkali
- 1 Dram
- An Ounce
- Thil A Pound
but in theories of language.

Chemical Theory.

The general chemical properties of these have been already taken notice of under the name of inflammable substances. They agree in giving out a very thick fume, when diffused by a strong fire; but in other respects they differ very considerably. Most kinds of vegetables give out an acid along with the oil; but all animal substances (ants, and perhaps some other insects, excepted) yield only a volatile alkali. Some kinds of vegetables, indeed, as mustard, afford a volatile alkali on distillation, similar to that from animal substances; but instances of this kind are very rare, as well as of animals affording an acid. Both animal and vegetable substances are susceptible of a kind of fermentation, called putrefaction, by which a volatile alkali is produced in great plenty: there is, however, this remarkable difference between them, that many vegetable substances undergo two kinds of fermentation before they arrive at the putrefactive stage. The first is called the evil, when the vegetable acid called vinegar is produced in plenty: and by this putrefactive stage succeeds when a volatile alkali is only produced; not the finest volatile vegetable spirit or of vinegar remaining. On the other hand, animal substances seem susceptible of only the putrefactive fermentation; no instance having ever occurred where there was the least drop, either of ardent spirit or of vinegar, produced from a purified animal substance. (See fermentation and putrefaction.)

Sect. IX. Of the Chemical Characters, and Tables of Elective Attraction.

The numerous marks or characters by which the ancient chemists used to denote many different substances of marks were invented rather from a superstitious and fantastical principle than from any real necessity: or, perhaps, from the etymological language used by the alchemists, they have thereby sought to conceal their mysteries from the vulgar. In contriving these marks, they affected a great deal of ingenuity; intending them as symbols of the qualities possessed by each of the different substances. A circle being figuring was therefore used to represent the perfect metal in nature, that is, gold. Silver being likewise a perfect and indestructible metal, is placed next to gold; but, on account of its inferiority, is expressed only by a crescent, as if but half gold. A circle was likewise used to denote salt of any kind, as being something elaborate and perfect. A crose was used to denote acrimony of any kind, and consequently employed for the acrimonious fumes of vitriol, alkali, &c. Hence all the inferior metals have the crose both before or after combined with the marks designed to represent them. Thus, the mark for quicksilver denotes, that it hath the splendor of silver, the weight of gold, but its perfection is hindered by an acrimony represented by the crose at bottom, &c. Fire is represented by an equilateral triangle, having one of its angles uppermost. This may be considered as a rude representation of flame, which is always pointed at top. Water, again, is represented by a triangle, with an angle downwards, showing the way in which that element exerts its strength, &c. All these marks, however, as they were of no real use at first, so they are now becoming every day more and more neglected. Such of them, however, as may most readily occur in chemical books are represented and explained on Plate CXXXII.

The French chemists have of late attempted to introduce a kind of new chemical language; and by adopting it themselves, may perhaps make it at last universal, etc.
**CHEMISTRY.**

### 1. Vitriolic Acid

<table>
<thead>
<tr>
<th>Phlogiston</th>
<th>Terra ponderosa</th>
<th>Fixed alkali</th>
<th>Calcareous earth</th>
<th>Zinc</th>
<th>Iron</th>
<th>Copper</th>
<th>Quicksilver</th>
<th>Silver</th>
<th>Volatile alkali</th>
<th>Magnesia</th>
<th>Earth of alum.</th>
</tr>
</thead>
</table>

### 2. Nitrous Acid

<table>
<thead>
<tr>
<th>Phlogiston</th>
<th>Fixed alkali</th>
<th>Calcareous earth</th>
<th>Zinc</th>
<th>Iron</th>
<th>Lead</th>
<th>Tin</th>
<th>Copper</th>
<th>Quicksilver</th>
<th>Silver</th>
<th>Volatile alkali</th>
</tr>
</thead>
</table>

### 3. Marine Acid

<table>
<thead>
<tr>
<th>Fixed alkali</th>
<th>Calcareous earth</th>
<th>Zinc</th>
<th>Iron</th>
<th>Lead</th>
<th>Tin</th>
<th>Copper</th>
<th>Regulus of antimony</th>
<th>Quicksilver</th>
<th>Silver</th>
<th>Spirit of wine</th>
<th>Volatile oils</th>
<th>Gold</th>
</tr>
</thead>
</table>

### 4. Sulphur

<table>
<thead>
<tr>
<th>Fixed alkali</th>
<th>Calcareous earth</th>
<th>Iron</th>
<th>Nickel</th>
</tr>
</thead>
</table>

### 5. Hepar Sulphuris

<table>
<thead>
<tr>
<th>Partially decomposed by</th>
<th>Quicksilver</th>
<th>Solution of fixed alkali</th>
<th>Lime-water</th>
<th>Volatile alkali.</th>
</tr>
</thead>
</table>

### 6. Fixed Air

<table>
<thead>
<tr>
<th>Calcareous earth</th>
<th>Fixed alkali</th>
<th>Magnesia</th>
<th>Volatile alkali.</th>
</tr>
</thead>
</table>

### 7. Alkaline Salts

<table>
<thead>
<tr>
<th>Vitriolic acid</th>
<th>Nitrous acid</th>
<th>Marine acid</th>
<th>Acetous acid</th>
</tr>
</thead>
</table>

### 8. Calcareous Earth

<table>
<thead>
<tr>
<th>Vitriolic acid</th>
<th>Nitrous acid</th>
<th>Marine acid</th>
<th>Acid of tartar</th>
<th>Acetous acid</th>
<th>Sulphureous acid and volatile salt</th>
<th>Sulphur.</th>
</tr>
</thead>
</table>

### 9. Metallic Substances

<table>
<thead>
<tr>
<th>Lead and Regulus of Antimony excepted.</th>
<th>Marine acid.</th>
</tr>
</thead>
</table>

### 10. Lead

<table>
<thead>
<tr>
<th>Vitriolic acid</th>
<th>Nitrous acid</th>
<th>Sulphur and acetous acid.</th>
</tr>
</thead>
</table>

### 11. Regulus of Antimony

<table>
<thead>
<tr>
<th>Vitriolic acid</th>
<th>Nitrous acid</th>
<th>Marine acid</th>
<th>Acetous acid.</th>
</tr>
</thead>
</table>

### 12. Arsenic

<table>
<thead>
<tr>
<th>Zinc</th>
<th>Copper</th>
<th>Lead</th>
<th>Silver</th>
<th>Gold.</th>
</tr>
</thead>
</table>

### 13. Regulus of Antimony

<table>
<thead>
<tr>
<th>Volatile alkali</th>
<th>Marine acid</th>
<th>Silver</th>
<th>Nitrous, marine, or acetous acids.</th>
</tr>
</thead>
</table>

### Theory

**Mony with Metals. Elective Attraction.**

<table>
<thead>
<tr>
<th>Iron</th>
<th>Copper</th>
<th>Tiff</th>
<th>Lead</th>
<th>Silver</th>
<th>Gold.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Quicksilver</th>
<th>Zinc, bismuth, and regulus of antimony.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Silver</th>
<th>Lead</th>
<th>Copper</th>
<th>Iron.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Water.</th>
<th>Oils and resin.</th>
</tr>
</thead>
</table>

---

In consequence of heat, sedative salt and the other fixed acids decompose vitriolated tartar, nitre, and sea-fish. Double Elective Attractions; which, in some cases, may be considered as exceptions to the foregoing table.

### I. Those which happen in mixtures of watery substances.

<table>
<thead>
<tr>
<th>Acids</th>
<th>Volatile alkali</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Mercury, silver, or lead.</th>
<th>Nitrous or acetous acids.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Vitriol acid</th>
<th>Alkalies, earths, or M. S.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Silver</th>
<th>Marine acid</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Vitriolic, nitrous, or acetous acids</th>
<th>Volatile alkali</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Acids</th>
<th>Fixed air</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Fixed air</th>
<th>Volatile alkali, magnesia, or earth of alum.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Vitriolic acid.</th>
<th>Fixed alkali, or absorbent earths.</th>
</tr>
</thead>
</table>

---
CHEMISTRY.

Reg. of antimon.  
Marine acid.  

Reg. of sulphur.  
Quicksilver.

III. Those which happen in mixtures by fusion.

1. Tin   Iron
2. Silver  Lead.
3. Copper  Sulphur
5. M. S.  Sulphur

The first of these tables requires very little explanation. The names printed in small capitals, are those of the substances which have the affinity with or attract those below them. Thus, vitriolic acid attracts most powerfully the phlogion, or inflammable principle; next, fixed alkali; then, calcareous earth; and so on, in the order in which they are marked. — The tables of double elective attractions cannot be made quite so distinct; though an explanation of one example will make this likewise easy to be understood. Thus in Table I. the first case is, if a combination of acids with calcareous earths or metallic substan­ces is mixed with a combination of volatile alkali and fixed air, the acids will unite themselves to the volatile alkali, and the fixed air to the calcareous earth or metallic substance.

Sect. X. Of the different operations in practical chemilory, and the proper instruments for performing each.

The most remarkable operations in chemistry, and by which the greatest changes are made upon those bodies which are the objects of that science, may be comprehended under the following names. 1. Solution. 2. Filtration. 3. Precipitation, or coagulation. 4. Evaporation. 5. Crystallization. 6. Distillation. 7. Sublimation. 8. Defagration. 9. Calcination. 10. Fusion. 11. Maceration, or digestion. To which we may add, 12. Trituration, or levigation.

Before we proceed to a particular account of each of these operations, it is necessary to take notice, that there are two different things proposed by those who enter on the practice of chemistry. Some have nothing farther in view than the enlargement of their knowledge, or making improvements in arts which are to be practised by others for their own advantage. Others design to follow chemistry as a trade, by which they hope to enrich themselves, or to get a comfortable livelihood. But the apparatus and utensils necessary for performing the very same operations are exceedingly different when experiments only are to be made, from what they must be when these operations are performed with a view to profit; and so great is this difference, that those who pursue chemistry with a view to advantage, will always find themselves very considerable losters if they follow the plan of an apparatus or a laboratory delineated only for making experiments. Along with the apparatus, therefore, which is commonly described in chemical books, and proper only for experiments, we shall also give that which is necessary for preparing great quantities of any chemical article in the way of trade.

In general, those who practice chemistry merely with an experimental view, ought, as much as possible, to make use of glass vessels, as not being liable to be corroded by the most powerful solvents; and, by their transparency, giving an opportunity of observing what passes within them during the operation. But by those who practice chemistry with a different view, these vessels ought, with equal care, to be avoided, on account of their expense and brittleness. This last quality, indeed, is posseied by glasses in the greatest degree, that glass vessels will sometimes fly to pieces, and that with considerable violence, when standing by themselves, and nothing touching them. The principle objects which a chemist ought to have in view, in performing his operations, ought to be to save time and fuel, especially the former; and for this purpose, he would find himself a considerable gain, though he should be at much greater expense in his apparatus than he would otherwise have occasion for.

On the subject of chemical vessels Dr Black observes, that with regard to the material of which these are composed, we are very much at a loss; and indeed there are no such materials in nature as are capable of answering the purposes of chemists in absolute perfection. — The qualities are, 1. Translu­cency, to allow us to see the changes going on; 2. The power of retarding the action of acids and corrosive substances; 3. That they bear sudden alterations of heat and cold without breaking; 4. That they be strong, in order to confine elastic vapours; and, 5. That they bear very great heat without melting. As these qualities, however, are not to be met with united in any one substance, the chemists are obliged to have recourse to different substances which possess some of them differently. These are, glass, metal, and earthen ware.

Glass is posseied of the two first properties, but has the inconvenience of being apt to crack and fly in pieces, on any sudden transition from heat to cold, or from cold to heat. The best method of remedying this defect, is to have the glasses made very thin, and of a round figure, that it may be all heated as equally as possible; and it is the unequal application of the heat which causes it break. Another requisite in the choice of chemical glasses, is that they be well annealed. If this is not done, the glasses will either immediately fly to pieces, or be liable to break on the smallest accident. That such glasses should be liable to be broken on every occasion, is a phenomenon that has hitherto received no explanation. If you touch them with a diamond, with a piece of flint, glasses, &c. or expose them to the heat of the sun, they break immedi­ately. Dr Black has had great vessels of glass, which broke immediately on his throwing a little sand into them to clean them. This manifestly depends upon the same principles as the qualities of what are called glass tears.

Glass when well annealed is universally to be pre­ferred, where great and sudden changes of heat, or much strength, are not required. Flint-glasses is the best; but the coarser kinds, as bottle-glasses, are very apt to break.

The metals have the third and fourth qualities in perfection, but are deficient in all the rest. The most troublesome properties of those are, that they are liable to be corroded by acids and other bodies as in a cafe with iron and copper; though this is in some measure...
measure remedied by tinning, which, though it wants some of the qualities from its melting too soon, yet refists the action of many acid substances without being so readily injured by them; but it is not entirely free from this imperfection, and is liable to some what corroded and rusted. In nice operations, therefore, recourse is had to silver, and even to gold vessels.

Earthen ware possesses only the fifth quality in perfection, viz. that of bearing a violent heat without fusion. The basis of these vessels is clay, which, when good, is very convenient for the formation of vessels, and it has been used from the earliest ages of chemistry for this purpose. The requisite qualities are: 1. A considerable degree of toughness when mixed with water. 2. A great degree of hardness when burnt in the fire with a violent degree of heat. The best kind of clay thus conveys a degree of hardeness scarcely inferior to flint, as is the case with that of which tobacco-pipes are made; but most other kinds, as that of which bricks are constructed, are apt to melt with a strong heat into a fpongy matter. Clay, however, can seldom be used alone; for when burnt to extreme hardnees, the vessels are very liable to crack. This is remedied by mixing sand reduced to a particular degree of fineness, with the clay of which the vessels are made. For this purpose both the finest and the coarsest particles of the sand must be thrown away.

Another substance known by the name of black lead, joined in the making of pencils, refists the fire exceedingly. This, however, does not contain an ore of lead, but sulphur, and some mineral substances; when mixed with clay, however, it makes it refist the fire surprizingly. But there are some particular vessels in which neither sand nor black lead can be used as a material; for the sand is easily corroded by acid matters, and the black lead would produce other inconveniences. Clay is therefore to be taken in its unburnt state, reducing it to a powder before hand; then burning this powder with a violent heat, so as to convert it into sand. Mixing it then with raw clay, it forms a composition which answers very well for making chemical vessels, and may be employed in those particular cases where sand would not answer. Pot of Berlin has written upon the different kinds of earthen ware proper to be employed in the construction of chemical vessels. There is a French translation of it in four or five volumes. In cases where the utmost compactness of texture is required, porcelain vessels are to be chosen; which is composed of the finest clay, mixed with a fomy matter, that has the quality of melting in a violent heat, and gives more compactness to the clay than it is naturally capable of receiving; but these are rather too costly for most operations. Reaumur has taught a way of converting glass into porcelain.

We shall now proceed to a particular description of each of the operations abovementioned.

1. Solution. By this is understood the dissolving a solid substance in a fluid, so as that the fluid shall totally disappear, and become part of a transparent liquor. This operation applies particularly to salts, earths, and metals; as well as to several noxious and inflammable substances. For performing this operation in a small way, common vials are in many cases sufficient. Where the solution is attended with effervescence and a discharge of vapours, the long-necked glass called Flaschetrit, or bolt-heads, (fig. 5.), are necessary. Florence flasks are indeed exceedingly well adapted for this operation, as being of the proper shape, and capable of bearing heat so well, that they may be filled with any fluid, and set on a common fire like a metal vessel. Solution is much promoted by agitating the vessel, and by heat. In some cases, indeed, it will not take place till the mixture becomes very hot; and in such cases it will be proper to make the fluid boiling hot by itself, and then slowly to add the substance to be dissolved.

When large quantities of saline matter are to be dissolved, metallic vessels must be used; but before any are made use of for this purpose, it will be necessary to make an experiment whether the salt receives any impregnation from the metal of which the vessel intended to be made use of is formed; and if this is found to be the case, it must not be used. The metals most liable to be corroded by saline bodies are iron and copper; and indeed, unless it be for the single purpose of dissolving fixed alkaline salts, iron vessels seem totally unfit for saline solutions of any kind. Copper vessels are also very liable to be corroded, and to communicate very mischievous qualities to the liquors which corrode them; for which reason, they ought never to be made use of for the purposes of solution. The metal least liable to be corroded, next to gold and silver, is lead; and therefore a chemist ought rather to provide himself with leaden vessels than those of any other metal. But though lead is not apt to be corroded by many kinds of salts, there are some which are found to act upon it, and to form therewith a very dangerous poison. The vegetable acid of vinegar is particularly apt to receive a dangerous impregnation from this metal; and therefore no solution of any salt containing this acid ought to be made in leaden vessels. It appears to be very little affected by the vitriolic or marine acids; and therefore any saline substance containing either of these acids may be safely enough dissolved in vessels made of lead.

In order to save time in making solutions, the vessels ought to be as large as possible; though even in this there must be a certain limit: for two small vessels filled with water will sooner acquire the necessary degree of heat than one large one; and in proportion as the vessel is made more capacious, the sides and bottom must be thicker, which considerably increases the expense. Fifteen or twenty English gallons is the utmost capacity of which they ever will be required; and it is rather above what will on most occasions be necessary. They ought to be of a conical figure round at the bottom; and to have a cover of thick plate-iron all around that part which is exposed to the action of the fire, that the lead may not bend on the application of heat, which it would otherwise be very apt to do. When the solution is to be made, the leaden vessel is first to be filled up with water so far as to have room for the quantity of salt intended to be dissolved; a fire is then to be applied so as to make it boil: and then the salt is to be added slowly, so as scarcely to hinder the boiling; for if a great quantity was thrown in at once, so as to cool the liquor very much, great part of the salt would concretie on the bottom, in such
<table>
<thead>
<tr>
<th>Chemical Characters</th>
<th>Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid of Fluor</td>
<td>&amp;</td>
</tr>
<tr>
<td>Azote</td>
<td>G</td>
</tr>
<tr>
<td>Borax</td>
<td>P</td>
</tr>
<tr>
<td>Sugar</td>
<td>D</td>
</tr>
<tr>
<td>Tarter</td>
<td>E</td>
</tr>
<tr>
<td>Sorrel</td>
<td>I</td>
</tr>
<tr>
<td>Lemon</td>
<td>L</td>
</tr>
<tr>
<td>Benzoine</td>
<td>B</td>
</tr>
<tr>
<td>Amber</td>
<td>C</td>
</tr>
<tr>
<td>Sugar of Milk</td>
<td>F</td>
</tr>
<tr>
<td>Vinegar</td>
<td>K</td>
</tr>
<tr>
<td>Milk</td>
<td>H</td>
</tr>
<tr>
<td>Ants</td>
<td>Q</td>
</tr>
<tr>
<td>Put</td>
<td>O</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>R</td>
</tr>
<tr>
<td>Aerial</td>
<td>D</td>
</tr>
<tr>
<td>Fixed vegetable</td>
<td>G</td>
</tr>
<tr>
<td>Prussian Blue</td>
<td>H</td>
</tr>
<tr>
<td>Coloured matter</td>
<td>I</td>
</tr>
<tr>
<td>Acid</td>
<td>J</td>
</tr>
<tr>
<td>Phlogisticated vitri-</td>
<td>K</td>
</tr>
<tr>
<td>olie Acid and the same with</td>
<td></td>
</tr>
<tr>
<td>Vol. Sulphurous Acid.</td>
<td>L</td>
</tr>
<tr>
<td>Platina</td>
<td>M</td>
</tr>
<tr>
<td>Manganese</td>
<td>N</td>
</tr>
<tr>
<td>Metallic calx</td>
<td>O</td>
</tr>
</tbody>
</table>
CHEMISTRY.

Theory.

Dr Black observes, that for the purpose of solution, if no particular nor uncommon consequence follow the application of the two bodies to each other, and if none of them be very volatile, any glass or porcelain vessel that can reseat the action of the substances will answer the purpose; but it often happens that they break out into violent ebullition, which produces steam; and here a common vessel is not so proper, as we would wish to have the vapour confined or condensed. We therefore choose a close vessel that will bear the heat suddenly produced by the mixture, or the heat that may be necessary to promote the action of such bodies upon one another. Of this kind is the phiala chemica, or matras, in which the vapours will have time to circulate and to be condensed again, without being allowed to escape. Where the matter is in small quantity, smaller vessels somewhat of the same form are used, as Florentine flasks, which bear sudden changes of heat and cold remarkably well, on account of their thinness. In order to promote the action of bodies, it is sometimes necessary to make the fluids boil; and for this purpose we must have a matras with a large neck, or apply another vessel to it that will receive these streams, and give them still more room for their condensation, and direct them to fall back again, when condensed, into the matras. This is called circulation. Macquer describes another vessel called the pelican, which has been made ufe of for this purpose; but it is hardly ever employed, on account of its being too troublesome to procure and manage it; and the advantages arising from it may be obtained by a more simple apparatus.

To this head we must refer Papin’s digester, which is represented Fig. 4. It is generally made of copper, very thick and strong, open at the top, with a lid fitted to it, which applies very exactly. There are usually two projections on the sides, designed to make the lid go in a particular manner, but they are unnecessary. There are other two, to which are fitted the two sides of a crofs bar B B; in which crofs bar there is a strong screw D, by which the lid can be pressed down very strongly. Its ufe is to force water to bear a stronger heat than it can do under the ordinary pressure of the atmosphere. It is sometimes furnished with an apparatus for letting out the beam, left it should be in danger of bursting the vessel. A pipe is passed through the lid which is fitted with a valve, on which paffes a lever at a very small distance from its centre of motion; and this can be made to apace on the valve with different weights, according to the distance of these weights from the centre. In one constructed by Dr Black, there was another pipe below, into which a thermometer could be introduced, in order to measure the degree of heat to which the beam was raised. This machine was pretty much employed some time ago, and its effects were much admired; but we find that most things which can be dissolved in this way, can likewise be dissolved in the ordinary way by boiling water, provided it is continued for a longer time, as animal bones, from which the gelatinous parts are indeed extracted very quickly by this vessel; but the same change is produced by boiling them in water for a long time in the ordinary degree of heat.

II. Filtration. This operation is generally the attendan upon of filtration: very few substances, of the saline kind especially, are capable of being dissolved without leaving some impurities, from which they must be freed; and the doing of this, so as to render the solution perfectly transparent, is what is understood by the word filtration. For purposes merely experimental, a glass funnel and piece of paper are generally sufficient. The paper is formed into a conical cap, which being placed in the funnel with its point downwards, the funnel is then placed in the mouth of a vial; and the solution or other liquor to be filtered is poured into the paper cap, through which the liquor passes transparent, leaving its impurities on the paper. For the purpose of filtration, paper has come into such general use, that a particular kind of it is prepared under the name of filtering paper. This is of a reddish colour; but Dr Lewis prefers the whitish grey paper which comes from Holland about the pill boxes, as not giving any colour to the solutions which pass through it.

This operation though apparently so simple and easy, is nevertheless attended with very troublesome circumstances, on account of the great time it takes up. Even where very small quantities of liquor are to be filtered, merely

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merely for experiment's sake, the impurities frequently settle on the paper so soon, and obstruct its pores to such a degree, that the operator is often quite wearied out: often, too, the paper breaks; and thus the whole is spoiled, and the operation must be begun over again.

To avoid these inconveniences, another method of filtration has been proposed; namely, to use a number of cotton threads, the ends of which are to be immersed in the liquor, and the other ends are to hang over the side of the vessel which contains it, and to hang lower than the surface of the liquor. By this means they will act as so many capillary syphons, (see SYPHON;) the liquor will arise in them quite pure, and be discharged from their lower extremities into a vessel placed to receive it. That the liquor may flow freely into the cotton, it will be proper to wet the threads before they are used.

In point of efficacy, no doubt, this method excels every other; and where the operator has abundance of time and patience, may be proper for experiments; but, in the way of trade, such a contrivance is evidently useless. For filtering large quantities of liquor, therefore, recourse has been had to large funnels; earthen cullenders, or basins full of holes in the bottom, lined with filtering paper; and to conical bags of flannel or canvas.

The inconveniences attending funnels, when used only in the way of experiment, are much greater when they are employed for filtering large quantities of liquor; and therefore they are generally laid aside. The earthen cullenders, too, do not answer any good purpose; nor indeed does filtration through paper in general succeed well. The conical flannel or canvas bags are greatly preferable; but they have this inconvenience, that the pressure of the liquor is directed chiefly against one particular point, or a small part of the bottom, and therefore the impurities are forcibly driven into that place; and thus the operation becomes insufferable tedious.

The best method of obviating the inconveniences of filtration seems to be the following. Let a wooden frame of about three feet square be made, having four holes, one in each corner, about three quarters of an inch in diameter. This frame is to be supported by four feet, the ends of which must project an inch or two through the holes. Thus the whole may be opened up and taken down so as to go into very little compass; for if the feet are properly placed, each with a little projection onwards, there will be no danger of its falling. A square piece of canvas must also be procured, somewhat less than the wooden frame. On each corner of it there must be a very strong loop, which slips on one of the projecting ends of the feet, so that the canvas may hang a little slack in the middle of the frame. The liquor to be filtered is now poured into the canvas, and a vessel placed underneath to receive it. At first it will pass through very foul; but being returned two or three times will become perfectly transparent, and will continue to run with great velocity, if the filter is kept constantly full. A filter of the size just now mentioned will contain ten gallons of liquid; which is a very great advantage, as the heat of such a quantity of liquor is not soon dissipated, and every solution filters much faster when hot than when allowed to cool.

The advantages of a filter of this kind above others Chemical arite from the pressure of the liquor being more equally diffused over a large space, by which the impurities are not forced so strongly into the cloth as to flop it up entirely. Yet even here, where large quantities of liquor require filtration, the cloth is apt to be stopped up so as to make the operation not a little tedious and disagreeable. It will be proper therefore to have several cloths, that one may be applied as soon as another is taken off.

To promote the operation of filtration, it is very proper to let the liquors to be filtrated settle for some time; for their greater fecultencies may fall to the bottom, and thus there will be the fewer to retard the last part of the operation. Sometimes, however, these fecultencies refuse to settle till after a very long time; and where this happens to be the case, a little powdered quicklime thrown into the boiling liquor remarkably promotes the separation. This, however, can only be used in certain cases.

In some cafes, the difficulty of a ready way of filtering a large quantity of liquor would be a matter of great inconvenience; as where a town is supplied with large quantities of river water, which is generally far from being clear, and often imparts a disagreeable colour to clothes washed with it. Some years ago, a scheme was proposed by a chemist for filtering muddy water in any quantity. His method was, to have a large cask covered over in the bottom with straw to the depth of four inches, and then filled up with sand. This cask was entirely open at one end, and had a hole in the other, which, by means of a leaden pipe, communicated with a large reservoir of the water to be filtered, and which flowed considerably higher than the cask. The water which descended through the pipe into the cask, having a tendency to rise up to the same level with that in the reservoir, would press violently against the sand, and, as he thought, run over the mouth of the cask perfectly filtrated, and free from its impurities. By this contrivance, indeed, a very violent pressure was occasioned, if the height of the reservoir was considerable: but the consequence was, not a filtration, but a greater degree of impurity in the water; for the sand was forced out of the cask along with it, and, however confined, the water always arose as muddy as it went in.

Where water is to be filtered in large quantity, as for the purposes of a family, a particular kind of soft spongy flint called filtering flakes, are employed. These, however, though the water percolates through them very fine, and in sufficient quantity at first, are liable to be obstructed in the same manner as paper, and are then rendered useless. A better method seems to be, to have a wooden vessel, lined with lead, three or four feet wide at top, but tapering so as to end in a small orifice at the bottom. The under part of the vessel is to be filled with very rough sand, or gravel, well freed from earth by washing. Over this, pretty fine sand may be laid to the depth of 12 or 14 inches, but which must likewise be well freed from earthy particles. The vessel may then be filled up to the top with water, pouring it gently at first, left the sand therefore be much displaced. It will soon filter thro' the sand, and run out at the lower orifice exceedingly transparent, and likewise in very considerable quantity. When the upper part of the sand begins to be stopped up, so as not to allow...
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A free passage to the water, it may occasionally be taken off, and the earthy matter washed from it, when it will be equally serviceable as before.

III. Precipitation of Coagulation. This operation is the very reverse of solution, and is the bringing a body suddenly from a fluid to a solid state. It differs from crystallization, in that it generally requires less time; and in crystallization the substance assumes regular figures, whereas precipitates are always in the form of powders.

Precipitation is generally preceded by solution and filtration: it is used for separating earths and metals from the acids which had kept them suspended. When a precipitation is made of the more valuable metals, can be known with certainty by measuring that portion of the precipitate which is very requisite for precipitation evaporated in a small quantity, wooden ones answer every purpose. (See the detached articles Solution and Distillation.) With regard to vessels for evaporation, the same thing must be applicable which was mentioned above under Solution. No saline liquor must be evaporated in a vessel which would be corroded by it; and hence iron vessels are absolutely improper for evaporations of any kind of saline liquor whatever.—Lead is in this case the metal most generally useful. It must only be used, however, where the evaporation is not carried to dryness; for, on account of the great fusibility of this metal, nothing could be extricated in it without great danger of its melting. Where a saline liquor therefore is to be perfectly exsiccated, the evaporation, if performed in lead vessels, must be carried on so far only as to form a saline pellicle on the surface of the liquor. It is then to be drawn off; for which purpose, all evaporating vessels should have a cock near the bottom. The liquor must now be put into a number of stone ware basons, set on warm sand, where the exsiccation may be finished.

V. Crystallization. This, though commonly Crystallization accounted one of the processes in chemistry, is in reality only a natural one, and which the chemist can only prepare for, leaving the operation entirely in the hands of nature.—By crystallization is meant the separation of a salt from the water in which it has been dissolved, in transparent masses regularly figured, and differently formed, according to the different nature of the salts.

This process depends upon the constitution of the atmosphere more than any other; and therefore is difficult to be performed, nor does it always succeed equally well; neither have there yet been laid down any rules whereby beautiful and regular crystals can with certainty be formed at all times.

As the different salts assume very different figures when crystallized, they are not subject to the same general rules in crystallization. Nitre, Glaeber's salt, vitriol of iron, and many others, crystallize best on having their solutions set in a cold place after proper evaporation. Sal polychreph, and common salt, require the solution to be kept as hot as the hand can bear it during the time of crystallizing. Soluble tartar too, and other deliquescent salts, require to be kept warm while this operation is going on: and there are many saline substances, such as the combinations of calcareous earths and magnesia with acids, which can scarcely be crystallized at all.

Mr Beaumé has discovered, that when two or more

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falts are distilled in the same quantity of water, when one crystallizes, the crystals of that salt will not contain the least quantity of any of the others; neither, although the liquor was acid or alkaline, will the crystals for that reason be either acid or alkaline, but will remain perfectly neutral; and the acid or alkaline liquor which adheres to the outside of the crystals may be removed and obtained by filtering paper.---Hence we are furnished with a better method of distilling salts into large and well formed crystals than merely by distilling them in water; namely, by adding to the solutions, when fet to crystallize, a certain quantity of acid or alkaline liquor, according to the nature of the salts themselves. These additions, however, are not equally proper for all salts; and it is not yet determined what kinds of salts ought to be crystallized in alkaline, and what in acid liquors.---Soluble tartar and Seignette's salt crystallize best when the liquor is alkaline. Sal sedativus, sal Glaberi, and sal polychrest, require an acid if crystallized in the cold, but sal polychrest forms in very fine and large crystals when the solution is alkaline, and kept as hot as the hand can easily bear.

The best general direction that can be given with regard to the regular crystallization of salts is, that they ought to be set to crystallize in as large a quantity at once as possible; and this, as far as we have observed, without any limit; for by this means, the crystals are formed much larger and better figured than they possibly can be by any other method hitherto known.

As to the form of the vessels in which the crystals are to be crystallized, little can be said with certainty. They are generally flat and wider at the bottom. The only proper material, in the large way, is lead.

Distillation. This is a kind of evaporation; only in such a manner, that the part of the liquor evaporated is not distilled in the air, but preferred by making the steam pass through a spiral pipe, which goes through a large vessel full of cold water, or into cold glass receivers.

This is one of the most common chemical operations; and as there are a variety of subjects which require to be distilled, there is consequently a considerable variety both in the form of the distilling vessels to be used on different occasions, and likewise in the materials of which they are made, as well as the management of the fire during the time of the operation.

The most simple and easily performed distillation is that by the common copper still, (fig. 3). It consists of two parts: one called the body, and the other the head. The body is a cylindrical vessel of copper, which is sometimes tinned over in the inside; but where distillation is performed without any regard to the residuum, the tinning is useless. The upper part of the body terminates in a kind of arch, in the middle of which is a circular aperture, about one half, or something less, in diameter, of the breadth of the whole body.---Into this aperture, a round head, made likewise of copper, is fitted, so as to be removable at pleasure. In the top, or sometimes in the side of the head, is inserted a pewter pipe, which communicates with a spiral one of the same metal, that passes through a large wooden vessel, called the refrigeratory, filled with cold water; each of its ends projecting a little above and below. The still is to be filled two-thirds full of the substance to be distilled, the head put on, and the junctures well closed with mixture of Chemical limited meal and water, or common flour or chalk and water will answer the same purpose. This mixture is called the luting, or sete. A fire being kindled under the still, the vapours will arise; and, being condensed by the cold water, through which the spiral pipe called the worm passes, will run in a stream more or less strong as the fire is properly urged, and is caught in a receiver set underneath.

This kind of distilling vessels is proper for procuring the essential oils of vegetables, vinous spirits from fermented liquor, and for the rectification of these after they are once distilled. Even the acetic acid may be very conveniently distilled in a copper vessel, provided the vessel and all the descending parts of the pipe which communicates with it be of pewter, otherwise a mischievous impregnation of copper would be communicated to the distilled vinegar. The reason of this is, that copper is not dissolved by vinegar, or in very small quantity, when that acid is boiled in it; but if the metal is exposed to the action of the acid, when cold, or to its vapour, a considerable dissolution takes place. For this reason, too, the still must be washed out after the operation while it continues hot, and must be very carefully freed from the least remains of acid, otherwise it will be much corroded.

Copper-stills ought to be as large a size as possible: but Dr Lewis very justly observes, that, in common ones, the width of the worm is by no means proportional to the capacity of the still: hence the vapour which issues from a large surface being violently forced through a small tube, meets with so much resistance as sometimes to blow off the still-head. This inconvenience is ridiculously endeavour'd to be prevented by strongly tying or otherwise forcing down the head; by which means, if the worm should happen to be choked up, a terrible explosion would ensue: for no ligatures, or any other obstacle whatever, have yet been found strong enough to resist the elastic force of steam, and the greater obstacle it has to overcome, the greater will the explosion be.

Dangers of this kind might be totally avoided by having the worm of a proper degree of wideness.

Sometimes, however, matters are to be distilled, Mineral such as mineral acid spirits, which would corrode any kind of metalline vessels; and for those only earths, or the closed kind of stone-ware, can be used. These are more easily condened than the stems of aqueous or vinous liquors, and therefore do not require to be passed through a pipe of such a length as is used for condensing the stems from the common still. In these cases, where a violent heat is not necessary, and the distillation is to be performed in glass vessels, the retort is used. (fig. 4.) When a fluid is to be put into this vessel, the retort must be laid upon its back on sand, or any other soft matter that will support it without breaking. A funnel must also be procured with a long stem, and a little crooked at the extremity, that the liquor may pass at once into the belly of the retort, without touching any part of its neck; otherwise, the quantity which adhered to the neck would pass into the receiver when the vessel was placed in a proper situation for distilling, and foul the produce. When the vessel is properly filled, which ought never to be above two-thirds, it is to be set in a sand-bath: that is, in an iron pot, of a proper thick-
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Of one or two inches, with dry sand. When the retort is put in, so as to stand on its bottom, the pot is to be filled up with sand, as far as the neck of the retort. A glass receiver is then applied, which ought to be as large as possible, and is called a coccus, for which reason it will be proper not to let the capacity of it be above what is necessary to hold ten gallons. In the hinder part of it should be drilled a small hole, which may be occasionally shut by a small wooden peg. The mouth of the receiver ought to be so wide as to let the nofe of the retort enter to the middle of it, or very near to it; for if the vapours are discharged very near the luting, they will act upon it much more strongly than when at a distance. It is likewise proper to have the neck of the retort as wide as may be; for this has a great very effect in the condensation, by presenting a larger surface to the condensing vapour.

The luting for acid spirits ought to be very different from that used in other distillations; for these will generate the common lutes thus to make them liquid and fall down into the receiver. Some have used retorts the necks of which were ground to the receive.

The proportions recommended by the Doctor for luting the joints of vessels, are four parts of sand and one of clay; but for lining the inside of furnaces, and we should think, likewise for coating glass vessels, he directs 6 or 7 of sand to 1 of clay, that the contraction of the clay in drying may thereby be the more effectually prevented. Besides this, he directs a mixture of three parts of charcoal-dust with one of clay to be put next the furnace itself, as being more apt to confine the heat; but probably the first composition might be sufficient for glases.

The coating of large glases must be a very troublesome and tedious operation; and therefore coated glases is never used but in experiments. When large distillations are to be performed in the way of trade, recourse must be had either to iron pots, or to earthen ware. Of the most proper kinds of earthen ware for refilling violents heat, we shall take notice under the article Fusion.

In all distillations by the retort, a considerable quantity of air, or other incomendable vapour, is extracted; and to this it is absolutely necessary to give vent, or the vessel would be burst, or the receiver thrown off. For this purpose, Dr. Lewis recommends an open pipe to be inflected at the luting, of such an height as will not allow any of the vapour to escape; but this we cannot approve of, as by that means a constant communication is formed between the external atmosphere and the materials contained in the retort and receiver, which is at all times to be avoided as much as possible, and in some cases, as the distillation of phosphorus, would be very dangerous. Having a small
IX. Calculation. This is the subjecting any matter to a heat so violent as to disperse some part of it, without melting what remains. It is often practised on metallic substances, particularly lead, for obtaining the calc of that metal called minimum, or red lead.

This operation, as indeed all other chemical ones, is best performed in large quantities, where a particular furnace is constructed on purpose, and a fire kept on day and night without interruption. The flame is made to play over the surface of the metal, and it is continually stirred so as to expose different parcels of it to the action of the heat.

X. Fusion. This is when a solid body is exposed to such a degree of heat as makes it pass from a solid to a fluid state; and as different substances are exposed to very different degrees of fusibility, the degrees of melting heat are very various.

Besides the true fusion, there are some kinds of fairs which retain so large a proportion of water in their crystals, as to become entirely fluid upon being exposed to a very small degree of heat. This is commonly called the water fusio; but is really a fusion: of the falt in that quantity of water retained by it in its crystalline form; for such fairs afterwards become solid by the evaporation of the water they contained: and then require a strong red heat to melt them thoroughly, or perhaps are absolutely infusible.

Of all known substances, unctuous and inflammable ones become fluid with the least heat: then come the more fusible metals, lead, tin, and antimony; then some of the more fusible fairs; and then the harder metals, silver, gold, copper, and iron; then the mixtures for making glafs; and last of all, the metal called platina, which has hitherto been incapable of fusion, except by the violent action of the sun-beams in the focus of a large burning glafs. This substance seems to be the most refractory of all others, even the hardest flints melting into glafs long before it. (See Platina.)

Fusion of small quantities of matter is usually performed in pots called crucibles; which, as they are required to stand a very violent heat, must be made of the most refractory materials possible.

The making of crucibles belongs properly to the Crucibles, potter; but as a chemist ought to be the judge of their proper materials for composition, we shall here give some account of the different attempts to make their vessels of the necessary strength.

All earthen vessels are composed, at least partly, of that kind which is called the argillaceous earth or clay, because thefe only have the necessary ductility, and can be formed into vessels of the proper form. Pure clay is, by itself, absolutely infusible; but is exceedingly apt to crack when exposed to sudden changes of heat and cold. It is also very apt to melt when mixed with other substances, such as calcareous earths, &c.

When mixed in a certain proportion with other materials, they are changed with violent heat into a kind of half-melted substance, such as our flint-bottles. They cannot be melted completely, however, by almost any fire; they are also very compact, and will contain the most fusible substances, even glafs of lead itself; but as they are very apt to crack from sudden changes of heat and cold, they are not so much used; yet, on particular occasions, they are the only ones which can be made use of.

The more dense any kind of vessels are, the more apt they are, in general, to break by a sudden application of heat or cold: hence crucibles are not in general, made of the greatest density possible: which is not at all times required. Those made at Heide, in Germany, have had the best reputation for a long time. Mr Pott, member of the Academy of Sciences at Berlin, hath determined the composition of these crucibles to be, one part of good refractory clay, mixed with two parts of sand, of a middling fineness, from which the finest part has been sifted. By fitting the finer particles from the sand, too great compactness is avoided.
but at the same time this mixture renders them apt to be corroded by vitrifying matters kept a long time in fusion; for these do not fail to act upon the sand contained in the composition of the crucible, and, forming a vitreous mass, at last run through it.

This inconvenience is prevented, by mixing, instead of sand, a good baked clay in gross powder. Of a composition of this kind are made the glafs-house pots, which sometimes sustain the violent heat employed in making glaſs for several months. They are, however, gradually consumed by the glaſs, and become constantly more and more thin.

As the containing vessel, however, must always be exposed to a more violent heat than what is contained in it, crucibles ought to be formed of such materials as are not vitrifiable by the heat of any furnace whatever. But from the attempts made to melt platina, it appears, that all known substances it would be the most defirable for a melting vessel. Heſſian crucibles, glaſs-house pots, Sturbridge clay, in short every substance which could be thought of to refiſt the most violent heats, were melted in such a manner as even to stop up the pipes of large bellows, while platina was not altered in the least; and Meffrs Macquer and Beame have shown, that though platina cannot be melted fo as to caſt crucibles, glaſs-houſe pots, and one part of fusible spar. Theſe crucibles muſt however, be exposed too suddenly to a violent heat. 6. Crucibles capable of containing glaſs of lead very well, were made of 24 parts of unburnt clay, four parts of burnt clay, and one part of chalk. These require to be armed. 7. Plume alum powdered, and mixed with whites of eggs and water, being applied to the internal furface of a Heſſian crucible, enabled it to retain for a long time glaſs of lead in fusion. 8. One part of clay, and two parts of Spaninl chalk, made very good crucibles. The ſubſtance called Spa niſh chalk is not a calcareous earth, but appears to be a kind of ſteatites. 9. Two parts of Spaninl chalk, and one part of powdered tobacco-pipes, made good lining for common crucibles. 10. Eight parts of Spaninl chalk, as much burnt clay, and one part of litharge, made folid crucibles. 11. Crucibles made of black lead are fitter than Heſſian crucibles for melting metals; but they are fo porous, that fuscd faſts pafs entirely thro' them. They are more tenacious than Heſſian crucibles, and are not fo apt to burst in pieces, and are more durable. 12. Crucibles placed with their bottoms upwards, are leſs apt to be cracked during the baking, than when placed differently. 13. The patte of which crucibles are made, ought not to be too moil; else, when dried and baked, they will not be fuficiently compact; hence they ought not to be made too moil as to be capable of being turned on a poſter's lathe; but they must be formed in brass or wooden moulds.

On this ſubjeft Dr Lewis hath alſo made feverai obſervations; the principal of which are, 1. Pure clay obſerves a due confiftence for being worked, onl only coheres together, but sticks to the hands. In drying, it contracts 1 inch or more in 12; and hence it is very apt to crack, unleſs it is dried exceeding flowly. In burning, it is ſubjeft to the fame inconvenience, unleſs very fowly and gradually heated. When thoroughly burnt, if it has escaped thoſe imperfections, it proves folid and compact; and fo hard as to strike fire with ſteel. Vessels made of it are not penetrated by any kind of liquid; and refist fæts and glaſses brought into the thinneſt folution, excepting thoſe which by degrees corrode and difolve the earth itſelf, as glaſs of lead; and even this penetrating glaſs is reflifted by it better than by almôt any other earth; but, in counterbalance to theſe good qualities, they cannot be heated or cooled, but withſuch precautions as can rarely
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2. Clay that has been once exposed to any considerable degrees of heat, and then powdered, has no longer any tenacity. Fresh clay, divided by a due proportion of this powder, proves less tenacious than by itself; not flocking to the hands, though cohering sufficiently together. It shrinks less in drying, is less apt to crack, and less susceptible of injury from alteration of heat and cold: but at the same time is less solid and compact. Considerable differences are observed in these respects; not only according to the quantity of dividing matter, but according as it is in finer or coarser powder.

3. Vessels made with a moderate proportion of fine powder, as half the weight of the clay, are compact and solid, but still very apt to crack, from sudden heat or cold: those with a larger proportion, as twice or thrice the quantity of the clay, are free from that imperfection, but so friable as to crumble between the fingers. Nor does there appear to be any medium between a disposition to crack and to crumble; all the compounds made of clay and fine powders having the one or the other imperfection. Coarser powders of the size of middling sand, form with an equal weight of clay, compounds sufficiently solid, and much less apt to crack than the mixtures with fine powders. Two parts of coarse powder, and one of clay, prove moderately solid, and but little disposed to crack: a mixture of three parts and one, tho' heated and cooled suddenly, does not crack at all, but suffers very fluid substances to transude through it; solidity, and resistance to quick vicissitudes of heat and cold, seeming here also to be incompatible.

4. Pure clay, mixed with pure clay that has been burnt, is no other than one simple earth; and is neither to be melted nor softened, nor made in any degree transparent with the most intense fires.

5. Mixtures of clay with gypseous earths burn whiter than clay alone; in certain proportions, as two parts of clay to three of gypseum, they become, in a moderate fire, semi-transparent, and in a strong one they melt.

6. Calcareous earths in small proportion bake tolerably compact and white; and added to other compositions, seem to improve their compactness. If the quantity of the calcareous earth nearly equals that of the clay, the mixture melts into a yellow glass; if it considerably exceeds, the product acquires the qualities of quicklime.

7. Vessels made from clay and sand, in whatever proportion, do not melt in the strongest fire: but they sometimes bend or bend, so as to yield to the tongs. Glasses in thin fusion penetrate them by dissolving the sand. If gypseous or calcareous earths urged in such crucibles with a vehement heat, the vessels and their contents run all into one mass. In moderate fires, these vessels prove tolerably compact, and retain most kinds of fusions in f buttock are liable to crack, especially when large; and do not long retain melted metals, being burst by their weight. Such are the Helenian crucibles.

8. Mixtures of clay and black-lead, which seems a species of tlect, are not liable to crack from alternations of heat and cold; but are extremely porous. Hence lead-crude crucibles answer excellently for the melting of metals, and stand repeated fusions: whilst Chemical salts flowing thin, transude through them almost as operations of water through a sieve: sulphurous bodies, as antimony, corrode them.

9. Pure clay, softened with water, and incrustated on earthen vessels, that have been burnt, does, not adhere to them, or scales off again upon exposure to the fire: applied to unburnt vessels, it adheres and incorporates. Divided clay unites with them in both states. Chemical matters, melted in vessels of pure clay, adhere so firmly as not to be separated from vessels of divided clay they may be knocked off by a hammer.

10. The saline fluxes which promote the fusion of clay, besides the common ones of all earths, alkali and borax, are chiefly arsine fixed by nitre, and the fusible salt of urine; both which have little effect on the other earths though mixed in a larger proportion. Nitre, which readily builds the crystalline earths into fusion, and sal mirabile and sandiver, powerful fluxes for the calcareous earths, do not perfectly vitrify with clay. Burnt clay does not differ in their respects from such as has not been burnt; nor in that singular property of vitrifying with gypseous or calcareous earths, with or without any saline or metallic addition; the utmost vehemence of fire seeming to destroy only its fluidity, or that power by which it coheres when its parts are moistened with water.

But though it seems impossible to make perfect vessels from mixtures of clay in its two different states, of burnt and unburnt, more is to be hoped from the mixtures which are employed in making porcelain. Many manufacturers of this kind of ware have been attempted, and vessels in different countries, (see Porcelain) and in some to be hoped for, places the qualities requisite for chemical vessels have been given to it in a very surprising degree. The count de Lauraguais, a French nobleman, and member of the academy of sciences, has distinguished himself in a very eminent manner by attempts of this kind. The translator of the chemical dictionary assures us, that he had it from a gentleman of undoubted veracity, that this nobleman having heated a piece of his porcelain red hot, threw it into cold water, without breaking or cracking it. The most useful attempt, however, for the purposes of chemistry, seems to be the discovery by Mr Reaumur of converting common green glasses into porcelain. Mr Reaumur. This was published as long ago as the year 1739; yet we have scarce heard of any chemist, no not claim, Dr Lewis himself, who has made trial of chemical vessels formed of this sort of porcelain, although the very use to which Mr Reaumur thought the preparation could be applicable was that of bringing chemical vessels to a degree of perfection which could not otherwise be done. The following is the result of Mr Reaumur’s experiments.

Green glasses, surrounded with white earthy matters, as white sand, gypseum, or plaster of Paris, &c. and exposed to a considerable heat not strong enough to alter its figure, as that of a potter’s furnace, acquires different shades of blue, and by degrees begins to grow white. On breaking the glass, the white coat appears to be composed of fine, white, glozy, satiny-like fibres, running transversely, and parallel to one another; the glass in the middle being fearfully altered. On continuing the combustion, the change proceeds further and further, till at length the white fibrous parts...
parts from both sides meet in the middle, and no appearance of glass remains. By this means, entire vessels of glass may be changed into porcelain.

The substance into which glass is thus converted, is opaque, compact, internally of great whiteness, equal to that of the finest china-ware; but, externally, of a much duller hue. It is considerably harder than glass, much less fusible in the fire, and sustains alterations of heat and cold without injury. Vessels of it, cold, bear boiling liquors; and may be placed on the fire at once, without danger of their cracking. "I have put a vessel of this porcelain (says the author) into a forge, surronded it with coals, and kept vehemently blowing for near a quarter of an hour; I have melted glass in this vessel, without its having suffered any injury in its figure." If means could be found of giving the outside a whiteness, equal to the internal part, glass vessels might thus be converted into a valuable kind of porcelain superior to all that have hitherto been made. Chemistry, says he, may receive from this discovery, in its present state, such vessels as have been long wanted; vessels which, with the compactness and impenetrability of glass, are also free from its inconveniences.

The common green glasses bottles yield a porcelain of tolerable beauty; window-glasses, and drinking-glasses, a much inferior one; while the finer kinds of crystaline glasses afforded none at all. With regard to the cementing materials, he found white sand and gypsum, or rather a mixture of both, to answer best. Coloured earths generally make the external surface of a deeper or lighter brown colour; foot, and charcoal, of a deep black, the internal part being always white.

The account of this kind of porcelain given by Mr. Reaumur, induced Dr. Lewis, who had also observed the same changes on the bottom of glass-retorts exposed to violent heat in a sand-bath, to make further experiments on this matter; an account of which he has published in his *Philosophical Transactions of Arts*. The results of his experiments were, 1. Green glasses, cemented with white sand, received no change in a heat below ignition. 2. In a low red heat, the change proceeded exceedingly slowly; and in a strong red heat, approaching to white, the thickest pieces of glass bottles were thoroughly converted in the space of three hours. 3. By continued heat, the glasses suffered the following progressive changes: first, its surface became blue; its transparency was diminished, and a yellowish hue was observable when it was held between the eye and the light. Afterwards it was changed a little way on both sides into a white substance, externally still bluish; and, as this change advanced still further and further within the glass, the colour of the vitreous part in the middle approached nearer to yellow: the white coat was of a fine fibrous texture, and the fibres were disposed nearly parallel to one another, and transverse to the thickens of the piece: by degrees the glasses became white and fibrous throughout, the external bluishness at the same time going off, and being succeeded by a dull white or dun colour. By a still longer continuance in the fire, the fibres were changed gradually from the external to the internal part, and converted into grains; and the texture was then not unlike that of common porcelain. The grains, at first fine and somewhat glossy, became by degrees, larger and duller; and at last the substance of the glass became porous and friable, like a mass of white sand.

Concerning the qualities of this kind of porcelain, Dr. Lewis observes, that, while it remained in the fibrous state, it was harder than common glass, and more able to resist the changes of heat and cold than glass, or even porcelain; but, in a moderate white heat, was fusible into a substance not fitous, but vitreous and smooth, like white enamel, that when its texture had become coarsely granulated, it was now much softer and fusible: and lastly, that when some coarsely granulated un fusible pieces, which, with the continuance of a moderate heat, would have become porous and friable, were suddenly exposed to an intense fire, they were rendered remarkably more compact than before; the solidity of some of them being superior to that of any other ware.

It seems surprizing that this able chemist, who on other occasions had the improvements of the arts so well studied, did not put some vessels of this kind of porcelain to other severe trials, besides attempting to fuse it by itself with a violent fire; for though pieces of it were absolutely fusible, we are not sure but they might have been corrupted by alkaline salts, acids, calcareous earths, or glass of lead: nay, it should seem very probable that they would have been so: in which case they would not be much superior to the vessels made from earthy materials. When a first-rate chemist publishes anything in an imperfect state, inferior ones are discouraged from attempting to finish what he has begun; and thus, notwithstanding that these experiments have been so long published, nobody has yet attempted to investigate the properties of this kind of porcelain, by getting chemical vessels made of it, and trying how they answer for crucibles, or retorts.

All that has been said concerning the proper materials for crucibles, must likewise be applicable to the materials for retorts, which are required to stand a very violent heat. Mr. Reaumur's porcelain bids fair for answering the purpose of retorts as well as crucibles. The great disadvantage of the common, earthen ones, is, that they suffer a quantity of volatile and penetrating vapours to pass through them. This is very observable in the distillation of phosphorus; and though this substance has not hitherto been used for any purpose in medicine, and very little in the arts, it is of value, being sometimes used as a flux, if vessels could be made capable of confining all the steam and at the same time bearing the heat necessary for its distillation, phosphorus, perhaps, might be obtained in such quantity, as to show that it is a preparation not altogether useless.

With regard to stone-ware vessels, and all those into which the composition of sand or flint enters, we shall only further observe, that they will be corrupted by fixed alkaline salts, especially of the caustic kind, in a very moderate heat. Dr. Black, having evaporated some caustic ley in a stone-ware bason, and then melted the dry salt in the same vessel, found it to corrode, as afterwards to be full of small holes; and he found nothing to reftist the action of this salt so well as silver. On Wedgewood's stone-ware vessels, we have now, however, to add the improved earthen ware of Mr. Wedgewood, in which the properties of compacts, inexpedibility, and the power of resisting sudden changes of heat and cold, are said to be united, so that it promises to be a very valuable addition to the chemical apparatus.
11. Maceration, or Digestion. This is the mixing two bodies, generally a solid and a fluid, together, and then expelling them to a moderate degree of heat for a considerable length of time, that they may have the better opportunity of acting upon one another. Digestion is usually performed in the glases already mentioned, called mortarese or bolt-heads; and is done in a sand-heat. When any of the substances are very volatile, as spirit of wine; or when the matter requires to be heat so considerably that a quantity of vapour will be raised, the necks of the bolt-heads ought to be pretty long; or a tin pipe may be inferred, of sufficient length to prevent the escape of any part of the steam.

12. Levigation. This is the reducing any body to a very fine powder, which shall feel quite soft between the fingers or when put into the mouth. It is performed by grinding the substance upon a flat marble stone, with some water, or by rubbing it in a marble mortar. In the large way, levigation is performed by mills drawn by horses, or driven by water; in this operation, when the matters are reduced to the finest degree, they wear off a part of the mortar, or marble stone, with some water, or by rubbing a smooth stone, called a levigator, by a funnel, which is fixed into a hole in the upper part of the mill, and turns along with it. The under millstone has round it a wooden ledge, whereby the levigating matter is confined for some time, and at length discharged, by an opening made for that purpose, when it has accumulated in a certain quantity.

In this operation, when the matters to be levigated are very hard, they wear off a part of the mortar, or stone on which they are levigated; so that a substance perfectly hard, and which could not be worn by any attrition, is as great a delideratum for the purposes of levigation, as one which could not be melted is for those of fusion. Dr. Lewis proposes the porcelain of Mr. Reamur as an improvement for levigating planes, mortars, &c. because, while in its fibrous state, it is considerably harder than glasts, and consequently much less liable to abrasion by the harder powders.

In many cases levigation is very much accelerated by what is called attrition. This is the method by which many of the painters' colours are prepared of the requisite fineness, and is performed by mixing any substance not totally reduced to the necessary degree of fineness, with a sufficient quantity of water, and stirring them together. The finer parts of the powder remain some time suspended in the water, while the groser particles fall to the bottom. The separation is then easily made, by pouring off the water impregnated with these fine parts, and committing the rest to the levigating mill, when it may again be washed; and this may be repeated till all the powder is reduced to the utmost fineness. Substances soluble in water cannot be levigated in this manner.

Of Chemical Furnaces.

The two general divisions we have already mentioned of those who practice chemistry, namely, those who have no other view than mere experiment, and those who wish to profit by it, render very different kinds of furnaces necessary. For the first, those furnaces are necessary which are capable of acting upon a small quantity of matter, yet sufficient for all the changes which fire can produce from simple digestion to the most perfect vitrification. For the others, those are to be chosen which can produce the same changes upon very large quantities of matter, that as much may be done at once as possible.

To avoid the trouble and expense of a number of portable furnaces, a portable one hath long been a desideratum among those chemists who are fond of making experiments. One of the best of these, if not the very best, that has yet appeared, is that described in Shaw's edition of Boerhaave's chemistry, and represented fig. 1. Plate CXXXIV. This furnace is made of earth; and, as the workmanship of a furnace requires none of the neatness or elegance which is required in making potters' vessels, any person may easily make a furnace of this kind for himself, who has time and patience for doing it. With regard to the most proper materials, all that we have said concerning crucibles and retorts must be applicable to the materials for constructing a furnace; only here we need not care so much for the porosity, or disposition to crumble, as when crucibles or other diluting vessels are to be made.

Plate iron is commonly directed for the outside of portable furnaces; but we cannot help thinking this is a very needless expense, seeing the coating which it necessarily requires on the inside may be supposed to harden to such a degree as soon to support itself, without any assistance from the plate-iron. This will be the less necessary, if we consider, that, for the thickness of the walls of any furnace where a considerable heat is wanted, two or three inches are by no means sufficient. When the inside of a furnace is heated, the walls, if very thin, are soon penetrated by the heat, and great part of it by this means dissipated in the air. If they are of a sufficient thickness, the heat cannot penetrate so easily; and thus the inner part of the furnace preserves the heat of the fuel, and communicates it to the contained vessel. In the construction of a portable furnace, therefore, it will be convenient to have all parts of it six inches thick at least. This will also give it a sufficient degree of strength; and, as it is formed of several different pieces, no inconvenience can follow from the weight of each of them taken separately.

In Boerhaave's chemistry, this furnace is represented as narrower at the bottom than at the top; but we cannot suppose any good reason for such a form, seeing a cylindrical one must answer every purpose much better, as allowing a larger quantity of air to pass through the fuel, and likewise not being so apt to be overturned as it necessarily must be when the upper part is considerably heavier than the lower. We have, therefore, given a representation of it as of a cylindrical form.

The furnace consists of five or more parts. C, represents the dome, or top of the furnace, with a short earthen funnel E for transmitting the smoke. B, B, B, are moveable cylinders of earth, each provided with a door D, D, D. In Boerhaave's chemistry these doors are represented as having iron hinges and latches; but they may be formed to more advantage, by fastening pieces of earth, having two holes in the middle, by which they may be occasionally taken out, by introducing an iron fork. In like manner, the domes and cylinders,
Chemical cylinders, in Boyle's chemistry, are represented with iron handles; but they may be almost as easily taken off by the cheaper contrivance of having four holes in each, two directly opposite one another, into which two short forks may be introduced when the parts are to be separated.

In the lowermost cylinder is to be placed an iron grate, a little below the door, for supporting the fire. In the under part is a small hole, big enough for introducing the pipe of a pair of good perpetual bellows when the fire is to be violently excited. Dr Lewis prefers the organ-bellows to any other kind.

When the bellows is used, the whole must stand upon a close cylinder A, that the air may be confined, and made to pass through the fuel. By having more bellows, the fire may be excited to a most intense degree. In this case, the pipe of every one of them must enter the cylinder B.

Each of the cylinders should have, in its upper part, a round hole, opposite to its door, for carrying off the smoke, by means of a pipe inserted into it, when the furnace is used for distillation by the sand-bath. Each cylinder ought likewise to have a semicircular cut in the opposite sides, both above and below, that when the under cut of the upper cylinder is brought directly above the upper cut of the lower one, a perfect circle may be formed. These are for giving a passage to the necks of retorts, when distillation by the retort is to be performed. The holes may be occasionally filled with stopples made of the same materials with the body of the furnace.

The most convenient situation for a furnace of this kind would be under a chimney, the vent of which might be easily flopped up by a broad plate of iron, in which a hole ought to be cut for the reception of the earthen tube of the dome. By this means the use of a long tube, which at any rate must be very troublesome, might be easily avoided, and a very strong blast of air would pass through the fuel. If it is found convenient to place the furnace at some distance from the chimney, a plate-iron pipe must be procured to fit the earthen pipe of the dome, and carry the smoke into the chimney. This pipe will also be of use, when the furnace is used for distillation by the sand-bath; it must then be inserted into the hole opposite to the door of any of the cylinders, and will convey away the smoke, while the mouth of the cylinder is totally covered with a sand-pot.

For portable furnaces, Dr Lewis greatly recommends the large black crucibles, marked n° 60, on account of their resisting a violent heat, and being very easily cut by a knife or saw, so that doors, &c. may be formed in them at pleasure. The bottom of one of these large ones being cut out, a grate is to be put into the narrow part of it. For grates, the doctor recommends cast iron-rings, having each three knobs around them. These knobs go into corresponding cavities of the outer rings, and the knobs of the outermost rest on the crucible, which is to be indented a little to receive them, that so the grate may rest the more firmly, and the furnace not be endangered from the swelling of the iron by heat. When this is to be made use of as a melting-furnace, and a violent heat to be excited, another crucible must be inverted on that which contains the fuel, which serves instead of the dome of the last mentioned furnace; and chemical matters must give very considerable weight to any thing he advances; and the warmth with which he recommends the furnaces must convince us, that he has found them abundantly answer the purposes of experiments. We cannot help thinking, however, that where a very great and lasting heat is to be given, the thicknefs, and even the form, of these crucibles, is some objection to their use. It is certain that such a permanent, or, as the workmen call it, a fixed heat, can never be given where the walls of a furnace are thin, as when they are of sufficient thicknefs. They are also very apt to burst with great heat; and, for this reason, Dr Lewis desires his furnace to be strengthened with copper hoops. This disposition to burst proceeds from the inner parts which are more intensely heated than the outer, expanding more than these do, and consequently bursting them. Hence the doctor desires his furnace to be strengthened also by putting it within another crucible of a larger size, and the intermediate space to be filled up with a mixture of sifted ashes and water. For most chemical processes, where only a small degree of heat is requisite, these furnaces answer beyond any thing that has hitherto been attempted. The whole is to be supported by an iron ring with three feet.

Dr Black has contrived a furnace in which all these inconveniences are avoided. Two thick iron plates, above and below, are joined by a thinner plate, forming the body of the furnace, which is of an oval form. The upper part is perforated with two holes; the one A, pretty large, which is the mouth of the furnace, and which is of a circular form; the other behind it, B, of an oval form, and designed for fastening the end of the vent which is screwed down upon it. The undermost thick plate has only the large circular opening G near to the middle, but not altogether fo, being nearer to one side of the ellipse than the other, where the round hole in the top is placed; so that a line passing this circular hole has a little obliquity forwards. The ash-pit C E is likewise made of a nolliptical form, and a very small matter widened; so that the bottom of the furnace is received within the ellipse. A little below, there is a border D that receives the bottom of the furnace; and except the holes of the damping-plate E, the parts are all closed by means of soft lute, upon which the body of the furnace is pressed down; by means of which the joining of the two parts, and all the different pieces, are made quite tight; for the body, fire place, ash-pit, vent, and grate, are all separable from one another. As the furnace comes from the workman, the grate is made to apply to the outside of the lower part. It consists of a ring laid on its edge, and then bars likewise laid on their edges; and from the outer ring proceed four pieces of iron, by means of which it may be ferewed down; so it is kept out of the cavity of the furnace, and preferred from the extremity of the heat. Thus it lasts much longer, and indeed hardly liable to any decay; for being exposed to the cool air, it is kept so cool, that it
Chemical Furnaces.

603 How adapted to the various operations of化学, we may observe, that for a melting furnace it is very convenient; we need only provide a cover for the opening above, which is made the door; and which being immediately over the grate, is convenient for introducing the substances to be acted upon, and for allowing us to look into the vessel and take it out. This cover may be a piece of tile, or two bricks rendered flat and square. Dr Black commonly uses a kind of lid with a rim containing a quantity of close metal. To preserve the substance from the contact of the fuel, they cut off about a third part of the length of a brick, and then put it on one end on the middle of the grate. They choose their fuel of large pieces, that the air may have free passage through it, and open a little of the door, which occasions a stream of air to flow in; and this strikes upon the substance and produces the effect desired; so that it may be used in the calculation of lead to convert it into litharge. It also answers very well in operations for producing vapour.

If we desire to employ it in distillations which require an intense heat, the earthen retort is to be suspended by means of an iron ring having three branches standing up from it, and which hangs down about half a foot from the hole; so that the bottom of the retort rests upon the ring, and is immediately hung over the fuel; and the opening between the mouth of the furnace and retort is filled up with broken crucibles and pottersclay, which are covered over with ashes. This transmission of heat is very slow; so it answers well for distillations performed with the naked fire. Dr Black has sometimes cauied them to be provided with a hole in the side, from which the neck of the retort may be made to come out; and in this way has distilled the phosphorus of urine, which requires a very strong heat. For distillations with retorts performed with the sand-bath, there is an iron pot fitted for the opening of the furnace, which is set on and employed as a sand-pot. The vent of the furnace then becomes the door; and it answers very well for that purpose; and is more easily kept tight than if it were in the side, and may be kept close with a lid of charcoal and clay. In like manner it answers well for the common still, which may be adapted to it; part of it being made to enter the open part of the furnace, and hang over the fire, as in Plate CXXXIII. fig. 8. and 9. that the bottom part of that still may be made to enter; and the vent becomes the door, by which fresh fuel may be added. Indeed it is seldom necessary to add fresh fuel during any operation. In the ordinary distillations it is never necessary; and even in distilling mercury, phosphorus, &c. it generally contains enough to finish the operation; so effectively is the heat preferred from loss or dissipation, and so very slow is the consumption of the fuel.

Theory.

For luting this and other furnaces, the doctor finds nothing preferable to a simple mixture of sand and clay. The proportions for luting the violence of fire are four parts of sand to one of clay; but when designed for the lining of furnaces, he uses six or seven parts of sand to one of clay, the more effectually to prevent the contraction of the latter; for it is known from experiments, that clay, when exposed to a strong heat, contracts the more in proportion to its purity. The sand settles into the lusks when wet, and does not contract by heat, which it also resists as well as the clay itself.

Besides this outside luting next the fire, Dr Black uses another to be laid on next the iron of the furnace; and this consists of clay mixed with a large portion of charcoal dust. It is more firm for containing the heat, and is put next to the iron, to the thickness of an inch and a half. That it may be pretty dry when first put in, he takes three parts by weight of Method of charcoal dust, and one of the common clay, which applying must be mixed together when in dry powder, otherwise it is very difficult to mix them perfectly. As much water is added as will form the matter into balls; and these are beat very firm and compact by means of a hammer upon the inside of the furnace. The other lute is then spread over it to the thickness of about half an inch, and this is also beat solid by hammering; after which it is allowed to dry slowly, that all cracks and fissures may be avoided; and after the body of the furnace is thus lined, the vent is screwed on and lined in the same manner. It must then be allowed to dry for a long time; after which a fire may be kindled, and the furnace gradually heated for a day or two. The fire is then to be raised to the greatest intensity; and thus the luting acquires a hardnefs equal to that of free-stone, and is afterwards as lasting as any part of the furnace.

When furnaces are used in the large way, they are Melting always built of brick, and each particular operation has furnace. a furnace allotted for itself. The melting-furnace, where very large quantities of matter are not to be melted at once, requires only to be built of brick in such a form as we have already described; but where very large quantities of matter are to be melted, it is necessary to procure a dome of the proper figure, the forepart of which is to be left entirely open for the admission of distillation vessels. The opening may be closed up with bricks and earth during the operation. There is no necessity for having the inside of a circular form; a square one will answer the purpose equally well. According to the author of the Chemical Dictionary, when the internal diameter of a furnace is 12 or 15 inches, the diameter of the tube of the furnace is 8 or 9 inches, and its thickness 18 or 20 feet, and when the figure be well supplied with fuel, and extreme heat is produced; in less than an hour the furnace will be white, and dazzling like the sun; its heat will be equal to the strongest glass-house furnace; and in less than two hours will be melted whatever is fusible in furnaces. The hottest part is at H F, 4 or 6 inches above the grate. A plate-iron tube may be advantageously supplied by a short chimney of bricks, built under a pretty high vent, so as the whole may easily be stopped, except that passage which transmits the smoke of the furnace. By this means a very strong current of air will be made to pass through the fuel.

On this subject Dr Black informs us, that Mr Pott of the melting Pott of Berlin employs one almost similar to the above furnace de- for friable.
Theory.

Chemical for making experiments on carth are; by which he showed that many substances is reckoned infu-

Chemical Furancees.

Reasons for making the fire-place of a roundish form.

607 When belows are necessary.

In what cases the elliplole may be made use of.

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Chemical Furnaces. for making the fire-place of a roundish form.

The ellipse too may be employed for driving air into fuel. The effect of this has been considered as a proof that air acts by its elasticity in animating fuel, as an elastic fluid vapour from the ellipse produces, the Chemical fame effect. But when we contrive to send flame.

2. That the vent should be made about one-half the grate. A small portable furnace of this kind is very convenient for ordinary crucibles; the largest of which are only about four or five inches high; the widest part of the furnace may be about an inch and a half in diameter, and when made of thin plate iron, and lined within, are very convenient, and may be heated at very little expense of fuel. But for heating much larger vessels, it is proper to construct them of brick, when they have prettily the same form; only it is necessary to make them square, and round on the inside with a luting of sand and clay. The top is generally made flat, and covered over with two or three bricks; the vent goes a little backwards, and then is raised to a proper height. Where the vessel to be heated is very large, it is common to leave the front open for putting in the vessel; and then to build it up with bricks, clay, and sand; which can be easily pulled down again when the operation is over.

There are some cafes in which it is necessary to have a rapidity of inflammation even beyond what this furnace can give; and in these we have recourse to belows of various constrictions, by which the air can be compressed and made to enter the fuel with great velocity. These again are sometimes wrought by water; but there is another machine which produces a greater effect, viz. the water-blown described by Lewis in his Commercial Philosph. Technical.

The ellipse too may be employed for driving air into fuel. The effect of this has been considered as a proof that air acts by its elasticity in animating fuel,
The under part of the vent. A much better method is to build the back part of the furnace entirely close, and make the fire come out through a long narrow opening before, after which it passes out through a hole in the back and upper part of the furnace into the chimney. The convenience of this form is, that the vent must either be very wide, or it is apt to choke up with foot, which is a very troublesome circumstance. If the vent is made very wide, a prodigous draught of air rushes through the fuel, and increases the heat to such a degree as to calcine the metal of which the still is made; and, on the other hand, nothing can be more disagreeable than to have the vent of a furnace stopped up with foot. These inconveniences, however, are totally avoided by making two small vents, one on each side of the distilling vessel, which may communicate with a chimney by means of two tubes either of plate-iron or formed with clay or bricks, which may be occasionally taken off if they happen to be choked up. The vessel is to be suspended by three trunnions, so that the whole surface may be exposed to the fire, excepting a ring the thickness of a brick all round; so that a very strong heat will be communicated although the furnace draws but little. The two small vents on each side will draw the flame equally; and by this means the most equal heat can be preferred, and may be pulled so far as to make the whole bottom and sides of the vessel intense red. Such a construction as this is more especially useful for sand-pots, and those which are used for the distillation of alkaline spirits from bones.

In the use of the furnaces hitherto described, the attendance of the operator is necessary, both for inspecting the process, and for supplying and animating the fuel. There are some operations, of a slower kind, that require a gentle heat to be continued for a length of time; which demand little attendance in regard to the operations themselves, and in which, of consequence, it is extremely convenient to have the attendance in regard to the fire as much as possible dispensed with. This end has been answered by the furnace called athanor; but the use of it has been found attended with some inconveniences, and it is now generally laid aside.

Sundry attempts have been made for keeping up a continued heat, with as little trouble as in the athanor, by the flame of a lamp; but the common lamp-furnaces have not answered so well as could be wished. The lamps require frequent filling, and smoke much; and the foot accumulated on the bottom of the vessel placed over them, is apt, at times, to fall down and stop the flame. The largeness of the wick, the irregular supply of oil from the reservoir by jets, and the oil being suffered to sink considerably in the lamp, so that the upper part of the wick burns to a coal, appeared to be the principal causes of these inconveniences, which accordingly were found to be in great measure remedied by the following contrivance.

The lamp consists of a brass pipe 10 or 12 inches long, and about a quarter of an inch wide, infected at one end into the reservoir of the oil, and turned up at the other to an elbow, like the hole of a tobacco-pipe, the aperture of which is extended to the width of near two inches. On this aperture is fitted a round plate, having 5, 6, or 7 small holes, at equal distances, round its outer part, into which are inserted as many pipes of cotton, all together not exceeding what is in the common lamps form one wick: by this division of the wick, the flame exposes a larger surface to the action of the air, the fum of the fish is confirmed and carried off, and the lamp burns clear and vivid.

The reservoir is a cylindrical vessel, eight or ten inches wide, composed of three parts, with a cover on the top. The middle partition communicates, by the lateral pipe, with the wicks; and has an upright open pipe folded into its bottom, whose top reaches as high as the level of the wick; so that, when this part is charged with oil, till the oil rises up to the wicks in the other end of the lamp, any further addition of oil will run down through the upright pipe into the lower division of the reservoir. The upper division is designed for supplying oil to the middle one; and, for that purpose, is furnished with a cock in the bottom, which is turned more or less, by a key on the outside, that the oil may drop fast enough to supply the consumption, or rather faster, for the overplus is of no inconvenience, being carried off by the upright pipe; so that the oil is always, by this means, kept exactly at the same height in the lamp. For common uses, the middle division alone may be made to suffice; for, on account of its width, the sinking of the oil will not be considerable in several hours burning. In either case, however, it is expedient to renew the wicks every two or three days; oftener or seldom according as the oil is more or less foul; for its impure matter, gradually left in the wicks, occasions the flame to become more and more dull. For the more convenient renewing of them, there should be two of the perforated plates; that when one is removed, another, with wicks fitted to it, may be ready to supply its place.

One of the black-lead pots, recommended by Dr Lewis for his portable furnace, makes a proper furnace for the lamp. If one is to be fitted up on purpose for this use, it requires no other aperture than one in the bottom for admitting air, and one in the side for the introduction of the elbow of the lamp. The reservoir stands on any convenient support without the furnace. The stopper of the side aperture consists of two pieces, that it may be conveniently put in after the lamp is introduced; and has a round hole at its bottom fitting the pipe of the lamp. By these means, the furnace being set upon a trevet or open foot, the air enters only underneath, and spreads equally all around, without coming in streams, whence the flame burns steady. It is not advisable to attempt raising the heat higher than about the 150th degree of Fahrenheit's thermometer; a heat somewhat more than sufficient for keeping tin in perfect fusion. Some have proposed giving a much greater degree of heat in lamp-furnaces, by using a number of large wicks; but when the furnace is so heated the oil emits copious fumes, and its whole quantity takes fire. The balnezum or other vessel including the subject-matters, is supported over the flame by an iron ring, as already described in the sand-bath and still; a bath is here particularly necessary, as the subject would otherwise be very unequally heated, only a small part of the vessel being exposed to the flame. Since the new invention of Argand's lamps, which perfectly consume the oil, attempts have been made to construct...
The vitriolic acid is never found pure, but always united with some proportion, either of phlogiston or metallic and earthy substances. Indeed there is scarce any kind of earth which does not contain some portion of this acid, and from which it may always some way or other be separable. When pure, the vitriolic acid appears in the form of a transparent colourless liquor. By distilling in a glass retort, the aqueous part arises, and the liquor which is left becomes gradually more and more acid. This operation is generally called the rectification, or dephlegmation, of the acid. After the distillation has gone on for some time, the water adheres more strongly to what remains in the retort, and cannot be forced over without elevating part of the acid along with it. The remaining acid, being also exceedingly concentrated, begins to lose its fluidity, and puts on the appearance of a clear oil. This is the state in which it is usually sold, and then goes by the name of oil of vitriol. If the distillation is still farther continued, with a heat below 600° of Fahrenheit's thermometer, the acid gradually loses more and more of its fluidity, till at last it congeals in the cold, and becomes like ice. In this state it is called the icy oil of vitriol. Such exceedingly great concentration, however, is only practised on this acid for curiosity. If the heat be suddenly raised to 600°, the whole of the acid fuses, and generally cracks the receiver. Clear oil of vitriol is immediately turned black by an admixture of the smallest portion of inflammable matter.

The icy oil of vitriol, and even that commonly sold, attracts the moisture of the air with very great force. Newmann relates, that having exposed an ounce of this acid to the air, from September 1736 to September 1737, at the end of the twelvemonth it weighed seven ounces and two drachms; and thus had attracted from the air above fix times its own weight of moisture. This quantity, however, seems extraordinary; and it is probable, that in so long a time some water had been accidentally mixed with it; for Dr Gould, professor at Oxford, who seems to have tried this matter fully, relates, that three drachms of oil of vitriol acquired, in 57 days, an increase only of six drachms and an half. The acid was exposed in a glass of three inches diameter; the increase of weight the first day was upwards of one drachm; in the following days less and less, till, on the fifty-sixth, it scarce amounted to half a grain. The liquor, when saturated with humidity, retained or lost part of its acquired weight according as the atmosphere was in a moist or dry state; and this difference was so sensible as to afford an accurate hygrometer. Hoffman having exposed an ounce and two scruples in an open glass-dish, it gained fifteen drachms and a scruple in 14 days.

This acid, when mixed with a large quantity of productive water, makes the temperature something colder than that of cold water; but if the acid bears any considerable proportion to the water, a great heat is produced, so as to make the vessel insupportable to the hand; and therefore

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**PART II. PRACTICE.**

**Sect. I. Salts.**

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Never found pure.

The vitriolic acid is never found pure, but always united with some proportion, either of phlogiston or metallic and earthy substances. Indeed there is scarce any kind of earth which does not contain some portion of this acid, and from which it may always some way or other be separable. When pure, the vitriolic acid appears in the form of a transparent colourless liquor. By distilling in a glass retort, the aqueous part arises, and the liquor which is left becomes gradually more and more acid. This operation is generally called the rectification, or dephlegmation, of the acid. After the distillation has gone on for some time, the water adheres more strongly to what remains in the retort, and cannot be forced over without elevating part of the acid along with it. The remaining acid, being also exceedingly concentrated, begins to lose its fluidity, and puts on the appearance of a clear oil. This is the state in which it is usually sold, and then goes by the name of oil of vitriol. If the distillation is still farther continued, with a heat below 600° of Fahrenheit's thermometer, the acid gradually loses more and more of its fluidity, till at last it congeals in the cold, and becomes like ice. In this state it is called the icy oil of vitriol. Such exceedingly great concentration, however, is only practised on this acid for curiosity. If the heat be suddenly raised to 600°, the whole of the acid fuses, and generally cracks the receiver. Clear oil of vitriol is immediately turned black by an admixture of the smallest portion of inflammable matter.

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Rectification.

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This acid, when mixed with a large quantity of productive water, makes the temperature something colder than that of cold water; but if the acid bears any considerable proportion to the water, a great heat is produced, so as to make the vessel insupportable to the hand; and therefore
Vitriolic acid and its combinations.

The vitriolic acid unites itself very strongly with alkalis, both fixed and volatile, it does not fuse near so much of the latter as of the former. A pound of oil of vitriol will fuse two of the common fixed alkali, but scarce one of volatile alkali. The specific gravity of good oil of vitriol is to water as 17 to 8.

If the concentrated acid is applied slightly and superficially to the skin of a living animal, it raises a violent burning heat and pain; but a larger quantity prefied on, so as to prevent the ingress of aerial moisture, occasions little pain or erection. If diluted with a little water, it proves corrosive in either case. Largely diluted with water, this acid is employed for checking putrefaction, abating heat, and quenching thirst; in debilities of the stomatch, and heart-burn. To persons of weak and unfound lungs, to women who give suck, to hydropic or emaciated persons, it is injurious. Some recommend it as a collyrium for fo eyes; but as it coagulates the animal plasmas, and is not at all, to be made in glass vessels, but in the common stone-bottles, or leaden vessels, which are not apt to be corroded by this acid. The greatest heat is produced by equal parts of acid and water.

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The difficulty of procuring it itself.

The vitriolic acid is so much used in different arts and manufactures, that the making of it has become a trade by itself; and the procuring it in plenty, and at a cheap rate, would be a very advantageous piece of knowledge to any person who could put it in practice. This, however, is very far from being easily done; for though it exists in almost every mineral substance, the attraction betwixt this acid and the bases with which it unites, is found to be so strong, that we can only decompose such combinations by prefening another substance to the acid, to which it has a greater attraction than that one with which it is joined. Thus the first combination is indeed dissolved, but we have another from which it is equally difficult to extricate the acid by itself. Thus, if we want to difegenate the vitriolic acid from any metallic substance, suppoce iron, this may be easily done by throwing a calcareous earth into a solution of green vitriol. We have now a compound of vitriolic acid with the calcareous earth, which is known by the name of gypsum or selenites. If we want to decompose this we must apply a volatile or a fixed alkali; and the result of this will certainly be a new combination, which we are as unable to decompose, and indeed more so, than the firft. There are two general methods which have been in use for procuring the vitriolic acid in such quantity as to supply the demands of trade. The one is from pyrites, and the other from sulphur.

I. From Pyrites, with the making of Copperas, and obtaining the pure Oil of Vitriol from it.

Pyrites are found in large quantity in the coal-mines of England, where most of the copperas is made. They are very hard and heavy substances, having a kind of braffy appearance, as if they contained that metal; and hence they are called brafier by the workmen. A very large quantity of these is collected, and vitriolic acid spread out upon a bed of stiff clay to the depth of three feet. After being some time exposed to the air, the uppermost ones lose their metallic appearance, split, and fall to powder. The heaps are then turned, the under part uppermost, so as to expose fresh pyrites to the air. When they are all reduced to powder, which generally requires three years, the liquor, which is formed by the rain-water running from such a large mass, becomes very acid, and has likewise a fhyptic vitriolic taste. It is now conveyed into large cisterns lined with clay, whence it is pumped into a very large flat vessel made of lead. This vessel, which contains about 15 or 20 tons of liquor, is supported by cast-iron plates about an inch thick, between which and the lead a bed of clay is interposed. The whole rests upon narrow arches of brick, under which the fire is placed. Along with the liquor, about half a ton or more of old iron is put into the evaporating vessel. The liquor, which is very far from being saturated with acid, acts upon the iron, and, by repeated filling up as it evaporates, dissolves the whole quantity. By the time this quantity is dissolved, a pellicle is formed on the surface. The fire is then put out; and as such a prodigious quantity of liquor does not admit of filtration, it is left to settle for a whole day, and then is let off by a cock placed a little above the bottom of the evaporating vessel, so as to allow the impurities to remain behind. It is conveyed by wooden spouts to a large leaden cistern, five or six feet deep, sunk in the ground, and which is capable of containing the whole quantity of liquor. Here the copperas crystallizes on the sides, and on sticks put into the liquor. The crystallization usually takes up three weeks. The liquor is then pumped back into the evaporating vessel; more iron, and freth liquor from the pyrites, are added; and a new solution takes place.

Copperas is used, in dyeing, for procuring a black colour; and is an ingredient in making common ink. It is also used in medicine as a corroboration, under the name of salt of vitriol; but before it is used with this intention, it is redissolved in water, and crystallized with the addition of a little pure oil of vitriol. Whether it is at all mended by this suppos'd purification, either in appearance or quality, is very doubtful.

This process furnishes us with the vitriolic acid, which could not be applied to any useful purpose; afterwards with an imperfect neutral salt, called green vitriol, which is applicable to several purposes where the pure acid itself could not be used; but still the acid by itself is not to be had without a very troublesome operation.

Though this acid adheres very strongly to iron, it is capable of being expelled from it by fire; yet not of vitriolic acid without a very violent and long-continued one. If acid from copperas we attempt to distil green vitriol in a retort, it swells and boils in such a manner by the great quantity of water contained in its crystals, that the retort will almost certainly crack; and though it should not, the salt would be changed into an hard stony mass, which the fire could never sufficiently penetrate so as to extricate the acid. It must therefore be calcined previous to the distillation. This is best done in flat iron-pan's, set over a moderate fire. The salt undergoes the water
Vitriolic acid and its combinations.

**Practice.**

Vitriolic acid, (See Fusion) after which it becomes opaque and white. By a continuance of the fire, it becomes brown, yellow, and at last red. For the purposes of distillation, it may be taken out as soon as it has recovered its solidity.

The dry vitriol, being now reduced to powder, is to be put into an earthen retort, or rather long neck (a kind of retort where the neck lies laterally, that the vapours may have little way to ascend), which it may nearly fill. This retort must be placed in a furnace capable of giving a very strong heat, such as the melting furnace we have already described. A large receiver is to be fitted on; and a small fire made in the furnace to heat the vessels gradually. White fumes will soon come over into the receiver, which will make the upper part warm. The fire is to be kept at an equal degree of strength, till the fumes begin to disappear, and the receiver grows cool. It then is to be increased by degrees; and the acid will become gradually more and more difficult to be raised, till at last it requires an extreme red, or even white, heat. When nothing more will come over the fire must be suffered to go out, the receiver be unstoppered, and its contents poured into a bottle fixed with a glass stopper. A sulphurous and suffocating fume will come from the liquor, which must be carefully avoided. In the retort, a fine red powder will remain, which is used in painting, and is called coloet of vitriol. It is useful on account of its durability; and, when mixed with tar, has been employed as a preservative of wood from rotting; but Dr Lewis prefers finely powdered pit-coal. As a preservative for masts of ships, he recommends a mixture of tar and lamp-black; concerning which he relates the following anecdote.

"I have been favoured by a gentleman on board of a vessel in the East-Indies, with an account of a violent thunder-storm, by which the main-mast was greatly damaged, and whose effects on the different parts of the mast were pretty remarkable. All the parts which were greased or covered with turpentine were burnt in pieces; those above, between, and below the greased pieces, as also the yard-arms, the round-top or scaffold, coated with tar and lamp-black, remained unburnt."

Oil of vitriol, when distilled in this manner, is always of a dark colour, and must therefore be rectified by distillation in a glass retort. When the acid has attained a proper degree of strength, the blackness either flies off, or separates and falls to the bottom, and the liquor becomes clear. The distillation is then to be discontinued, and the clear part which is left in the retort is vitriol.

This was the first method by which the vitriolic acid was obtained; and from its being distilled from vitriol has ever since retained the name of oil of vitriol. Green vitriol is the only substance from which it is practicable to draw this acid by distillation; when combined with calcareous earths, or even copper (though to this last it has a weaker attraction than to iron), it refits the fire most obstinately. When distillation from vitriol was practised, large furnaces were erected for that purpose, capable of containing an hundred long necks at once; but as it has been discovered to be more easily procurable from sulphur, this method has been laid aside, and it is now needless to describe these furnaces.

**CHEMISTRY.**

II. To procure the Vitriolic Acid from Sulphur.

This substance contains the vitriolic acid in such plenty, that every pound of sulphur, according to Mr Kirwan's calculation, contains more than one-half of acid in sulphur; which being in a flat perfectly dry, is consequently of a strength far beyond that of the most highly rectified oil of vitriol. Common oil of vitriol requires to be distilled to one-fourth of its quantity before it will coagulate when cold; and even in this state it undoubtedly contains some water. No method, however, has as yet been upon to condense all the fumes of burning sulphur, at least in the large way, nor is any other profitable way of accomplishing quantity produced from it.

Method of obtaining it, though to this last it has a weaker difficulty. When nothing more will come over, the receiver be unluted, and the liquor becomes clear, the distillation will be suffered to go on, the receiver be unluted, and its contents poured into a bottle fixed with a glass stopper. A sulphurous and suffocating fume will come from the liquor, which must be carefully avoided. In the retort, a fine red powder will remain, which is used in painting, and is called coloet of vitriol. It is useful on account of its durability; and, when mixed with tar, has been employed as a preservative of wood from rotting; but Dr Lewis prefers finely powdered pit-coal. As a preservative for masts of ships, he recommends a mixture of tar and lamp-black; concerning which he relates the following anecdote.

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The difficulties here are, that sulphur cannot be burnt but in an open vessel; and the stream of air, which is admitted to make it burn, also carries off the acid which is emitted in the form of fume. To avoid this, a method was contrived of burning sulphur in large glass globes, capable of containing an hog-head or more. The fume of the burning sulphur was then allowed to circulate till it condensed into an acid liquor. A greater difficulty, however, occurs here; for though the sulphur burns very well, its steam will never condense. It has been said, that the condensation is promoted by keeping some warm water continually smoking in the bottom of the globe; and even Dr Lewis has asserted this: but the steam of warm water immediately extinguishes sulphur, as we have often experienced; neither does the fume of burning sulphur seem at all inclined to join with water, even when forced into contact with it. As it arises from the sulphur, it contains a quantity of phlogiston, which in a great measure keeps it from uniting with water; and the deidentarum is not something to make the sulphur burn freely, but to deprive the fumes of the phlogiston they contain, and render them miscible with water. For this purpose nitre has been advantageously used. This conforms a very large quantity of the phlogiston contained in sulphur, and renders the acid easily condensable: but it is plain that few of the fumes, comparatively speaking, are thus deprived of the inflammable principle; for the vessel in which the sulphur and nitre are burnt, remains filled with a volatile and most suffocating fume, which extinguishes flame, and lies in such quantity as to render it highly dangerous to stay near the place. It has been thought that nitre contributes to the burning of the sulphur in clove vessels; but this too is a mistake. More sulphur may be burnt in an oil of vitriol globe without nitre than with it, as we have often experienced; for the acid of the sulphur unites with the alkaline basis of the nitre, and forms wither with an inflammable compound, which soon extinguishes the flame, and even prevents a part of the sulphur from being burnt either at that time or any other.

In the condenstation of the fumes of sulphur by means of nitre, a remarkable experience happens, which naturally leads us to think that the condensation is produced by some struggle between the vitriolic and nitrous oxides.
A very great improvement in the apparatus for its kindling, after which they change their colour to white. How the nitrous acid should exist in the liquid, indeed, does not appear; for this acid is totally destructible by deagglutination with charcoal: but it does not follow, that because the nitrous acid is destroyed when deagglutinated with charcoal, it must likewise be so if deagglutinated with sulphur. Indeed it certainly is not; for the clysis of nitre made with charcoal is very different from that made with charcoal.

The proportions of nitre to the sulphur, used in the large oil of vitriol works, are not known, every thing being kept as secret as possible by the proprietors. Dr Lewis reckons about six pounds of nitre to an hundred weight of sulphur; but from such experiments as we have made, this appears by far inadmissible. An ounce and a half, or two ounces, may be advantageously used to a pound of sulphur. In greater proportions, nitre seems prejudicial.

A very great improvement in the apparatus for making oil of vitriol, lies in the using lead vellums instead of glafs globes. The globes are so apt to be broken by accident, or by the action of the acid upon them, that common prudence would suggest the use of lead to those who intend to prepare any quantity of vitriolic acid, as it is known to have so little affinity with sulphur; indeed it does not appear, that the acid and alkali are not very much diluted, the salt will be precipitated in powder, during the time of saturation.—It is very difficult of fusion, requiring a strong red heat; but, notwithstanding its fixedness in a violent fire, it arises with the steam of boiling water in such a manner as to be almost totally diffipated along with it by strong boiling.—This salt has been used in making glafs; but with little success, as the glafs wherein it is an ingredient always proves very brittle and apt to crack of itself.

If, instead of the vegetable fixed alkali, the vitriolic Glauber's salt is saturated with the fomile one called the salt of falt. Soda, a kind of neutral salt will be produced, having very different properties from the vitriolated tartar. This compound is called Glauber's salt. It dissolves easily in water, fothers into long and beautiful crystals, which contain a large quantity of water, in consequence of which they undergo the aqueous fusion when exposed to heat. They are also more easily fusible than vitriolated tartar.—This kind of salt was formerly much recommended as a purgative, and from its manifold virtues was instilled by its inventor falt mirabile. It is, however, found to possess no virtue different from that of other purgative salts: and its use is, in many places, entirely superseded by a salt prepared from the bitterm, or liquor which remains after the crystallization of sea-fals, which shall be afterwards described.

II. With volatile alkali. Take any quantity of volatile alkali, that prepared with quicklime secret salt ammoniac.

Vitriolic Acid combined,

With Fixed Alkali. Dilute a pound of oil of vitriol with ten times its quantity of water; diluive also two pounds of fixed alkali falt in ten pounds of water, and filter the solution. Drop the alkali into the acid as long as any effervescence arises; managing matters so that the acid may prevail. The liquor will now be a solution of the neutral salt, called vitriolated tartar, which may be procured in a dry form, either by evaporation or crystallization. In case the latter method is made use of, some more alkali must be added vitriolic when it is set to evaporate, for this salt crystallizes best in an alkaline liquor.

Other methods, besides that above described, have been recommended for preparing vitriolated tartar; particularly that of using green vitriol instead of the pure vitriolic acid. In this case the vitriol is decomposed by the fixed alkali: but as the alkali itself dissolves the calx of iron after it is precipitated, it is next to impossible to procure a pure salt by such a process; neither is there occasion to be particular about the preparation of this salt by itself, as the materials for it are left in greater quantity than will ever be demanded, after the distillation of spirit of nitre.

Vitriolated tartar is employed in medicine as a purgative; but is not at all superior to other farts which are more easily prepared in a crystalline form. Its very difficultly fusible in water, from which proceeds the difficulty of crystallizing it: for if the acid and alkali are not very much diluted, the salt will be precipitated in powder, during the time of saturation.—It is very difficult of fusion, requiring a strong red heat; but, notwithstanding its fixedness in a violent fire, it arises with the steam of boiling water in such a manner as to be almost totally diffipated along with it by strong boiling.—This salt has been used in making glafs; but with little success, as the glafs wherein it is an ingredient always proves very brittle and apt to crack of itself.
Practice.

Vitriolic acid and its combinations.

Vegetate, or arise in emolences upon the fishes of the glass. It easily melts in the fire; penetrates the common crucibles; and if diluted in glads vessels, which requires a very considerable heat, it always becomes acid, however exactly the saturation was performed.

This salt has been dignified with the names of Glau-ber's salt, sal ammoniaci, or philosophical salt, from the high opinion with which some chemists have entertained of its activity upon metals: but from Mr Potter's experiments, it appears, that its effects have been greatly exaggerated. It dissolves or corrodes in some degree all those metals which oil of vitriol dissolves, but has no effect upon those on which that acid does not act by itself.

Gold is not touched in the least, either by the salt in fusion, or by a solution of it: the salt added to a solution of gold in aqua-regia occasions no precipitation or change of colour. On melting the salts with inflammable matters, it forms a sulphurous compound, which dissolves gold in fusion, in the same manner as compositions of sulphur and fixed alkaline salt. Melted with silver, it corrodes it into a white clay, which partially dissolves in water: it likewise precipitates silver from its solution in aquafortis. It acts more powerfully on copper; elevates a part of the metal in sublimation, so as to acquire a bluish colour on the surface; and renders the greatest part of the residue soluble in water. This solution appears colourless, so that it could not be supposed to hold any copper; but readily discovers that it abounds with that metal, by the blue colour it acquires on an addition of volatilised alkali, and the green calx which fixed alkalies precipitate. In evaporation it becomes green without addition. Iron is corroded by this salt in fusion, and dissolved by boiling in a solution of it. Zinc dissolves more freely and more plentifully. Lead unites with it, but does not become soluble in water. Tin is corroded, and a part of the calx is soluble in boiling water. Of regulus of antimony also a small portion is made soluble. Alkalies precipitate from the solution a bluish powder. Calcined bismuth-ore treated with its equal weight of the salt, partly dissolved in water into a pale red liquor, which became green from heat, in the same manner as tinctures made from that ore by aqua-regia. The undiluted part yielded still, with frit, a blue glas. On treating manganese in the same manner, aluminous crystals were obtained: the undiluted part of the manganese gave still a violet colour to glads.

III. With Calciferous Earth. This combination may be made by saturating diluted oil of vitriol with chalk in fine powder. The mixture ought to be made in a glas; the chalk must be mixed with a pretty large quantity of water, and the acid dropped into it. The glas must be well shaken after every addition, and the mixture ought rather to be over saturated with acid; because the superfluous quantity may afterwards be washed off: the solution, as it is called, or gypsum, having very little solubility in water.

This combination of vitriolic acid with chalk or calciferous earth, is found naturally in such plenty, that it is seldom or never made, unless for experiment's sake, or by accident. Mr Potter indeed says, that he found some slight differences between the natural and artificial gypsum, but that the former had all the essential properties of the latter.

The natural gypsums are found in hard, semitransparent masses, commonly called alabaster, or piolifer of Paris. (See Alabaster, Gypsum, and Plaster.) By exposure to a moderate heat, they become opaque, and very friable. If they are now reduced to fine powder, and mixed with water, they may be cast into moulds of any shape: they very soon harden without shrinking; and are the materials whereof the common white images are made. This property belongs likewise to the artificial gypsum, if moderately calcined.

Mr Beaumé has observed, that gypsum may be dissolved in some measure by acids; but is afterwards separable by crystallization in the same state in which it was before solution, without retaining any part of the acids. This compound, if long exposed to a pretty strong heat, loses great part of its acid, and is converted into quicklime. In glas vessels it gives over no acid with the most violent fire. It may be fused by suddenly applying a very intense heat. With clay it soon melts, as we have observed when speaking of the materials for making crucibles. A like fusion takes place when pure calciferous earth is mixed with clay; but gypsum bubbles and swells much more in fusion with clay than with calciferous earth.

From natural gypsum we see that vitriolated tartar may be made, in a manner similar to its preparation from green vitriol. If fixed alkaline salt is boiled with any quantity of gypsum, the earth of the latter will be precipitated, and the acid united with the alkali. If a mild volatile alkali is poured on gypsum contained in a glas, and the mixture frequently shaken, the gypsum will in like manner be decomposed, and a philosophical salt ammoniaci will be formed. With the caustic volatile alkali, or that made with quicklime, no decomposition ensues.

IV. With Argillaceous Earth. The produce of Alum of this combination is the astringent salt called alm, which was much used in dyeing and other arts. It has a different name from the Latin word alumen called from our semiaque. The Greeks; though by those words the ancients expressed a flataeish substance containing very little alum, and that entirely enveloped in a vitriolic matter. The alum used at present was first discovered in the oriental parts of the world; though we know not when, or on what occasion. One of the most ancient alum-works of which we have any account was the name of that of Rococco, now Edessa, a city of Syria: and from rock alum this city was derived the appellation of Rock-alum; an expression soleilte understood by the generality, that it has been supposed to signify rock-alum. From this, and some works in the neighbourhood of Constaninopole, as well as at Phocaea Nova, now Foyra Nova, near Smyrna, the Italians were supplied till the middle of the 15th century, when they began to set up works of a similar kind in their own country. The first Italian alum-works was established about 1459 by Bartholomew Perrix, or Permiss, a Genoese merchant, who had discovered the proper matter, or ore of alum, in the island of Iclia. Soon after the same material was discovered at Tolfa by John de Castri, who had visited the alum manufactories at Constaninopole.
The component principles of this fault were long unknown; but at last Meffrs. Boulauce and Geoffroy discovered, that it consisted of argillaceous earth superabundantly vitriolic acid. This is confirmed by the experiments of other chemists. It is found to reden the tin dioxide and paper of vitriolic acid; and on taking away the superabundant acid, it leaves its solubility and all the other properties of alum. Mr Morveau, indeed, will not admit of a superabundance of acid in alum, which he thinks would necessarily be separated by edulcoration and crystallization; and he is of opinion with Mr Kirwan, that the turning vegetable juices red is not any unequivocal sign of the presence of an acid. In the present cafe, however, we certainly know that there is a superabundance of acid, and that a certain portion of the vitriolic acid adheres to the clay less tenaciously than the remainder. If we put a piece of it into a solution of alum, it will attract this portion of acid; and the vitriolated clay when deprived of the superfluosity, will fall down to the bottom in an infusible powder.

Alum in its ordinary state contains a considerable quantity of water, and crystallizes by proper management into ochrecoloured and perfectly transparent and colourless crystals. When exposed to a moderate fire, it melts, bubbles, and swells up; being gradually changed into a light, spongy, white mass, called burnt alum. This, with the addition of some vitriolic acid, may be crystallized as before. The principles it contains, therefore, are water, vitriolic acid, and argilla­ceous earth. The proportions may be ascertained in the following manner. 1. The water and superfluos vitriolic acid may be distilled by evaporation, or rather distillation; and the loss of weight sustained by the salt, as well as the quantity of liquid which comes over into the receiver, shows the quantity of aqueous phlegm and uninfusurate acid. 2. By combining this with as much caustic fixed alkali as is sufficient to saturate the acid which comes over, we know its proportion to the water; and by redistilling this new compound, we have the water by itself. 3. The earth may be obtained by precipitation with an alkali in its caustic state, either fixed or volatile: but this part of the process is attended with considerable difficulty; for the alkalies first absorb the superfluos acid, after which the earth combined to saturation with the acid falls to the bottom, and the digestion with the alkaline must be continued for a very considerable time before the acid is totally separated. By analysing alum in this manner, Mr Bergman determined the principles of alum to be 38 parts of vitriolic acid, 18 of clay, and Vitriolic acid and 44 of water, to 100 of the crystallized salt.

It has been a question among chemists, whether the earth of alum is to be considered as a pure clay or not. The fault was extracted from common clay by Meffrs. Hellot and Geoffroy. The experiment was repeated Propos with success by Mr Pott; but he seemed to consider it rather as the production of a new substance during the operation, than a combination of any principle already existing with the vitriolic acid. Margrauf, however, man­ from some very accurate experiments, demonstrated, that all kinds of clay consist of two principles mecha­ nically mixed: one of which constantly is the pure earth of alum. This opinion is expounded by Bergman; who concludes, that since an equal quantity of it may or not, be extracted from clay by all the acids, it can only be mixed with these clays; for if it was generated by Compounds during the operation, it must be procured in parts different quantities, if not of different qualities also, ac­ cording to the difference of the solvents made use of. Notwithstanding this, the matter seems to be rendered somewhat obscure by an experiment of Dr Lewis. Powdered tobacco-pipe clay (says he) being boiled in Lewis’s a considerable quantity of oil of vitriol, and the boiling experiment continued to dryness, the matter when cold discovers very little tafe, or only a slight acidulous one. Ex­ posing to the air for a few days, the greatest part of clay under which it was changed into laugnious effu­ rences tainting exactly like alum. The remainder, treated with fresh change in oil of vitriol, in the same manner exhibits the same being accompanied phenomena till nearly the whole of the clay is converted into an astringent salt.” Hence he concludes, that the clay is in some degree changed before the alumi­ nous salt is produced. Without this supposition, in­ deed, it is difficult to see why the salt should not be produced immediately by the combination of the two principles. An hundred parts of crystallized alum requires, according to Mr Bergman, in a mean heat of alum in 1412 parts of distilled water, but in a boiling heat warm and in cold water.

The ores from which alum is prepared for sale, according to Mr Bergman, are of two kinds: one containing the account of alum already formed, the other its principles united by the swedische roasting method of finding the ingredients and their proportions.

Difficultly in obtaining the pure earth of alum.
by lixiviating this schist before calcination, thought Mr Bergman thinks nothing more is necessary for the production of the salt but the presence of a pyrites. This, he tells us, is generally dispersed through the masses in form of very minute particles, though it sometimes appears in small nuclei. The goodness of the ore, therefore, depends on the proper proportion of the pyrites to the clay, and its equal distribution through the whole. The most dense and ponderous is most esteemed, while that which contains so much pyrites as to be visible is rejected as having too much iron. The ore which produces less than four pounds of alum from 100 of the ore does not pay the expense of manufacturing in Sweden. Sometimes this kind of ore produces salts without the application of fire; but this must be attributed to a kind of spontaneous calcination.

That species of ore which contains the principles already united into alum, according to Mr Bergman, is to be met with only in volcanic countries; and of this kind are the principal Italian ores of alum, particularly that employed at Tolfa near Cencelles, for boiling the Roman alum. Mr Monnet, however, is of opinion, that even this ore does not contain alum perfectly formed, but a combination of nearly equal parts of clay and sulphur, which by exposure to air during calcination, is converted into alum. He found a little earthy material also contained in it, to which he ascribes the reddish colour of that alum. The alumino ore at Solfatara in Italy consists of old lava whitened by the phlogocitic vitriolic acid. The clay thus becomes a component part of the alumina salt, and the masses effloresce in the same manner, and for the same reason, as the mass left after boiling tobacco-clay in all of vitriol mentioned by Dr Lewis. Mr Bergman, who examined this ore, found that 100 pounds of it contained eight of pure alum, besides four of pure clay; and that the remainder was sialicious. This proportion, however, must be very variable, according to the quantity of rain which falls upon the ore.

A variety of aluminous ores are to be met with in different parts of the world. In Hailia and Bohemia, this salt is obtained from wood impregnated with bitumen. At Hellingsborg in Scania, a turf is found consisting of the roots of vegetables mixed with nuts, straw, and leaves, often covered with a thin pyrites crust, while the remaining part was alum. Even the lightest, vitriolic pyrites is generally mixed with an argillaceous matter, which may be separated by menstruation. In some places, phylite, vitriol, and alum are extracted from the same material. The sulphur riffs by distillation; the residuum is exposed to the air till it effloresces, after which a green vitriol is obtained by lixiviation, and alum from the same liquor, after no more vitriol will crystallize. The alum flat, from which the salt is made near York in England, contains a considerable quantity of sulphur; and therefore produces alum on the principles already mentioned.

Mr. Bergman has given various particular directions for the preparation of this salt, from its ores, and minutely describes the several operations which they must undergo. These are.

1. **Roasting**. This is absolutely necessary in order to destroy the pyrites; for on this the formation of the alum entirely depends; as the sulphur of the pyrites will not part with its phlogiston without a burning heat in the open air. By long exposure to the air, indeed, the same effect will follow; but unless the ore be of a particular kind, and loose in texture, so that the air can freely pervade it, the process we speak of cannot take place. The hard ores, therefore, cannot be treated in this manner; and the earthy ores are not only unfit for spontaneous calcination, but for roasting also, as they will not allow the air to pervade them and extinguish the fire. Such as are capable of spontaneous calcination, should be supplied with some quantity of water, and laid on a hard clay bottom, as directed for making green vitriol. The roasting is performed in Sweden in the following manner. Small pieces of the ore are strewn upon a layer of burning ficks to the thickness of half a foot. When the ficks are consumed, these are covered, nearly to the same thickness, with pieces burned before and four times lixiviated: Thus the ficks are alternately laid of such thickness, and at such intervals of time, that the fire may continue, and the whole mass grows hot and smoky, but not break out into flame. The upper ficks, however, may sometimes be increased to a double thickness on account of the long continuance of the fire. When eight ficks are laid, another row is placed contiguous to the former; when this is finished, a third; and so on until the heap be of a proper size, which rarely requires more than three rows. When the ore is once roasted, it still contains so much phlogiston that water acts but little upon it; but after the operation is two or three times repeated, the ore yields its principles more freely: the roasting may even be repeated to advantage till the whole be reduced to powder. The bottom keeps up the fire; for which reason alternate layers of the crude ore are used; and in rainy weather these layers of unburnt ore should be thicker. An heap, 20 feet broad at the base, two feet at the top, and consisting of 26 rows, is finished in three weeks, but requires two or three months to be well burned, and three weeks to cool. The greater pyrites nuclei explode like bombs. In this process the sulphur of the pyrites is slowly consumed, and the phlogocitic acid penetrating the mass, is fixed; after which the remaining phlogiston is gradually dissipated. The chief art consists in moderating the heat in such a manner as to avoid with safety the two extremes; for too small a heat would not be capable of forming the mass, while a heat too strong would destroy it by melting the ore. The scoria is insoluble in water, and therefore thrown away as useless. They are produced by violent winds, or by a strong heat too much closed up; for it is necessary to make holes in the red ficks, that the fire may reach the back stratum which is to be laid on. Another method of burning was invented by the celebrated Rinman, and is practiced at a place called Garphytan in Sweden. There the ore itself is set on fire; and after burning is boiled, and yields alum in the same manner as the former. The heaps are formed in the following manner: First the schist, burning from the furnace, is laid to the depth of four feet; if the fire be then wood is added; after that a thin stratum of elixiated schist; the third stratum of schist not burned; and the fourth of elixiated schist a foot and a half thick, after that the burning schist, and so on. This method, however, is attended with some inconveniences. The vitriolic acid is partly dissipated by the fire, and thus
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671 Method of burning the hard ores at Tofla in Italy.

672 Singular circumstance by which the alum may be destroyed.

673 Of the proper strength of the lixivium before boiling.

674 Contraction of the evaporating vessecl.

675 Of the first evaporation, where it is allowed to rest for about an hour to free it from the greater sediment; after which it is put into wooden or stone receptacles to crystallize. In eight or ten days the remaining liquor, commonly called mother ley, or magindar water, is let off into another vessecl. A great number of crystals, generally small and impure, adhere to the bottom and sides of the vessel, which are afterwards collected and washed in cold water.

676 Depuration of the crystals.

677 Vitrile acid and its combinations.

678 Bergman's remarks on the proper form of the coolers.

The quantity of alum is diminished: so much schift also is requisite in this method that it cannot all be elixated; and thus the heat must be perpetually increasing. The hard ores containing bitumen, such as those of Tofla, are burned upon wood for some hours like lime-furnes, until they become pervious to water, and effulce. The fire is extinguished as soon as the flame becomes white, and the smol of sulphurous acid begins to be perceived. When the ore cools, those particles which were nearest to the fire are placed outermost, and those which had been outermost within, the fire being again lighted. The ore is sufficiently burned when it can be broken with the hands. It is then heaped up near certain trenches, and watered five times a-day, particularly when the sun shines clear; the operation being destroyed by a continued rain and cloudy sky. In some places the ore is first burned and afterwards elixated; neither is there any way of knowing the proper methods of managing it but by experiment.

Elixation. This is performed in some places with hot, and at others with cold, water. At Garphytan in Sweden, where the latter method is choosen, the receptacles, in the year 1772, were of iron stone, having their joints united by some cement capable of resisting the liquors. Every fet consisted of four square receptacles dippofed round a fifth, which was deeper than the rest. The first receptacle is filled with roasted schift, and the ore lies in water for 24 hours; the water is then drawn off by a pipe into the fifth; from thence into the second, containing schift not yet washed; from that in like manner, after 24 hours, through the fifth into the third, and so into the fourth. The lixivium is then conveyed to the fifth, and allowed to stand in it; and lastly is drawn off into a vessel appropriated for its reception. In other places the water passes over the schift that has been washed three times for six hours, then that which has been twice washed, next what has been once washed, and lastly, the ore which has been newly roasted. Those who superintend the alum manufactories are of opinion that the alum is destroyed by passing the water first over the newly burnt ore, and then over that which has been previously elixated.

The lixivium, before boiling, ought to be as richly impregnated with alum as possible, in order to fave fuel, though this is frequently neglected. In some places the tafte is used as the only criterion; but in others the weight of water which fills a small glass bottle is divided into 64 equal parts, each of which is called in Sweden a pannings; and the quantity by which the same bottle, full of lixivium, exceeds it when filled with water, is supposed to indicate the quantity of salt dissolved. This method may undoubtedly be reckoned sufficiently accurate for work conducted on a large scale: and though Mr Bergman gives formulae by which the matter may be determined to a frupus exactness, it does not appear that such accuracy is either necessary or indeed practicable in works conducted in a great way.

Those who manage the alum manufactories assert, that the cold lixivium ought to be made no richer than when the weight of the bottle filled with lixivium exceeds it when filled with water by 41 pannings, which shows the water to be loaded with one half of its weight of alum. If the overplus amounts to two pannings, which indicates its containing 4½ of salt, crystals are then deposited. Congelation is of no use to concentrate the aluminous lixivium; for water saturated with alum freezes almost as readily as pure water.

2. Boiling the ley for crystallization.

The ley being now brought from the pits through channels made for the purpose, is put into a leaden boiler, at the back of which is a retort, out of which the felsuftrated by evaporation is constantly supplied, so that the surface of that in the boiler continues always nearly at the same height. Variousings are used by different manufacturers to know when the ley is properly evaporated: some determining the matter by the floating of a new laid egg; others by dropping a small quantity on a plate, and observing whether it crystallizes on cooling; and lastly, others weigh the lixivium in the bottle abovementioned. The boiling is supposed to be finished when the increase of weight is equal to 10 pannings; that is, if the water be loaded with half of its own weight. It might, however, take up above one half of its weight, or nearly 27 pannings; but as it has to be depurated by standing quiet before the crystals are formed, the liquor must not be fully saturated with salt.

The lixivium, when sufficiently concentrated by the first evaporation, flows through proper channels into coolers, where it is allowed to rest for about an hour to free it from the greater sediment; after which it is put into wooden or stone receptacles to crystallize. In eight or ten days the remaining liquor, commonly called mother ley, or magindar water, is let off into another vessel. A great number of crystals, generally small and impure, adhere to the bottom and sides of the vessel, which are afterwards collected and washed in cold water.

When a sufficient quantity of the small crystals are collected, thy must then be put into the boiler for depuration. They are now dissolved in as small a quantity of water as possible; after which the lixivium is poured into a great tub containing as much as the boiler itself. In 61 or 8t days the hoops of the tub are holed, and the aluminous mass bound with an iron ring; and in 28 days more the residuum of the solution is let out through a hole, and collected in a trench; after which the saline mafs, which at Garphytan in Sweden amounts to 26 tons, is dried and fold as depurated alum. The boiler emptied for the first crystallization is next filled two-thirds full with the magindar lixivium; and as soon as the liquor arrives at the boiling point, the other third is filled with crude lixivium, with which the evaporation is also constantly supplied. A certain quantity of the aluminous impurities left by washing the fels of the first crystallization in water is then added, and the above described processes repeated. Only the first boiling in the spring is performed with the crude lixivium alone, the rest are all done as juft now related. Mr Bergman remarks, that the time required for crystallization may undoubtedly be shortened. The retrovers used in Sweden for this purpose (he says), are deep and narrow at the top; on which account they are not only long
long in cooling, but the evaporation, which is absolutely necessary for the crystallization, goes on very slowly, especially in extremely warm weather, at the same time that the doors and windows are disposed in such a manner as to direct a current of air along the surface. In Italy he tells us that conical reveriers are used with the wide part uppermost.

It is remarkable, that pure alum cannot be obtained in very considerable quantity by merely evaporating and cooling the ley. The reason of this is, that the lixivium sometimes acquires such a confluence, that it both crystallizes with difficulty, and produces impure crystall. The cause was unknown till the time of Mr Bergman, who has shown that it proceeds from an excess of vitriolic acid. Hence also we may see the reason why alkaline farts, volatile alkali in its pure state, or even purerized urine, when added to this thick solution, produce good crystals of alum when they cannot be obtained otherwise... It is remarkable that this impediment to crystallization is not removed by mineral alkali, though it may be vegetable and volatile alkalis, which is a phenomenon hitherto unexplained. According to our author, however, an addition of pure clay, to absorb the superabundant acid, is preferable to any other; and indeed it is reasonable to think so, as the union of vitriolic acid and pure clay forms the salt desired, which is not the case with any of the alkalis. To ascertain this, he made the following experiments.

1. He dissolved 215 grains of pure alum in distilled water, in a small cucurbit, and evaporated it over the fire till the surface of the liquor floor at two marks, which indicated, in a former evaporation, that it was fit for crystallization. 2. Having poured out this into a proper glass vessel, he dissolved other 215 grains, and added to the solution 241 grains of concentrated vitriolic acid. 3. This solution being likewise poured out, the experiment was repeated a third time, with the addition of 53 grains of vitriolic acid, and the glases being at last let in a proper place for crystallization, the first yielded 1551, the second 1709, and the third 1200 grains of alum.

This shows that an excess of vitriolic acid impedes the crystallization of the alum; but to determine how far this could be remedied by the addition of clay, farther experiments were necessary. Having therefore employed a magistral residuum, in which the excess of acid was nearly in the proportion already related, he added two drachmas of clay in fine powder to a kanne, or Swedish canthus, of the liquor; he boiled the mixture for ten minutes; and on separating the clay that remained, he found that 25 grains were dissolved, which indicates an increase of 141 grains of alum. On gently boiling the liquor for half an hour, 75 grains of the clay were dissolved, which indicated an increase of 416 grains of alum.

The addition of clay must therefore be much preferable to that of alkaline farts, but also as there is no danger of adding too much; for we have already shown, that when the liquor is entirely deprived of its superabundant acid, the neutralized clay is insoluble in water.

The earth itself, however, dissolves so slowly, that there is not the least danger of the acid being oversaturated by simply boiling them together.

Alum, as commonly made, though depurated by a second crystallization, yet is almost always found contaminated by dephlogisticated vitriol; whence it grows yellow, and deposits an ochre in solution when old. This is equally useful in some arts with the purest kind, and is even so in dyeing where dark colours are required; but where the more lively colours are wanted, every vitriol must be avoided. This is done by the addition of pure clay, which precipitates the ole.

This defect to the laws of chemical attraction; for though iron is remedied dissolved by a solution of alum, and the earthy base of the clay precipitated, and though in a solution of vitriol and alum the white earth falls first on an addition of alkali, and then the ochre; this happens only in consequence of employing phlogisticated metallic iron, or such as is but very little dephlogisticated; for the inflammable principle be any further diminished, the attraction is thereby so much weakened, that the clay has a greater attraction for the vitriolic acid than the iron. The truth of this may be proved in many different ways. Thus, let a portion of alum be dissolved in a solution of highly dephlogisticated vitriol, and an alkali then added, the ochre of the vitriol will be first deposited and then the clay; and provided there be a sufficient quantity of the latter, the iron will all be precipitated; and hence we see that an aluminous solution mixed only with one of dephlogisticated vitriol may readily be freed from it.

But a solution of alum containing perfect vitriol cannot be freed from it effectually either by clay or alkali; for the former effects no decomposition, and the latter, although it can destroy the vitriol, will undoubtedly decompose the alum in the first place. As long, therefore, as the solution is rich in alum, it may be employed in the common manner; but when the vitriolic salt begins to predominate, it must either be crystallized in its proper form, or be destroyed in such a manner as to produce alum, which may be accomplished in the following manner.

Let the lixivium be reduced to a tenacious mass with clay, phlogisticated and formed into cakes, which must be exposed in an hause to the open air. Thus the phlogiston, which is powerfully attracted by the dephlogisticated part of the atmosphere, by degrees separates from the iron, while the clay is taken up by its superior attraction for the acid. The calcination is accelerated by fire; but it must be cautiously employed, lest the acid should be expelled.

In the alum manufactories in Sweden, a considerable quantity of vitriolated magnesia, or Ephom salt, may be mixed with the alum. Mr Bergman directs this to be separated by means of an uncalked calcareous earth, which entirely destroys both the alum and vitriol; falling down to the bottom with the acid in form of a felsenitic matter. This must be added to the boiling liquor gradually, left the effervescence should cause the mass to swell and run over the top of the vessel. A just proportion destroys both the alumino and vitriolic salt, on being properly agitated and heated; neither is there any danger of the Ephom salt.
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689 Superfluous acid might be advantageously distilled.

falt being decomposed in this process, the uncalcined earth being unable to separate the magnesia from the acid. Were this method followed in the Swedish manufactories, he is of opinion, that as much Epom falt might be produced from them as would supply the confumpt of that kingdom.

With regard to the quantity of superfluous acid found in the magisterial lixivium, Mr Bergman informs us, that it amounted to five ounces in onenullable; so that in a single boiler there is nearly 250 lb. But vitriol, when well dephlogisticated, retains its acid do loosely that it may easily be separated by fire. He has no doubt, therefore, that if the surface of such a lixivium were first increased in order to let the phlogiston evaporate, the liquor might afterwards be advantageously committed to distillation for the sake of its acid.

From what has been above delivered the necessity will be sufficiently apparent of not continuing the coction even with pure clay to perfect saturation of the liquor; and this is further confirmed by M. Beernaé, who relates, that having boiled four ounces of earth of alum with two ounces of the falt, in a sufficient quantity of water, the acid became saturated to such a degree with earth, that the liquor loft its aluminous taff entirely, and assumed that of hard spring water. After filtration and evaporation, only a few micaceous crysals, very difficult of solution, were formed by letting the liquor stand for some months.—Dr Sieffert informs us, that by boiling half an ounce of alum with half a drachm of flaked lime, cubical crysals of alum may be obtained.

V. With Magnesia. The earthy substance called magnesia alba is never found by itself, and consequently this combination cannot originally take place by art. The vitriolic acid, however, is found combined with magnesia in great plenty in the bitter liquor which remains after the crystallization of common falt; from whence the magnesia is procured by precipitating with a fixed alkali. If this liquor, which, when the common falt is extracted, appears like clean oil of vitriol, is set by for some time in a leaden vessel, a large quantity of falt shoots, very much resembling Glauher’s falt mirabile. This falt is in many places sold instead of the true Glauher’s falt; and is preferred to it, because the true sal mirabile calcines in dry air, which the spurious kind does not. If after the first crystallization of the bittren, the remainder is gently evaporated further, a fresh quantity of Glauher’s falt will shoot; and if the liquor is then hastily evaporated, a falt will still be crystallized; but instead of large regular crysals, it will concrete into very small ones, having something of the appearance of snow when taken out of the liquid. These fals are essentially the fame, and are all used in medicine as purgatives. The falt shot into small crysals is termed Epom falt, from its being first produced from the purging waters at Epom in England. The bittren affording this kind of falt in such great plenty, these waters were soon neglected, as they yielded it but very sparingly, and the quantity prepared from them was insufficient for the demand. Neumann says, that having infilpated two quarts of Epom water, he scarce obtained half an ounce of fa-

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Vitriolic acid and its Combination.

692 Epom falt.

VI. With Silver. Oil of vitriol boiled on half its weight of silver-filings, corrodes th'm into a salina mafs. ver. This substance is not used in medicine nor in the arts. The only remarkable property of it is, that it has a very strong attraction for mercury; coagulating and hardening as much quicker as the acid weighed at first. If the hard concrete be diluted with fresh acid, it melts easily in the fire, and does not part with the mercury in the greatest heat that glass vessels can endure. The vitriolic acid, by itself, strongly retains mercury, but not near so much as when combined with silver.

Silver thus corroded by the vitriolic acid, or precipitated by it from the nitrous, may in great part be dissolved, by cautiously applying a very little water at a time; and more effectually by boiling in fresh oil of vitriol.

VII. With Copper. With this metal the vitriolic acid of copper cannot be combined, unless in its concentrated state, and strongly heated. If pure oil of vitriol is boiled on copper filings, or small pieces of the metal, it dissolves it into a liquor of a deep blue colour, which easily crystallizes. The crysals are of a beautiful blue colour, and are sold under the name of blue vitriol, or Roman vitriol.

Where sulphur is found in great plenty, however, blue vitriol Roman vitriol is made by straining thin plates of copper, how with sulphur; and upon slowly burning the sulphur, made its acid corrodes the copper. The metal is then to be boiled in water, that the salina part may be dissolved. The operation is to be repeated till all the copper is consumed; and all the salina liquors are to be evaporated together to the crystallizing point. By this method, however, a great part of the acid is lost; and in Britain, where the sulphur must be imported, we should think the pure acid preferable for those who prepare blue vitriol.

This falt, on being exposed to the fire, first turns Phosphene, white, then of a yellowish red colour. On urging it on with a strong fire, the acid finely exalhes, and a dark red calx of copper remains. The whole of the vitriolic acid cannot be expelled from copper by heat: as much of it still remains as to render a part of the metal soluble in water. After this soluble part has been extracted, a little acid is still retained amounting to about 1/3 of the calx.

Vitriol of copper is employed in medicine as a cathartic, in which respect it is very useful; but when used internally, is dangerous, as indeed all the preparations of copper are found to be. It has, nevertheless,
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VI. With Iron. The vitriolic acid does not act on this metal till considerably diluted. Common oil of vitriol requires to be mixed with ten or twelve times its quantity of water before it will act briskly on the metal. In this state it offervences violently with iron filings, or small bits of the metal, and a great quantity of inflammable vapour is discharged (see Air). The liquor assumes a fine green colour; and by evaporation and flow coolings, very beautiful rhomboidal crystals are formed. These are named salt of steel, and are used in medicine; but for the salt made of the pure acid and iron, the common copperas, made with the impure acid extracted from pyrites, is commonly substituted. This is generally esteemed a venial fraud, and the acid and iron, the common copperas, made with the impure acid extracted from pyrites, is commonly substituted. This is generally esteemed a venial fraud, and the acid of nitre, being left at liberty to act upon the remaining part of the litharge, begins anew to dissolve it with effervescence. When it is again saturated, more oil of vitriol is to be dropped in, and a white precipitate is again thrown down. If any of the litharge is still undissolved, the nitrous acid, being left at liberty a second time, attacks it at first; and by continuing to add oil of vitriol, the whole of the litharge may be converted into a most beautiful and durable white. Unfortunately this colour cannot be used in oil, though in water it seems superior to any. If the process is well managed, an ounce of spirit of nitre may be made to convert several pounds of litharge into a white of this kind.

XI. With Quicksilver. The distillation of quicksilver Quicksilver in vitriolic acid cannot be performed but by a concentrated oil and strong boiling heat. The metal is first corroded into a white calx, which may afterwards be easily dissolved by an addition of fresh acid. Every time it is dissolved, the mercury becomes more and more fixed and more difficult to dry. If the exsiccation and distillation has been repeated several times, the matter becomes as fixed as to be of the greatest degree of red heat. This combination is the basis of a medicine formerly of some repute, under the name of turbit mineral. The procès for making turbit mineral is given by the author of the Chemical Dictionary as follows.

"Some mercury is poured into a glass retort, and turbit mineral, or more, according to the strength of the acid. These matters are to be diffilied together, in the heat of a sand-bath, till nothing remains in the retort but a dry saline mass, which is a combination of the vitriolic acid and mercury. The acid which passes into the receiver is very suffocating and fulphurous; which qualities it receives from the phlogiston of the mercury. The white saline mass which is left at the bottom of the retort is to be put into a large vessel; and upon it are to be poured large quantities of hot water at several different times. The water weakens the acid, and takes it from the mercury; which is then precipitated towards the bottom of the vessel, in form of a very shining yellow powder. The water with which
which it is washed contains the acid that was united with the mercury, and likewise a little mercury rendered soluble by means of the very large quantity of acid.

Most chemists have believed, that a portion of vitriolic acid remains united with the turbith mineral, only too little to render it soluble in water. But Mr Beaumé, having examined this matter, affirms, that turbith mineral contains no acid, when it has been sufficiently washed; and that, by frequently boiling this preparation in a large quantity of distilled water, not a vestige of acid will adhere to it."

Dr Lewis, who is of opinion that the whole of this mercurial calx is soluble in a very large quantity of water, desires the water with which it is washed to be impregnated with some alkaline salt; which makes the yield of turbith greater than when pure water is used. The author of the Chemical Dictionary also observes, that the precipitate remains white till well freed from the acid; and the more perfectly it is washed, the deeper yellow colour it acquires.

The product of this combination is white vitriol, which is used in medicine as an ophthalmic, and in painting for making oil-colours dry quickly: what is used for this purpose, however, is not made in Britain, but comes from Germany. It is made at Gollar by the following process. An ore containing lead and silver, having been previously roasted for the obtaining of sulphur, is lixiviated with water, and afterwards evaporated in leaden boilers, as for the preparation of green vitriol: but the bottom; but, on standing for some days, was taken up, and dissolved in the liquor, nothing being left but a little yellowish dust scarcely worth mentioning. Six parts of oil of vitriol, dissolved with an equal quantity of water, dissolves one part of zinc.

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XII. With Zinc. This femimetal is not acted upon by the vitriolic acid in its concentrated state; but, when diluted, is dissolved by it with effervescence, and with the extraction of an inflammable vapour in the same manner as iron. Neumann observes, that, during the distillation, a grey and blackish fpongy matter fell to the bottom; but, on standing for some days, was taken up, and dissolved in the liquor, nothing being left but a little yellowish dust scarcely worth mentioning. Six parts of oil of vitriol, dissolved with an equal quantity of water, dissolves one part of zinc.

XIII. With Regulus of Antimony. To combine vitriolic acid with regulus of antimony, the same method must be used as before, except that quicksilver, for making turbith mineral, sib. to employ a very concentrated acid, and to distil in close vessels. The same phenomena also occur in this case as in making turbith mineral; a very suffocating sulphureous acid arises; and, as Mr Grégoire observes, a true sulphur sublimes into the neck of the retort; a white, soapy, tumeled mass remains in the vessel; and when the vessels are unluted, a white fume issues, as in the smoking spirit of libavius. See Combinations of marine acid with tin, infra.

XIV. With Regulus of Cobalt. From a combination of Regulus of the vitriolic acid with cobalt, a red salt may be obtained, cobalt.

To procure it, one part of cobalt, reduced to a very fine powder, may be mixed with two or three of concentrated acid, diluting the liquor after it has been digested for 24 hours, and then filtering and evaporating it.

XV. With arsenic. Neumann relates, that powdered white arsenic being distilled in a retort with oil of vitriol, a transparent sublimate like glass arose, which in a few days lost its transparency, and became opaque like the arsenic itself. The arsenic remaining in the retort sustained an open fire without any sensible alteration. The author of the Chemical Dictionary says, that if a concentrated vitriolic acid is distilled from arsenic, the acid which comes over smells exactly like marine acid. When the solution is distilled till no more acid arises, the retort is then almost red-hot, and no arsenic is sublimed; but remains fused at the bottom of the retort; and, when cold, is found to be an heavy, compact mass, brittle and transparent as crystal-glass. This kind of arsienical glass, exposed to the air, soon loses its transparency from the moisture it attracts, which dissolves and partly detepliates it. This deliquium is extremely acid—by digesting one part of arsenic with two of concentrated oil of vitriol, diluting the solution with water, and then filtering and evaporating, we obtain a yellowish salt which shines into pyramidal, transparent, and shining crystals. None of the three last mentioned combinations have been found applicable to any useful purpose.

XVI. With Oil. The product of this combination is a thick black substance, very much resembling balsam of sulphur in colour and consistence; to which it is sometimes sublimated. If this substance is distilled with a gentle heat, great part of the acid becomes volatile, and evaporates in white fumes, having a pungent smell resembling that of burning sulphur. This goes by the name of volatile or sulphureous vitriolic acid; and a salt Volatile was formerly prepared from it by furation with fixed sulphure-alkali, which was thought to poise great virtues. From its invention it was called the sulphureous salt of Stahl. The most singular property of this volatile acid is, that though the vitriolic in its fixed state is capable of expelling any other acid from its basis, the volatile one is expelled by every acid, even that of vinegar. It is very difficult condensible, as we have already taken notice; and, when mixed with water, seems scarcely at all acid, but rather to have a bitternis taste.

Several methods have been proposed for procuring this acid from burning sulphur, which yields it in its greatest degree of volatility, as well as concentration; but the produce is so exceedingly small, that none of them are worth mentioning. Dr Priestley has given some very good directions for obtaining the volatile vitriolic acid in the form of air. His method was, to pour, on
Vitriolic acid and its combinations.

some oil of vitriol contained in a phial, a very small quantity of oil of olive; as much as was sufficient to cover it. He then applied the proper apparatus for the reception of the air in quicksilver (see Air); and, holding a candle to the phial, the volatile vitriolic acid rushed out in great quantity. Had he received this air in water, instead of quicksilver, the confluence would have been, that some part of it, at least, would have been absorbed by the water, and a sulphurous acid liquor produced. This seems indeed almost the only method of procuring the fulphureous vitriolic acid of any aborbed by the water, and a fulphurous acid liquor produced. This seems indeed almost the only method of a liquor, except for experimental purposes. The acid is, that it is remarkably destructive of colours of all kinds; and hence the fumes of sulphur are employed to whiten wool, &c.

Charcoal.

Vitriolic acid and charcoal. If charcoal is mixed with concentrated vitriolic acid, and the mixture distilled, the same kind of acid is at first obtained, which comes over when oil is used; and towards the end, when the matter begins to grow dry, a true sulphur sub- limes. The best way, however, of producing sulphur from the vitriolic acid is by combining it, when in a perfectly dry state, with the phlogiston. By this means sulphur may very readily be made at any time. The procefs is generally directed to be performed in the following manner:

Reduce to fine powder any quantity of vitriolated tartar. Mingle it carefully with a tenth part of its weight of charcoal-dust. Put the whole into a covered crucible set in a melting furnace. Give a heat sufficient to melt the falt; and when thoroughly melted, pour it out on a flat stone. The vitriolated tartar and charcoal will now be converted into a sulphurous maf, similar to a combination of alkaline salts with sulphur. See Alkaline Salts, below.

Sulphur prepared from vitriolated tartar.

Spirit of wine.

XVII. With Phlogiston of charcoal. If charcoal is mixed with concentrated vitriolic acid, and the mixture distilled, the same kind of acid is at first obtained, which comes over when oil is used; and towards the end, when the matter begins to grow dry, a true sulphur sub- limes. The best way, however, of producing sulphur from the vitriolic acid is by combining it, when in a perfectly dry state, with the phlogiston. By this means sulphur may very readily be made at any time. The procefs is generally directed to be performed in the following manner:

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Sulphur prepared from vitriolated tartar.

XVIII. With Spirit of wine. The result of this combination is one of the most extraordinary phenomena in chemistry; being that fluid, which, for its extreme degree of volatility, was first distinguished by the name of ether; and now, since a liquor of the like kind is discoverèd to be preparable from spirit of wine by means of other acids, this species is distinguished by the name of vitriolic ether. The method of preparing this subtile liquor recommended by M. Beaumé, seems to be the best of any hitherto discovered.

Ether.

Mix together equal parts by weight, of highly rectified spirit of wine and concentrated oil of vitriol, or somewhat more than two measures of spirit of wine with one of the acid. The mixture is to be made in a flint glafs retort, the bottom and sides of which are very thin, so that the spirit may be directed against the side of the glafs; in which case it will not exert much of its force on the spirit, but will lie quietly below at the bottom. The retort is now to be very gently shaken, that the acid may mingle with it by little and little. When the mixture is completed, very little more heat will be necessary to make the liquor boil.

This mixture is to be distilled with as brisk and quick a heat as possible; for which reason, immediately after the acid and spirit are mixed, the retort should be put into a sand furnace heated as much as the mixture is. The distillation should be continued only till about one-third of the liquor is come over; if it is continued farther, part of the vitriolic acid rises in a sulphurous flate. In the retort a thick, black, acid matter remains, which is similar to a combination of oil of vitriol with any inflammable matter, and from which a little sulphur may be obtained. Along with the sulphurous acid, a greemish oil, called oleum vitri- oli dulcis, arises, which has a smell compounded of that of the ether and sulphurous acid; and Mr Beaumé has shown that it is compounded of these two; for if after being recomposed with an alkali, to attract the acid, it is changed into ether. If, after the distillation of the ether, some water be poured into the retort, the liquor by distillation may be brought back to the state of a pure vitriolic acid.

As the fumes of the ethereal liquor are exceedingly volatile, and at the same time a quick fire is necessary to the success of the operation, the receiver must be carefully kept cool with very cold water or with snow. Care must also be taken to prevent any of the sulphurous acid fumes from coming over; but as it is impossible to prevent this totally, the liquor requires rectification. This is the more necessary, as a part of the spirit of wine always rises unchanged. From this acid the liquor is easily set free, by adding a small quantity of alkaline salt, and redistilling with a very gentle heat; but as spirit of wine is likewise very volatile, the distillation must be performed in a very tall glafs. Dr Black recommends a matras, or bolt-head, with a tin-pipe adapted to the head, so as to convey the fumes at a right angle, to be condensed in the receiver. When this fluid is to be prepared in great quantities, the ether, by proper management, may be made to equal half the weight of the spirit of wine employed. Mr Dollfus has made many important experiments on this subject; of which the following is an abstract: 1. Two pounds of vitriolic acid were mixed with one of spirit of wine, and the mixture distilled with a very gentle fire. The first ten ounces that came over consisted of a liquor strongly impregnated with ether, and of an agreeable odour. This was put in itself and marked A. It was followed by a stronger ethereal liquor, of which a small quantity only would mix with water. Of this there were 12 ounces, which were also put by themselves, and marked B. By continuing the proccs two ounces more were obtained, which smelled of sulphur, and were marked C. The distillation was now continued with a view to concentrate the vitriolic acid, when three drachms of a thicker kind of ether were found swimming on a weak sulphurous acid. This thick liquid was not in the least volatile, and in confidence resembled an expressed oil. 2. Twenty-four ounces of spirit of wine were now added to the residuum of the former distillation, and the proccs recommenced. The first seven ounces that came over were poured to the dulified spirit marked A. Next passed over ten ounces of a tolerably pure ether, which was mixed with the contents of B; besides two ounces that had a sulphurous smell, which were mixed with C. By a repeated dephlegmation of what remained in the retort were obtained five ounces of a weak sulphurous acid; and
the remainder being again mixed with 20 ounces of spirit of wine, yielded first six ounces of the liquor marked A; then four ounces of pure ether marked B; and after that another ounce marked C. By continuing the distillation four ounces of weak sulphurous acid were obtained, on which floated a little oil of wine. 2. The remainder, which was very thick, and covered with a flight pellicle, was mixed with 20 ounces of spirit of wine, and yielded five ounces of dulcified spirit marked A; eight ounces of pure ether marked B; and at last one ounce of the same, which had rather a sulphurous smell. This was followed by a few drops of acid; but the remainder frothed up with such violence, that an end was put to the operation, in order to prevent its pouring over into the receiver.

By these four distillations there were obtained from six pounds of spirit of wine and two of oil of vitriol, 28 ounces of dulcified spirit of vitriol and 38 of ether; which last, when rectified by distillation over manganese, yielded 28 ounces of the best ether. At the end of this distillation were produced 13 ounces of weak acetic acid; and the liquor of the last running marked C, afforded, by rectification, four ounces of good ether. The sulphurous acid liquor yielded four ounces of weak acetic acid, and three drachms of naphtha resembling a distilled oil in consistency. By these processes the vitriolic acid was rendered quite thick and black; its weight being reduced to 24 ounces. The blackness was found to be owing to a powder which floated in the liquid, and could neither be separated by subiding to the bottom nor rising to the top. The liquor was therefore diluted with eight ounces of water, and filtered through powdered glas; by which means the black fulphate was collected, partly in powder, and partly in grains of different sizes. It felt very soft between the fingers, and left a black stain upon paper like Indian ink; but though washed with 24 ounces of water, still tasted of naphtha.

The above experiment made by Wallerius, induced him and others to think, that the vitriolic acid was convertible into the nitrous acid, in favour of the transmutation of vitriolic into nitrous acid.

Some felt of tartar (says he) being mixed with the dulcified spirit of vitriol, or perhaps with the acetic acid (for the author expresses himself a little ambiguous), the full bottle flopped a cork, tied over with bladder, and laid on its side; on standing for four months, the greatest part of the spirit was found to have escaped, and the felt was that into hexagonal prismatic crystals resembling nitre. It tasted strongly ff the spirit, but had no other particular taste. Laid on a burning coal, it crackled, exploded with a bright flash, and flew into the air. He afterwards found, that by adding to the spirit a drop or two of any acid, the felt crystallizes the sooner; that in this case it has a fourth taste, but in other respects is the same with that made without acid. This felt-petre (says the author) promisses, from the violence of its explosion, to make the strongest gun-powder in the world, but a very dear one. Though the experiment should not be applicable to any use in this way, it will probably contribute to illustrate the generation of nitre: as it palpably shows nitre, that is, the acid or characteristic part of nitre, produced from the vitriolic acid and phlogiston.

We cannot here help again regretting that chemists of superior abilities should sometimes leave very important discoveries only half finished, so that chemists of an inferior rank knew not what to make of them. Had Wallerius,
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Wallerius, who seems more than once to have been in possession of this fact, only poured on it a few drops of oil of vitriol, the peculiar colour and smell of its fumes must have been a much more convincing proof of the reality of the transmutation than that of mere deflagration; because the latter can be otherwise accounted for.

It is certain, that many substances, water itself not excepted, when exploded with great violence if suddenly heated beyond their great heat of combustion, will explode with great violence if suddenly applied to the containing vessel, their great heat will be suddenly communicated to the air itself, and this happens, not from any substance are inflammable, the explosion will be attended with a flash if any flame is near. In like manner ether, on the approach of a candle, takes fire, and goes off in a flash like lightning; but this happens, not from any thing nitrous, but from its great volatility and inflammability. If therefore the vapours of the etheral liquors are confined, and heat is applied suddenly to the containing vessel, their great volatility will cause them make an instantaneous effort against the sides of it, which increasing with a swiftness, and in like manner a violent explosion, will make a much quicker as well as a much stronger explosion than either of them; and if a flammable substance is near, the explosion will be attended with a bright flash like that of the ether itself.

In the experiment now before us, the salt raised strongly of the spirit, or ether, from which it was made. The spirit was therefore confined in the crystals of salt; and this volatile liquor, which, even under the pressure of the atmosphere, boils with the heat of 100° of Fahrenheit, was, in a confined state, subjected to the heat of a burning coal; that is, to more than ten times the degree of heat necessary to convert it into vapour. The consequence of this could be no other, than that the particles of salt, or perhaps the air itself, not being capable of giving way from enough to the forcible expansion of the ether, a violent explosion would happen, and the salt be thrown about, which accordingly came to pafs, and might very reasonably be expected, without any thing nitrous contained in the salt.

Mr Cavallo describes an easy and expeditious method of purifying ether, though a very expensive one; as out of a pound of the common kind scarce three or four ounces will remain of that which is purified. The method of purifying it, he says, was communicated to him by Mr Winch chemist in London, and is to be performed in the following manner. "Fill about a quarter of a strong bottle with common ether, and pour upon it twice as much water; then stop the bottle and give it a shake, so as to mix the ether for some time with the water. This done, keep the bottle for some time without motion, and the mouth of it downwards, till the ether be separated from the water, and swins above it; which it will do in three or four minutes. Then opening the bottle with the mouth full inverted, let the greatest part of the water run out very gently; after this, turn the bottle with the mouth upwards; pour more water upon the ether, shaking and separating the water as before. Repeat this operation three or four times; after which the ether will be exceedingly pure, and capable of dissolving elastic gum, though it could not do so before."

As great part of the ether undoubtedly remains nitrous with the water after this process, our author remarks, that it might be worth while to put the water into a retort, and distil the ether from it, which will come sufficiently pure for common use. He observes also, that "it is commonly believed that water combines with the purest part of the ether when the two fluids are kept together; though the contrary seems to be established by this process. According to Mr Walthurn, we may obtain from the residue of vitriolic ether a reain containing vitriolic acid, vinegar, Glauber's salt, sebene, calcareous earth, filax, iron, and phosphoric acid."

§ 2. Of the NITROUS Acid and its Combinations.

This acid is far from being so plentiful as the vitriolic. It has been thought to exist in the air; and the experiments of Mr Cavendish have shown, that it may be artificially composed, by taking the electric spark in a mixture of dephlogisticated and phlogisticated air. See ARKNOLOGY, No. 77.

With regard to the preparation of nitre, Dr Black observes, that it is made in great plenty in the more southern parts of Europe; likewise in the southern part of Perla, in China, the East Indies, and in North America. We have had no accounts of the manner in which it is prepared in the East Indies, no person on the spot having taken particular notice of the manufacture. The general account is, that it is obtained from the soil of certain districts which are called faltpetre grounds; where the soil is very cold, barren, and unhealthy. The falt is there ready formed by nature. It is only necessary to gather large quantities of the earth, and to put it into a cavity through which the water runs into an adjacent pit, out of which it is lifted in order to be evaporated and obtained in the form of cryflas. This account, however, has been thought unsatisfactory; because there is hardly any part of Europe in which it is found in this manner. It is discovered indeed in some very large districts in Poland, particularly in Podelia, where the country is flat and torrid, and had been once very populous, but is now in a great measure defverted. It is there obtained from tumuli or hillocks, which are the remains of former habitations; but these are the only places in which it is found in any considerable quantity. In Spain, it is said that the inhabitants extract it from the soil after a crop of corn. It has been found in America in lime-flone grounds, in the shores of pigeon-houses, tobacco-houses, or the ruins of old stables, where a number of purifying vegetables were once collected. In general, however, it is extracted from artificial compounds or accidental mixtures, where animal and vegetable substances have been fully purified by being exposed to the air with any spongy or loose earth, especially of the calcareous kind, and open to the north or north-east wind, and more or less covered from the heat or rains. This last particular is absolutely necessary to its formation in any quantity; for the heat, by evaporating the moisture too much, prevents it from being produced, and the rains wash it away after it is already made. Cramer, an author of the greatest credit, informs us in his Deoimagistics, that he made a little but exposed to the fresh air, and the country, nitre.
Nitrous acid and its combinations.

How prepared in Hanover.

In other parts of Germany.

In France.

Dr Black's conclusions concerning the nature of saltpetre.

Supposed to be the last effluent putrefaction.

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Practice.

Nitrous acid and its combinations.

In this country, with windows to admit the winds. In this he put a mixture of garden mold, the rubbish of lime, and putrid animal and vegetable substances. This he frequently moistened with urine; and in a month or two found his composition very rich in nitre, yielding at least one-eighth part of its weight.

It is manufactured in Europe by making artificial compounds with less trouble. In Hanover it is got by collecting the raking of the streets, which are built up into mud-walls that are allowed to remain a certain time, when the surface is found covered with a white saline efflorescence. A person is employed to scrape this off; and putting it into a vessel, it is washed with water to dissolve the nitre, and the remaining earthy matter is again plastered on the mud-walls, and fresh matter brought from the streets to renew them occasionally: and by this simple method a considerable quantity is obtained. In Germany the peasants are directed by law to build mud-walls of this kind with the dung and urine of animals, and some straw. After they have flooded for some time, the vegetable and animal substances are rotten, they afford a considerable quantity of nitre. In France it is obtained from accidental collections of this kind, as where loofe earth has been long exposed to the contact of animal substances, as the rains of old stables, pigeon-houses, &c. Sometimes from the mould upon the ground where dunghills have been lying. A particular act of people go about in search of these materials; and when, by making a small effay, they find that they will turn to account, they put the materials into a large tub with a perforated bottom, and another which is water-proof put below it. Some straw is interposed between the two; and on pouring water upon the materials, it soaks through them, undergoes a kind of filtration in pouring through the draw, and is then drawn off by a cock placed in the under-tub, and boiled to a proper consistence for crystalization. The crystals are at first brown and very impure, but by repeated distillation and crystalization become pure and white.

From these particulars relating to the history of saltpetre, Dr Black concludes, that it is not properly a foil, being produced at the surface of the ground. Margraaff discovered a small quantity of it in the analysis of some of the waters about Berlin, and others have found it in the wells about some great cities: but no true nitre has ever been found in springs; so that this nitrous salt may be supposed to have derived its origin from the quantity of putrid matters with which all cities abound. All rich and fertile soils are found to contain it; and in the hot countries, where the products of nature are numerous, and putrefaction carried on very fast, they are often very rich in nitre. This may happen in some places from the conflux of waters; which remaining for some time on the surface, and afterwards exhalting, left the saline particles behind.

On the whole, Dr Black concludes, that neither nitre nor its acid does exist in the air, because it might easily be detected there; though many have embraced this opinion from its being usually found at the surface of the ground. He is of opinion, that it is the effect of the last stage of putrefaction of animal and vegetable substances; and it is never to be found except where these or their effluvia are present, and never till the putrefaction is complete. It has been a matter of dispute, whether it existed in those matters before the process of putrefaction, or was produced by it. But it is pretty certain, says the Doctor, that it originated in them; for the sun-flower, tobacco, and other plants, are found to contain it before putrefaction; and some have even asserted, that plants placed in the earth, deprived of all its saline substances, will yield it. The compositions recommended by Cramer are the finest for producing a complete degree of putrefaction; provided they contain a moderate degree of humidity, and that the quantity exposed to the air be defended from too great a heat by the sun, which would dry up its moisture; and likewise from too great a degree of cold, which likewise checks fermentation. The importance of the calcareous earth in such a composition would likewise favour the conclusions just now drawn; for the most remarkable effect of this earth is to promote and perfect the putrefaction of these substances. It would seem, therefore, that the true secret of the production of nitre is to mix properly together animal and vegetable substances with earth, particularly the calcareous kind; exposing them to the air with a moderate degree of humidity, sufficient to promote their putrefaction in the most effectual manner; and when the putrefaction is carried to the utmost height, we may then expect that nitre will be produced.

The distinguishing characteristic of the nitrous acid is its great disposition to unite with the phlogiston; and, when so united, to become exceedingly volatile, and at last be diffipated in a very white bright flame: this is called its detonation or deflagration. In the strongest state in which this acid is procurable in a liquid form, it is of a reddish yellow colour, and continually exahles its noxious fumes; and in this state it is called smokning, or, from its inventor, Clauiter's, spirit of nitre.

1. To extract the Nitrous Acid by means of the Vitriolic.

Into a glass retort put two pounds of good salt spirit of nitre, and pour upon it 18 ounces of concentrated oil of vitriol; set the retort in a sand-heat, and lute on a large receiver with the composition already recommended, for redistilling acid fumes; the mixture will grow very warm, and the retort and receiver will be filled with red vapours. A small fire is then to be kindled, and cautiously raised till no more drops will fall from the nofe of the retort. What comes over will be a very strong and smokning spirit of nitre.

In this process, the nitrous acid is generally mixed with part of the vitriolic which comes over along with it, and from which it must be freed if designed for nice purposes. This is most effectually done by distilling in it a small quantity of nitre, and redistilling the mixture. The vitriolic acid which came over in the first distillation is kept back by the nitre in the second, combining with its alkaline baits, and expelling a proportionable quantity of the nitrous acid.

We have here directed the pure vitriolic acid to be different used, in order to expel the nitrous one; but for this method of purpose any combination of the vitriolic acid with a metallic or earthy basis may be used, though not with equal advantage. If calcined vitriole is made use of,
its exceedingly volatile, so that great part of it is lost. If calcined alum, or felenite, is made use of, the vir- tuous acid in these substances immediately leaves the earth with which it was combined, in order to unite with the alkaline bases of the nitre, and expels its acid: but the moment the nitrous acid is expelled from the alkali, it combines with the earth which the vir- tious acid had left; from which it cannot be driven without a violent fire; and part of it remains obsti- nately fixed, so as not to be expelled by any degree of heat. Hence the produce of spirit, when nitre is distilled with such substances, always turns out consid- erably less than when the pure vivriolic acid is used. Alum is preferable to felenite, for the purposes of distilling spirit of nitre; because the acid does not ad- here so strongly to argillaceous as to calcareous earth.

According to Weigleb, the nitrous acid may be expelled not only by clay, gypflun, and other substances containing the virtuous acid, but even by various kinds of vitrifiable earth. Clay, pebbles, quartz in the form of sand, pieces of broken china and stone ware, powdered glafs, etc. mixed with nitre in the proportion of six to one, always expel the acid, though imperfectly. In France the acid is always extracted by means of clay.

The reason of these decompositions is, that the alk- aline bases of the nitre attract the flicile earth, whose fixed nits in a vehement fire gives it an advan- tage over the volatile nitrous acid, in the same manner that the weak acid of phosphorus or arsenic will also expel it by reason of their fixed nits in the fire.

Even spirit of salts, according to Margraaff's experi- ments, may be used for distilling the spirit of nitre. That celebrated chemist informs us, that on distilling nitre with eight or nine times its quantity of strong marine acid, a spirit comes over which consists chiefly of the nitrous acid, but has also some portion of that of fes-falt. The reason of this is shown in Mr. Kir- want's experiments on chemical atractiones in the present cafe, however, the decomposition may be facili- tated by the strong attraction of the nitrous acid for phlogifon; for it is well known, that on mixing the nitrous and marine acids together, the latter is always déphlogififed. It seems therefore that in this cafe a double decomposition takes place, the nitrous acid uniting itself to the phlogifon of the marine, and the latter attaching itself to the alkali of the nitre.

Spirit of nitre is very useful in the arts of dyeing and refining, where it is known by the name of aquafor- tis; and therefore an easy and cheap method of procuring it is a valuable piece of knowledge. Many difficulties, however, occur in this process, as well as that for the vivriolic acid. Oil of vitriol, indeed, al- ways expels the nitrous acid with certainty; and on distilling the mixture, a spirit of nitre arises; but if a glafs retort is used for the purpose of distilling this acid, the quantity of residuum left in distillation is so great, and so inoluble in water, being no other than vitriolated tartar, that the retort must always be broken in order to get it out; and the produce of spirit will scarce afford the breaking a retort. If earthen ret- torts are made use of, they must certainly be of that kind called stone-ware, and the price of them will be

very little if at all inferior to that of glafs. Iron pots are said to be made use of in the distillation of common acids and aquafortis in large quantities; but they have the great inconvenience of making a quantity of the acid fo vo- latile, that it not only will not condense, but spreads its suffocating vapours all round in such a manner as to prove very dangerous to those who are near it. If an iron vessel, therefore, is thought of for the purpose of distilling aquafortis, it will be proper at least to at- tempt luting over the inside with a mixture of gyp- seous earth and sand, to prevent as much as possible the acid from attracting the metal.

Déphlogififed spirit of nitre is obtained by distil- ling the smoking kind with a gentle heat, until what remains is as colourless as water. It is distilled with emitting white and not red fumes like the other kind, when set in a warm place. It must be kept con- stantly in the dark, otherwise it will again become phlogififed, and emit red vapours by the action of the light; the same thing will also take place if it be heated with too violent a fire.

II. To procure the Nitrous Acid by means of Arsenic.

Pulverife equal quantities of dried nitre and white blue aquafor- tis arsenic; mix them well together, and distill fortis, in a glafs-retort with a fire very cautiously applied; for the arsenic sets on the nitre with such a violence, and the fumes are so fific that volatile, that unless great care is taken, a moft dangerous explosion will almost certainly happen. As in this cafe, the nitrous fumes arise in a perfectly dry state, some water must be put into the receiver, with which they may unite and conden- se. The aquafortis so produced will have a blue colour, owing to the inflammable principle separated from the arsenic, by which its extreme volatility is likewise occasioned. If this blue aquafortis is ex- posed to the air, its colour soon flies off. If instead of the white arsenic we employ the pure arsenic acid, the distilled liquor will have no blue colour.

Nitrous Acid combined.

I. With Vegetable fixed Alkali. This salt, combined Sulphate.

with the nitrous acid to the point of saturation, regener- rates nitre. It is observable, however, according to Neumann, that there is always some diffimilarity between the original and regenerated nitre, unlefs quick- lime is added. The regenerated salt, he says, always corrodes tin, which the original nitre does not; owing probably to a quantity of phlogififed acid remaining in it. Boiling with quicklime deprives it of this quality, and makes it exactly the same with original nitre.

II. With Fossil alkali. The neutral salt arising from Cubic- a combination of the nitrous acid and fossil alkali is nitre, somewhat different from common nitre; being more difficult to crystallize, inclining to deliquate in the air, and flowing into crystals of a cubical form, whence it gets the name of cubic nitre. Its qualities are found somewhat inferior to the common nitre; and therefore it is never made, unless by accident, or for exper- iments.

Nitre is one of the most fusible salts. It is liquefied in a heat much less than what is necessary to melt red; and thus remain in tranquil fusion, without fus- ting. If nitre thus melted be left to cool and fix, whe-
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whether it has been made red-hot or not in the fusion, it coagulates into a white, semi-transparent, solid mass, called mineral crys\(\text{t}\)al, having all the properties of nitre itself. By this fusion, Mr Beaumo observes that nitre leaves very little, if any, of the water contained in its crys\(\text{t}\)als, since the weight of mineral crys\(\text{t}\)al is nearly the same with that of the nitre employed.

When nitre is kept in fusion with a moderate heat, and at the same time does not touch any inflammable matter, nor even flame, it remains in that state without suffering any very sensible alteration; but if it is long kept in fusion with a strong fire, part of the acid is destroyed by the phlogiston which penetrates the cooler; but very often fits uneasily on the considerable antiseptic power; whence its use in the resemblance of the

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its effect on itself. By this means a sediment falls to the bottom, which carries with it any impurities that may have been in the nitre, and leaves the fluid salt clear and transparent as water. This precipitate is probably no other than a vitriolated tartar formed by the union of the sulphurous acid and alkali of the nitre, which being less fusible than the nitre, sublimes in a solid form and clarifies it.

IV. With Calcareous Earths. These the nitrous acid Calcareous dissolves into a transparent colourless liquid; but for this nitre purpose it must be very much diluted, or the solution will have a gelatinous consistence. This compound is not applicable to any useful purpose. It has a very acrid taste; and, if inspissated, attracts moisture from the air. If it is totally dried, it then resembles an earthy matter, which deflagrates very weakly. By distillation in a retort, almost all the acid may be expelled, and what little remains flies off in an open fire.

Mr Pott, who has particularly examined the combination of nitrous acid with quicklime, says that the acid decomposes and is converted into a white precipitate. By these experiments he obtained a salt more easily fusible than the quicklime, and repeated coagulations upon it. By these experiments it would seem, that nitrous acid, by this treatment with quicklime, was capable of being entirely decomposed.

If a solution of chalk in the nitrous acid be evaporated to dryness, and then gently calcined, it acquires the property of fuming in the dark, after having been exposed to the sun’s rays, or even to the light of a candle. This substance, from its inventor, is called Baldwin’s phosphorus; or, from its being necessary to Phosphorus keep it in a glass hermetically sealed, phosphorus hermeticus. (See EARTHS.)

V. With Argillaceous Earths and Magnesia. All that is known concerning the combinations of nitrous acid with these earths is, that the first produce alriment, and the second purgative compounds, similar to alum and Epsom salt, and which are not fusible in crystallization.

VI. With Gold.—Till very lately it has been the opinion of chemists, that the nitrous acid by itself was incapable of acting upon this metal. Dr Brandt, however, produced before the Swedish academy of sciences, a solution of gold in the nitrous acid, obtained in parting, by that acid, a mixture of gold and silver.

The mixed metal was boiled with aquafortis in a glass body fitted with a head and receiver, the liquor poured off, and the coction repeated with fresh parcels of stronger and stronger nitrous spirit, till all the silver was judged to be extracted. The last parcel was boiled down till the matter at the bottom looked like a dry salt; on boiling this in fresh aquafortis in close vessels, as before, a part of the gold was dissolved, and the liquor tinged yellow. But though gold is by this means truly soluble in the nitrous acid, the union is extremely slight; the gold being not only precipitated on the addition of silver, but likewise spontaneously on exposure to the air.—Dr Lewis very justly observes, that this solution may have been often made unknown.

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unknown to the chemist who did so; and probably occasioned the mistakes which some have fallen into, who thought that they were in position of aquafortis capable of transmuting silver into gold. Notwithstanding these authorities, Mr. Kirwan is of opinion that the nitrous acid is in no case able to dissolve gold; the metal being only intimately mixed or diffused through it.

II. With Silver.—Pure spirit of nitre will dissolve its own weight of silver; and shoots with it into fine white crystals of a triangular form, consisting of very thin plates joined closely one upon another. These crystals are somewhat deliquescent; of an extremely bitter, pungent, and nauseous taste; and, if taken internally, are highly corrosive and poisonous. They melt in a small heat, and, on cooling, a dark-coloured mass still more corrosive, called lunar caustic, or lapis infernalis. They readily dissolve in water; and, by the affinity of warmth, in spirit of wine. In the Æte Natura Curiosorum, tom. vi. there is a remarkable history of silver being volatilized by its combination with the nitrous acid. Four ounces of silver being dissolved in aquafortis, and the solution let to distil in an earthen retort, a white transparent butter rose into the neck, and nothing remaining behind; by degrees the butter liquefied, and piled down into the phlegm in the receiver. The whole being now poured back into the retort, the silver arose again along with the acid. The volatilization being attributed to the liquor having stood in a laboratory where charcoal was burning in, the experiment was repeated with a fresh solution of silver, and a little powdered charcoal, with the same event.

Solution of silver in the nitrous acid stains hair, bones, and other solid parts of animals, and different kinds of wood, of all the intermediate shades from a light brown to a deep and lasting black. The liquors commonly used for staining hair brown or black, are no other than solutions of silver in aquafortis, so far diluted in water as not sensibly to corrode the hair.

It gives a permanent stain likewise to sandy stones; not only to those of the softer kind, as marble, but to some of considerable hardness, as agates and jaspers.

The solution for this purpose should be fully saturated with the metal; and the stone, after the liquor has been applied, exposed for some time to the sun. M. du Fay observes (in a paper on this subject in the French memoirs for 1728), that if the solution be repeatedly applied, it will penetrate into the whitish agate, or chalcedony, about one-twelfth of an inch: that the tinctorium does not prove uniform, on account of the veins in the stone: that the colours, thus communicated by art, are readily distinguished from the natural, by disapppearing on laying the stone for a night in aquafortis: that, on exposing it to the sun afterwards for some days, the colour returns: that the solution gave somewhat different tinctures to different stones; to oriental agate, a deeper black than to the common chalcedony; to an agate spotted with yellow, a purple; to the jade stone, a pale brownish; to the common emerald, an opaque black; to common granite, a violet unequally deep; to serpentine stone, an olive; to marble, a reddish, which changed to purple, and fixed in a brown; that on plates, tales, and amianthus, it had no effect.

If a solution of silver be diluted with pure water, a considerable quantity of pure mercury added, and the whole set by in a cold place; there will form by degrees a precipitation and crystallization resembling a little tree, with its root, trunk and branches, called arbor Diana, or the philosophic silver tree. Another kind of artificial vegetation may be produced by spreading a few drops of solution of silver upon a glass plate, and placing in the middle a small bit of any of the metals that precipitate silver, particularly iron. The silver quickly concretes into curious ramifications all over the plate.

Like other metallic solutions, this combination of solution of the nitrous acid with silver is decomposed by fixed and volatile alkalies, calcareous earths, and several metals, (see the Table of Affinities); but with several peculiar circumstances attending the precipitation. With metals, the silver is readily and copiously thrown down at first, but slowly and difficulty towards the end. The menstruum generally retains some portion of the silver, as the silver almost always does of the metal which precipitated it. For recovering the silver from aquafortis after paring, the refiners employ copper. The solution, diluted with water, is put into a copper vessel, or into a glass one with thin plates of copper, and let into a gentle warmth. The silver begins immediately to separate from the liquor in form of fine grey scales, or powder; a part of the copper being dissolved in its place, so as to tinge the fluid more or less of a bluish green colour. The plates are now and then shaken, that such part of the silver as is deposited upon them may fall off, and settle to the bottom. The digestion is continued till a fresh bright plate, kept for some time in the warm liquor, is no longer observed to contract any powdery matter on the surface; when the liquor is poured off, and the precipitate washed with fresh parcels of boiling water. It is observable, that though the acid in this process separates itself with the copper, in proportion as it lets go the silver, yet the quantity of copper which it takes up is not near so great as that of silver which it depots. One dram of copper will precipitate three of silver, and saturate all the acid that held the three drachms dissolved.

Calcereous earths, as chalk or quicklime, throw Characters down a part of the silver, but leave a very confiderecurably part suspended in the liquor. If the earth be marked on moiltened with the solution into the conftitution of a pale, and exposed to the sun, it changes its white by means colour to a dark purplish black; different characters of the sun's may be exhibited on the matter, by intercepting a light. part of the sun's light by threads, flit paper, &c. placed on the outside of the glass. Culinary fire does not afiect its colour; after the mass has been exploded by this, it changes as before, on exposure to the sun.

Mild volatile alkaline spirits, added to a solution of silver, precipitate but little, and caustic volatile alkalies none. Pure fixed alkalies, and alkalies rendered caustic by quicklime, throw down the whole. Fixed alkalies impregnated with inflammable matter by calcination with animal coals, occasion at first a considerable precipitation; but if added to a larger quantity, take up a great part of the metal again. Mr. Mar- graaf relates, that edulcorated calces of silver totally dissolve, both in a lixivium of these alkalies and in vo-
In this case had been contained in the aquafortis; for nitrous pure lead dissolved in pure aquafortis gives no such precipitate.

The crystals of lead in the nitrous acid, when thrown into the fire, do not disengage as other combinations of this acid with metallic or saline bases; but crackle violently, and fly round, with great danger to the by-standers. If they are rubbed into very fine powder, they may then be melted without any danger. By repeated dissolutions in fresh aquafortis, they at last form a thick fluid like oil, which cannot be dried without great difficulty. This composition is not adapted to any particular use, and is a violent poison.

Nitrous acid and its combinations.

Copper.

The nitrous acid very readily dissolves this metal into a green-colored and very caustic liquor. The solution, if properly evaporated, will crystallize; but the crystals are deliquescent, and therefore difficult to be prepared. The only use of this combination is for the preparation of the pigment called verditer. Of this there are two kinds, the blue and green. The blue is by far the brightest colour, and consequently the most valuable. It has been said that this is obtained by precipitating a solution of copper by any calcareous earth; and therefore is sold by the refiners who have large quantities of solution of copper accidentally made. The solution is said to be precipitated by chalk, or whiting; and that the precipitate is the beautiful blue colour called verditer. By this method, however, only the green kind can be obtained. The blue we have found to be of a quite different nature, and formed by precipitation with a gentle heat from a solution of copper in volatile alkali. See the article Colour-making.

Iron.

This metal is very abundantly precipitated in the nitrous acid, and is then dissolved in the aquafortis; for nitrous dioxide of such a degree of strength as to take up half its weight of silver, dissolves with ease above equal its weight of mercury into a limpid liquor, intensely corrosive and poisonous, which spontaneously shoots into white crystals. These crystals, or the solution exsiccated, and moderately calcined, assume a sparkling red colour; and are used in medicine as an escharotic, under the name of red lead precipitate. The precipitate has sometimes been given internally, it is said, in very large quantities; even a whole drachm at one dose. But this would seem incredible; and the present practice does not contemplate the taking of red precipitate inwardly. This solution seems to have been what gave the efficacy to Ward's white drop.

When red precipitate is prepared in quantity, it is proper to dilute the mercurial solution; because most of the aquafortis may then be saved. It is exceedingly pure, if by purity we mean its being free of any admixture of vitriolic or marine acid; but is considerably tainted with the inflammable principle of the mercury extracted during the distillation. In consequence of this, it is very volatile and smoking; which has generally, though improperly, been taken as a sign of strength in the nitrous acid.

Bismuth.

This semi-metal is very readily dissolved in the nitrous acid. The nitrous acid dissolves about half its weight of bismuth. If the metal was formerly added, the solution proves of a greenish colour; if otherwise, it is colourless and transparent. Unless the acid was diluted with about an equal quantity of water, a part of the bismuth crystallizes almost as fast as it dissolves. The metal is totally precipitated both by fixed and volatile alkalis. The lead, added in greater quantities than are sufficient for precipitation, takes it up again. The liquor generally appears greenish; by alternate additions of the alkaline spirit and solution, it becomes bluish or purple. Fixed alcalies calcined with inflammable matter likewise dissolve the bismuth after they have precipitated it.

The only use of this compound is for the precipitate, which is used as a cosmetical, under the name of bismuth.

In the memoirs of the French academy for 1733, there is a particular account of an experiment, in which mercury is said to have been extracted from lead by dissolving in it the nitrous acid. During the distillation, there fell a precipitate which is plainly proved to be mercury, and was looked upon to be one of the constituent parts of the lead separated by this simple process: it seems probable, however, that the mercury spirit
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Nitrous acid and its combinations.

IX. With Zinc. Upon this sublimate the nitrous acid acts with greater violence than any other, and will forswear any other metallic sublimation for it. The whole is very soon dissolved into a transparent colourless liquor. The cals of flowers of zinc are likewise soluble in the nitrous acid; but neither the solution of the flowers, nor of the metal itself, have been yet found applicable to any useful purpose. Neumann remarks, that on extracting the nitrous acid, the soluble parts of calamine, which is an ore of zinc, the solution, infuriated to dryness, left a reddish brown mass, which on digestion with spirit of wine exploded and burst the vessel.

X. With Regulus of Antimony. The nitrous acid rather corrodes than dissolves this femimetal. The corroded powder forms a medicine formerly used under the name of bezoar mineral, but now disfregaded.

XI. With Regulus of Cobalt. This femimetal dissolves readily in the nitrous acid, both in its metallic form and when reduced to a calx. The solution is of a red colour. Hence the nitrous acid furnishes means of discerning this femimetal in ores after long calcination; very few other cals being soluble in the nitrous acid, and those that are not influencing the colour.

XII. With Nickel. This femimetal is easily dissolved by the nitrous acid into a deep green liquor; but neither this solution, nor indeed the femimetal of which it is made, has hitherto been found of any use.

XIII. With Arsenic. This sublimation is readily dissolved by the nitrous acid; which abstracts the phlogiston, and leaves the pure arsenical acid behind. See below.

Acid of Arsenic.

XIV. With Expressed Oils. These, as well as all other fatty or unctuous substances, are considerably thickened and hardened by their union with the nitrous acid. There is only one preparation where this combination is applied to any use. It is the breguentum citrinum of the shops. This is made by adding to some quantity of melted hog-plaster a solution of quicksilver in the nitrous acid. The acid, though in a diluted state, and combined with mercury, nevertheless acts with such force on the lard, as to render the ointment almost of the consistence of tallow.

XV. With Vinous Spirits. If highly rectified spirit of wine and strong spirit of nitre are suddenly mixed to-gether, the acid instantly becomes volatile, and is dissipated with great heat and effervescence in highly noxious red flames. If the acid is cautiously poured into the spirit, in the proportion of five, six, or even ten parts of spirit to one of acid, and the mixture distilled in a glass retort set in a water-bath, an exceedingly fragrant and volatile spirit comes over, used in medicine as a diuretic and cooler, under the name of spiritus nitri dulcis. This liquor is not acid; nor has spiritus nitri dulcis any of the characterisitics of tri duleis, of nitrous acid, which seems to be entirely decomposed in this process. (See the following article.)

With the nitrous acid and spirit of wine, may also Nitrous ether be made an exceedingly volatile liquor, called nitrous ether, to distinguish it from the vitriolic abovementioned. The proportions of nitrous acid and spirit of wine to each other for nitrous ether, are two of the acid by weight to three of the spirit. Dr Black's process for making it is as follows. Take four ounces of strong phlogilicated nitrous acid; and having cooled it by putting it into a mixture of salt and snow, or into water cooled very near the freezing point, by putting pieces of ice into it, he puts it into a phial, and pours upon it an equal quantity of water, likewise cooled very low, in such a manner that the water may float as much as possible on the surface of the spirit. Six ounces of strong spirit of wine are then put in, so as to float in like manner on the surface of the water; the phial is placed in a vessel containing cold water; and so great is the power of cold in restraining the action of bodies, that if the mixture was too cold, no ether would be produced; but at the temperature just mentioned, the ether begins to form in a few hours, with some little effervescence, and an expulsion of a small quantity of nitrous air. We must provide for the escape of this elastic fluid, by having a hole in the cork, or the vessel would be broken. The whole of the ether will be formed in a few days, and may be separated from the rest of the liquor by means of a funnel, shaped as in Pl. CXXXIV. fig. 9.

To procure the nitrous ether in large quantities, Mr Woulfe recommends the following process. Put four ounces of nitre into a retort four pounds of nitre, then mix together four pounds of vitriolic acid, and three pounds five ounces of spirit of wine. These are poured on the nitre by adding only two ounces at a time; the vitriolic acid acting on the nitre, produces a sufficient degree of heat; and the acid of the nitre uniting with 302 the
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Marine acid and its combinations.

Mr Potter has given an analysis of the oleaginous residue from the distillation. Distilled by a stronger fire, it gave over a yellow, slightly empyreumatic spirit, which being saturated with fixed alkali, the liquor evaporated, and the dry neutral fuel laid on burning coals, did not deflagrate. After this spirit arose a red empyreumatic oil; and in the bottom of the retort it left a shining black mass like a foot, which, burnt in a crucible, left a white fixed earth, convertible by a vehement fire into gla.s. Another parcel of the above residuum was evaporated to the consistence of pitch. In this state it gave a yellow tincture to spirits of wine, flame vividly and quietly on burning coals, and at last swelled up like bitumen. Another portion was saturated with alkaline ley, with which it immediately evaporated, and then evaporated as the former. It gave, as before, a yellow tincture to rectified spirit of wine, and a much deeper yellow to dulcified spirit of nitre; and in the fire discovered no footstep of detonation. M. Marquer supposes this acid to have been not the nitrous, but the acetous, which enters into the composition of the spirit of wine; and his conjecture is now confirmed by late experiments.

§ 3. Of the Marine Acid and its Combinations.

This acid is never, at least very rarely, found but Marine acid in a state of mixture with the mineral alkali; in said which case it forms the common salt used in food. Almost the only exception to this is human urine, and perhaps that of some other animals; for there the marine acid is found saturated, not with the mineral, but the common vegetable, fixed alkali. From being found in such plenty in the waters of the ocean, it has the name of marine acid.

It is commonly thought that this acid is no other than the vitriolic, somehow or other disguised by the inflammable principle; to which some have added another, called by them a mercurial earth. The reasons given for this supposition, however, are but very slight, consisting chiefly in the resemblance between the volatile vitriolic acid and the marine, both in the white colour of their vapours, and likewise the great volatility of both. As to the existence of that principle called a mercurial earth, it hath never been proved; and till that time, can never be allowed to be an ingredient in the composition of any substance whatever. As we do not remember to have read of any experiments where the marine acid was directly produced from that of vitriolic, we shall content ourselves with relating one very remarkable fact which happened to fall under our own observation.

As vitriolized tartar, or Glauber's salt, when fused with charcoal dust, is converted into an hepar sulphuris, attempts have been made on this principle to separate the pure alkali from the residuum of Glauber's spirit of nitre and spirit of salt. In an attempt of this kind, which, by the bye, proved unsuccessful, as all others of the same kind must do, 30 or 40 pounds

Nitrous acid and its combinations.

Inquiry into the nature of ether.

Marine spirit, forms a nitrous ether, which flies off from the mixture, and is condensed in a number of vessels placed in cold water. To obtain good nitrous ether readily, and at one distillation, Mr Dollfué advises to divide four parts of nitre of manganese, four of vitriolic acid, and eight parts of spirit of wine.

M. Macquér supposes ether to be the most oily part or quintessence of spirit of wine. But it cannot be proved that ether contains any oil. And, besides, if this were the case, those acids which have the strongest attraction for water would produce the greatest quantity of ether; which is found not to be the case: and it is most probable that ether is produced by a combination of some part of the acid with a portion, particularly the inflammable part, of the spirit of wine; and it has been shown by chemical experiments, that every kind of ether contains a part of the acid employed. Dr Black himself has formed ether without any spirit at all, by expelling nitrous acid highly phlogosticated for some months to the light of the sun. This was owing to the attraction of the principle of inflammability; which it is well known that light has the power of affording to bodies that attract it with force.

Nitrous Acid Decomposed.

I. By Essential Oils. If equal quantities of strong nitrous acid and oil of cloves are poured into the same vessel, the mixture instantly takes fire; both acid and oil burning with great fury till only a light fumption coal remains. Dr Lewis observes, that this experiment does not always succeed, and that there are but few oils which can be fired with certainty, without attending to a particular circumstance first discovered by M. Roselle, and communicated in the French Mémoirs for the year 1747. "On letting fall into the oil equal its quantity of acid, the mixture effervesces, swells, and a light fungous coal arises: a little more of the acid poured upon this coal lets it instantly on fire. By this method almost all the distilled oils may be fired by spirit of vitriolic moderate strength. Expressed oils also may be set on fire by a mixture of the nitrous acid and oil of vitriolic; the use of which last seems to be to absorb the aqueous humidity of the spirit of nitre.

II. By Charcoal. By this substance the nitrous acid cannot be conveniently decomposed, unless it is combined with an alkaline or metallic base. For the purpose of decomposing the acid, common saltpetre is most convenient. The proportions recommended by Dr Lewis for alkaliating nitre, are four ounces of the salt to five drachms of powdered charcoal. If these are carefully mixed, and injected by little and little into a tubulated retort made red hot, and fitted with a large receiver and a number of adopters, a violent deflagration will ensue on every addition, attended with a great quantity of air, and some vapours which will circulate for some time, and then condense in the vessels. This liquor is called Clyfus of nitre. If sulphur is used instead of nitre, the clfyfus is of a different kind, consisting of a mixture of the nitrous and vitriolic acids. The residuum, when charcoal issued, is a very strong and pure alkali; with sulphur it is vitriolated tartar. To prevent the loss occasioned by the violent deflagration, when this operation is performed in open vessels, Dr Black recommends to have the materials somewhat moist.

III. By Vincis Spirits. In the process already mentioned for making spiritus nitri dulcis, a total decomposition of the acid seems to take place: for neither the dulcedified spirit itself, nor the acid matter left in the retort, show any signs of deflagration with inflammable matters, which is the peculiar characteristic of nitrous acid.
The yellow colour of the marine acid is sometimes Marine owing to iron, which may be precipitated from it by acid means of an alkali. In certain cases, however, it is observed to have a much darker and nearly a brown colour, without containing the smallest particle of this metal.—Mr Duflos is of opinion, that the yellow colour of the marine acid is owing to a portion of depoliticized air which it generally contains. A pretty strong proof that it emits this kind of air indeed is, that a candle will burn longer in a bottle containing some marine acid, than it will in an equal quantity of common air.

I. To procure the Marine Acid by means of the Vitriolic.

Put any quantity of sea-salt into a tubulated glass retort, to which a large receiver is firmly luted, having a quantity of water in it, more or less as you want your spirit of salt to be more or less strong. Having placed your retort in a sand-bath, take of concentrated oil of vitriol half as much as you put salt into the retort. Through the aperture in the upper part of the retort, pour a small quantity of the vitriolic acid; a violent effervescence will immediately arise, and white vapours will ascend, and come over into the receiver. These vapours are the marine acid in its most concentrated state; and, as they are very greedy of moisture, they will unite with the water in a very short time, unless too much oil of vitriol is put in at once; in which case, part of them will be diffipated through the small hole in the receiver. When you perceive the first fumes condensed, add a little more oil of vitriol, taking care to stop the aperture of the retort as soon as you drop in the vitriolic acid, that the marine acid may not escape. Continue this by intervals, till your acid is all put in; and then make a very gentle fire, that the retort may be no warmer than the hand can bear. This degree of heat must be continued a long time, otherwise very much of the acid will be lost. To perform this operation perfectly, no more acid should be forced over, than what the water in the receiver can take up; and by this means the operator’s patience will be rewarded with a vastly larger produce of acid than can be procured by hasty distillation. When the vapours become a little more fixed, a greater heat is necessary, but nothing equal to what the nitrous acid requires. For distilling spirit of salt, Mr Wiegleb recommends four pounds of oil of vitriol to six of common salt.—It may also be obtained from the bittern remaining after the crystallization of common salt, by adding one pound of oil of vitriol to five of bittern. It may even be obtained from this liquid by simple distillation without any additional acid; but a violent fire will then be necessary, and it is almost impossible to prevent the liquor from swelling and running over the neck of the retort in the beginning of the process.

The marine acid cannot be procured by means of Why distillation of sea-salt with cop per passes does not succeed. combinations of the vitriolic acid with metallic and earthy bases, as the nitrous is: for though, by means of calcined vitriol, for instance, the marine acid is effectually expelled from its alkaline basis, yet it immediately combines with the calx of iron left by the vitriolic acid, and not only adheres obstinately, but even sublimes the metal; so that what little spirit can be ob-
obtained, is never pure. This inconvenience is not
so great when uncalci ned copperas is made use of:
for the marine acid has a very strong attraction to
water; which partly dissolves its union with the me-
tanine salt. If gypsum is used, instead of calcined
vitriol, not a drop of spirit will be obtained. Alum
and sal cathericus amans answer better.

II. To procure the Marine Acid by means of the
Nitrous.

Aqua-regis.
Take equal quantities of sea-faIt and Glauber's spi-
rit of nitre; put the salt into a retort, and pour on it
the nitrous acid; let them stand for 10 or 12 hours;
then distil with a gentle heat; an acid liquor will come
over, which is a compound of the nitrous and marine
acids, called aqua-regis. When the distillation is fi-
nished, and the vessels cooled, pour back the distilled
liquor on the mash which is left in the retort, and
distil again; the second produce will be more of the
nature of spirit of sea-faIt than the former. Continue
to do this, pouring the distilled liquor either on the
mash left in the retort, or upon fresh sea-faIt, till you
observe that no nitrous acid arises. No experiments
have been made on this spirit of salt, by which we can
judge whether it is different from that procured by the
vitrilic acid or not.

III. To procure the Marine Acid, by distilling Salt
per se.
Put into a retort any quantity of common salt which
has not been dried, and distil in a sand-heat till noth-
ing more will come over. In the receiver you will
have a liquor considerably more acid than vinegar, in
weight about the fourth part of the salt employed.
On the dry salt left in the retort, pour some water,
somewhat less in quantity than the liquor which came
over. Let it stand till the salt has thoroughly imbi-
ced the moisture, and then distil again. You will again
have an acid, but weaker than the former. Repeat
this process four or five times, after which you will obtain
no more marine acid in this way. It has been thought
that sea-faIt was capable of total decomposition by
means of moisture alone; but that is found to be a
mistake. The reason of any acid being procured in
this way, is the impurity of the common salt, which is
always mixed with a quantity of sal cathericus am-
arus, and of marine acid combined with magnesia, from
which it is separable by moisture. If a pure salt be
formed by combining marine acid with salt of soda,
no spirit will be obtained.

IV. To dephlogisticate the Marine Acid.

The marine acid, when mixed either with that of
nitre or with manganese, loses that peculiar smell by
which it is usually distinguis hed, and acquires one much
more volatile and suffocating. When mixed with the
former, the compound is called aqua-regis; when sub-
mitted to the action of manganese, the product is called
dephlogisticated spirit of salt. The method of procuring
this acid recommended by Mr. Scheele is as follows:
Mix common muriatic acid in any quantity with levit-
gated manganese in a glass retort; to which lute on
with blotting paper a receiver capable of containing
about 12 ounces of water. Put about two draehms of
liquid into it; and in about a quarter of an hour, or
somewhat more, a quantity of elastic fluid, which is the
true dephlogisticated spirit of salt, will pass over, and Marine
communicate a yellow colour to the air in the receiver; acid and
water will be separated from the retort. If the paper has been closely applied, a quantity of
the air will now null out with some violence; a con-
stant reat must therefore instantly be put into it, and another
receiver applied, having in like manner two draehms of
water in it, which will also be filled in a short time;
and thus mayveral phials full of this aerial acid be
procured in a short time. Care should be taken, that
the retort be placed in such a manner as that any drops
of liquid which chance to arise may fall down again in-
to it. The water put into the receivers seems to den-
si f y the vapours of the marine acid; and it is most
proper to use small receivers, on account of the great
quantity of vapour which is lost at every operation.

The effects of this dephlogisticated marine acid, which can scarcely be condensed into a liquid, are:
The lute is corroded in distillation, and the corks be-
come yellow, as from aquafortis. 2. Paper coloured
by lacmus becomes nearly white; as well as all vege-
table red, blue, and yellow flowers; and the same
change is likewise produced upon the green colour of
vegetables; nor can any of these colours be recovered
by either alkalies or acids. 3. Expressed oils and an-
imal fats, exposed to the vapour, become as tenacious
as turpentine. 4. Cinnabar grew white on the sur-
f ace; and when it was washed, a pure solution of corro
sive sublimate was obtained; but the sublimate did not
change. 5. Green vitriol became red and delique-
cent, but white and blue vitriol remained unchanged.
6. Iron filings were dissolved; and on evaporating the
solution to dryness, common muriatic acid was ob-
ained by distillation with marine acid. 7. In like man-
ner all the metals, even gold itself, were dissolved;
and by precipitation with volatile alkali, the solution of
gold yielded aurum pulvis. 8. The caustic volatile
alkali produced a white cloud, and emitted a number
of air-bubbles, which on burning discharged an elastic
vapour. 9. Fixed alkali was changed into common
faIt, which decomp sed in the fire. 10. Arsenic be-
came deliquec dent, infects died, and fire was infanta-
iously extinguished in the v.pour.

These phenomena proceed from the strong attrac-
tion of dephlogisticated marine acid for the phlogis-
to have lost; and which is one of the es sential parts of it,
without which it cannot scarce be condensed into a
liquid. "Perhaps (says Mr. Scheele) Stable obtained
such a dephlogisticated muriatic acid by means of iron;
and from the yellow colour of the cork was led to sup-
pose that the muriatic acid had been changed into the
nitrous. If you make a mixture of manganese, muri-
atic acid, or distilled vitriolic acid, and alcohol; and af-
after some days digestion distil it by a gentle fire, no ef-
rence ensues; but the spirit of wine goes over;
and, what is very remarkable, has a strong smell of
nitrus ether.

A new salt has been produced by Mr. Berthollet from New salt
the union of dephlogisticated spirit of salt with vege-
table alkali. This appears to be the nitrous kind, nitre by
as having a coal taste and devastating strongly in the tho-
let. The compound was in very small quantity, and
seemed to require more pure air for its composition than
an equal bulk of acid. The greatest part of this salt
produced was the common salt of Sylvius, or digestive
salt, formed by a combination of the phlogisticated ma-
}H
When the fixed alkali is employed, marine rine acid with alkali. Six parts of the dephlogiticated acid are required to give their air to one of the salt. When the fixed alkali is employed, some of the dephlogiticated acid escapes with the pure air; and in general, when not exposed to a bright heat, the salt we speak of is formed. Some of the dephlogiticated acid remains in its proper form after the salt is made, and may be separated by the volatile alkali. It is to be observed, that if the caustic alkali be employed, and the solution much concentrated, even though not under the influence of a bright light (for it is the light which produces the extraction of the dephlogiticated air*), the other properties of this salt as yet discovered are, that it fothers into rhomboidal crystals; it does not precipitate mercury, silver, or lead, from their solutions in nitrous acid; and it gives out its air again in such a pure state as scarcely to be paralleled in any other substance.

With the mineral alkali the dephlogiticated acid forms a deliquescence salt, soluble in spirit of wine; and which, even in a fluid state, detoanates with burning charcoal. With lime, when so far quenched that the air in its interstices is separated, the dephlogiticated acid unites but weakly. It may be recovered from the lime, however, provided the light be obscure, with very little loss, and almost unchanged.

Marine acid and its combinations.

Sal ammoniac is usually sold in large semi-transparent cakes, which are again capable of being sublimed into masses of the like kind. If they are dissolved in water, the salt very easily shoots into small crystals like feathers. Expoused to a moist air, it deliquates. It is one of the salts which produces the most cold by its solution; so as to sink the thermometer 18 or 20 degrees, or more, according to the temperature of the atmosphere. According to Mr Gellert, a solution of salt ammoniac has the property of dissolving resins. According to Neumann, the volatility of salt ammoniac is so much diminished by repeated sublimations, that at last it remains half fluid in the bottom of the sublimate vessel. In its natural state, it sublimes with a degree of heat necessary to melt lead. Pott says, that a small quantity of salt ammoniac may be produced by distilling sea-salt with charcoal, or with alum, or by distilling marine acid with Armenian balsam. The same author affirms, that the inflammability of sulphur is destroyed by subliming it with twice its quantity of salt ammoniac.

The method of making this salt was long unknown; and it was imported from Egypt, where it was said to be prepared by sublimation from foot alone, or from a mixture of sea-salt, urine, and foot. That it should be produced from foot alone is very improbable; and the other method, from the known principles of chemistry, is absolutely impossible. The composition of this salt, however, being once known, there remained no other desideratum than a method of procuring those competent parts of salt ammoniac sufficiently cheap, so as to afford salt ammoniac made in Britain at a price equal to what was imported. The volatile alkali is to be procured in plenty from animal substances or from foot; and the low price of the vitriolic acid made from sulphur affords an easy method of decomposing sea-salt, and obtaining its acid at a low rate. A salt ammoniac work has, accordingly, been established for several years past in Edinburgh; the principal material made choice of for procuring the volatile alkali is foot; and though no persons are admitted to see the work, the large quantities of oil of vitriol brought into it, and the quantities of genuine salt mirabilis which are there made, evidence that the process for making salt ammoniac also produces Glauber's salt, by the decomposition of common salt by means of vitriolic acid. The method of conducting the process is unknown; but it is plain that there can be no other difficulty than what arises from the volatility of the vapours of the alkali and of the marine acid. In the common way of distilling these substances, a great part of both is lost; and if it is attempted to make salt ammoniac by combining these two when distilled by the common apparatus, the product...
duc will not pay the cost; a little ingenuity, however, will easily suggest different forms and materials for distilling-vessels, by which the marine acid and volatile alkali may be united without losing a particle of either.

If a solution of vitriolic or Glauber's secret sal ammoniac is mixed with sea-salt, the vitriolic acid feizes the alkaline balls of the sea-salt, and expels the marine acid, which immediately unites with the volatile alkali left by the vitriolic acid, and forms a true sal ammoniac. If this solution is now evaporated to dryness, and the saline masses sublimed, the sal ammoniac rifies, and leaves a combination of vitriolic acid and mineral alkali at the bottom. This fixed mafs being dissolved, filtered, and evaporated, affords Glauber's salts. This has sometimes been thought a preferable method of making sal ammoniac, as the trouble of distilling the marine acid was thereby prevented; but it is found vastly inconvenient on another account, namely, that when sal ammoniac is mixed with any fixed salts, it is always more difficult of sublimation, and a part of it even remains entirely undissolved; but if the mctal is melted in a crucible and cooled, it appears luminous when struck, and has been called phosphorus fluens. See Earths.

V. With Gold. The marine acid has no action on gold in its metallic state; in whatever manner the acid be applied; but if the metal is previously attenuated, or reduced to a calx, either by precipitation from aqua-regia or by calcination in mixture with calcinable metals, this acid will then perfectly dissolve, and keep it permanently suspended. Gold, precipitated from aqua-regia by fixed alkalis, and evaporated by repeated ablations, may be dissolved even in a very weak spirit of salt by moderate digestion. This solution appears of the same yellow colour as that made in aqua-regia; gives the purple stain to the skin, feathers, bones, and other solid parts of animals; the same violet stain to marble; and strikes the same red colour with tin. Even when common aqua-regia is made use of for the menstruum, it seems to be chiefly by the marine acid in that compound liquor that the gold is held in solution. In distillation the nitrous acid arises, and the marine acid remains combined with the gold in a blood-red mafs, soluble, like most of the combinations of metallic bodies with this acid, in spirit of wine. If, towards the end of the distillation, the fire is hastily raised, part of the gold dills in a high faffron-coloured liquor; and part sublimes into the neck of the retort in clusters of long slender crystals of a deep red colour, fusible in a small heat, deliquating in the air, and easily soluble in water. By repetitions of this process the whole of the gold may be elevated, except a small quantity of white powder whose nature is not known. Marine -This red sublimate of gold is said to be easily fusible acid and with the heat of one's hand, and to be thrown by the combinations Papiffs for the blood of St. Januarius; the sublimate contained in a phial, being warmed by the hands of the priests who hold it, constitutes the miracle of that blood of St. Januarius.

VI. With Silver. Strong spirit of salt corrodes leaf-silver into a white powder, but has no effect on filings or larger masses of the metal. If applied in the form of vapour to masses of silver, and strongly heated at the same time, it readily corrodes them. Thus, if filings, grains, or plates, of silver are mixed with about twice their weight of mercury sublimate, and exposed to a moderate fire, in a retort, or other distilling vessel, a part of the marine acid in the sublimate will be separated and unite with the silver, leaving the mercury to arize in the form of mercurius dulcis. Marine acid is commonly supposed to be incapable of dissolving silver into a liquid state; but Hencelk relates, that if red silver ore, which consists of silver intimately mixed with red arsenic, be digested in spirit of salt, the silver will be extracted and kept permanently dissolved.

The combination of marine acid with silver is called Luna cornea. The most ready way of preparing it is by means of dissolving silver in the nitrous acid, and then adding spirit of salt, or a solution of sea-salt, when a precipitation instantly ensues; the marine acid expels the nitrous, and unites with the silver, falls to the bottom in form of a white powder. The same precipitation would take place, if a solution of silver was made in the vitriolic acid.

Luna cornea weighs one-fourth more than the silver it is employed; yet, when perfectly washed, it is quite in- tin-sipid to the taste. It does not dissolve in water, spirit of wine, aqua-fortis, or aqua-regia; but is in some small degree acted upon by the vitriolic acid. It melts in the fire as soon as it grows red-hot; and, on cooling, forms a ponderous brownish mafs, which being cast into thin plates, becomes semitransparent, and somewhat flexible, like horn; whence its name Luna cornea. A stronger fire does not expel the acid from the metal, the whole concrete either fusilming entire, or fusiling through the crucible. It totally dissolves in volatile alkali spirits without any separation of the metal. Exposed to the fire in a clofe copper vessel, it penetrates the copper, and tinges it throughout of a silver colour. Kuncelk observes, that when carefully prepared, melted in a glafs vessel, and suffered to cool slowly, to prevent its cracking, it proves clear and transparent; and may be turned into a lafe and formed into elegant figures. He supposes this to be the preparation which gave rise to the notion of maleable glafs.

VII. With Copper. In the marine acid, copper dissolves but slowly. The solution, if made without heat, appears at first brown; but, on standing for some time, deposits a white sediment, and becomes green. On adding fresh copper, it becomes brown again, and now recovers its greenness more slowly than before. The white sediment, on being barely melted, proves pure and perfect copper of the same colour as at first. Copper calcined by fire communicates a reddish colour to this acid.

VIII. With Iron. The marine acid acts upon iron-
PRACTICE.

Marine acid and its combinations.

Maries very much than the nitrous, and does not dissolve so much; nevertheless, it attacks the metal briskly, so as to raise considerable heat and effervescence, and distils off a yellow liquor. During the solution, an inflammable vapour arises as in the solution of this metal by vitriolic acid. This solution of iron does not crystallize. If it is evaporated, it leaves a greenish saline mass, which is soluble in spirit of wine, and runs in the air into a astringent yellow liquor. On distillation, some of the acid separates, and towards the end of the operation the spirit becomes yellow. This is followed by a yellowish, or deep reddish sublimate, which glitters like the scales of fishes; leaving behind a substance which consists of thin, glossy plates, like talc.

Iron volatileized.

The solution of iron in spirit of salt, with the addition of some spirit of wine, is used in medicine as a corrosorant, under the name of tincture a maris. The sublimate of iron is also used for the fame purpose, and called enervis, or florae maritales. It is commonly directed to be prepared by subliming iron filings and salt ammoniac together. In the process, the salt ammoniac is partly decomposed, and a caustic alkaline liquor diffuses. Then the undecomposed salt ammoniac, and the marial sublimate abovementioned, arise together. The sublimate has a deeper or lighter yellow colour, according as it contains more or less iron. The name enervis is improper. It was given by Mr. Boyle, who discovered this medicine. He imagined it to be a preparation of copper, having made use of a colocho of vitriol containing both iron and copper. A medicine of this kind was lately sold with great reputation on the Continent, under the name of Belutschef's nervous tincture. It was introduced by M. Belutschef Field Marshal in the Russian service: but not long after it came into vogue in Prussia and other northern kingdoms of Europe: it made its appearance also in France, under the name of General de la Motte's golden drops. This happened through the infidelity of Belutschef's operator, who, for a sum of money, violated the oath of secrecy he had taken to Belutschef, and discovered the secret to de la Motte. To the latter it proved a very valuable acquisition; for he not only procured a patent for it from the king of France in 1750, with the exclusive privilege of selling it, but had a handsome pension allotted upon it; selling his medicine besides a half a Louis d'or per phial.

The attention of the public was particularly drawn to these drops, by their remarkable property of losing their yellow colour in the sun, and regaining it in the shade, which induced many to believe that they contained gold; and in which opinion they were encouraged by de la Motte. Even chemists of no little reputation were deceived by this appearance; and M. Beaumé, imagining he had discovered the secret, published a preparation to the world as the true arcanum of de la Motte's drops. It consisted of a calx of gold precipitated from aqua-regia by means of fixed alkali, and redissolved in nitrous acid, to which was added a large quantity of spirit of wine. Others, however, who could find nothing but iron by an analysis of the drops, refuted their ailment; and at length, in 1750, M. Beaumé's mistake was made evident by the publication of the process at the desire of the empress of Russia, who gave 5000 rubles for the receipt. The original receipt is perplexed, tedious, and expensive; but when deprived of its superfluous parts, is nearly as follows. Six pounds of common pyrites and twelve pounds of corrosive sublimate are to be triturated together, and then sublimed fix or eight times till all the mercury is expelled. The residuum is to be boiled three times with thrice its quantity of water, and as often filtered, and lastly, distilled to dryness. By increasing the fire, a martial salt is at last sublimed into the neck of the retort; to three drachms of which are to be added 12 ounces of highly rectified spirit of wine. The whole exposed to the rays of the sun. This is the yellow tincture; but there was also a white one, which, however, seems to be but of little value. It is made by pouring on the residuum of the last sublimation twelve pounds of highly rectified spirit of wine, and drawing it off by a gentle distillation after a few days digestion.—Mr. Klaproth imagines, from the following experiment, that Belutschef's tincture absorbs phlogiston from the rays of the sun. He poured a phlogiston few drops of a solution of tartar into two ounces of distilled water, and divided this into two parts. Into one glass having poured a few drops of the tincture that had not been exposed to the sun, the iron was precipitated in the usual form of a yellow ochre; but on treating in the same manner a portion of the tincture that had been exposed to the solar rays, the precipitate fell of a bluish green colour.

Marine acid and its combinations.

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and is capable of fully dissolving much tin in the ordinary way. From this imperfect saturation, together with its concentration, proceeds partly its property of smoking so considerably: nevertheless, some other cause probably concurs to give it this property; for though it smokes infinitely more than the most concentrated spirit of salt, its vapours are, notwithstanding, much less elastic. It has all the other properties of concentrated marine acid when imperfectly saturated with tin. If it is diluted with much water, most of the metal separates in light white flocks. In drying, it produces the same effects as solution of tin made in the common way. If the distillation is continued after the smoking liquor of Libavius has come over, the mercury of the corrosive sublimate will then arise in its proper form.

X. With Lead. Marine acid, whether in its concentrated or diluted state, has little effect upon lead, unless affixed by heat. If spirit of salt is poured on filings of lead, and the heat is increased so as to make the liquor boil and distil, a part of the acid will be retained by the metal, which will be corroded into a feline mass; and this, by a repetition of the process, may be dissolved into a limpid liquor. If lead is dissolved in aquafortis, and spirit of sea-salt, or sea-salt itself, added to the precipitation of the metal entire, but if some aqua-regia is added, the precipitate is redissolved.

The combination of lead with marine acid, has, when melted, some degree of transparency and flexibility like horn; whence, and from its resemblance to which he says, some precautions are necessary, and which those constantly employed here-in are belch acquainted with. The principal are, the due mixture of the ingredients, which in some places is performed in the same manner as that of the ingredients for gun-powder: that a head and receiver be adapted to the subliming glas, to sáye some spirit of nitre which will come over. (Here a bent tube of glas will answer the purpose, as already mentioned). The fire must not be rased too hastily. When the sublimate begins to form, the ashes must be removed a little from the sides of the glas, or the glas cautiously raised up a little from the ashes. (This last, we think, is highly imprudent.) Lastly, the laboratory must have a good chimney, capable of carrying off the noxious fumes. The above-mentioned quantities commonly yield 360 pounds of sublimate; the 280 pounds of quicksilver gaining 80 from the 200 pounds of sea-salt. The makers of sublimate...
Marine acid and its combinations.

817. Observations on the different methods.

The above processes, particularly the last, are unexceptionable as to the production of a sublimate perfectly corrosive; but the operation, it is evident, must be attended with considerable difficulty, by reason of the large quantity of matter put into the glass at once. We must remember, that always on mixing a volatile salt with a quantity of fixed matter, the sublimation of it becomes more difficult than it would have been had no such matter been mixed with it. This is of considerable consequence, therefore, in all sublimations, to make the quantity of matter put into the glasses as little as possible. It would seem more proper, instead of the calcined vitriol used in the processes last mentioned, to dissolve the mercury in the vitriolic acid, as directed in turbit mineral, and sublimate the dry mafs mixed with nitre and peaf-fall.

819. Subpoled adulteration with arsenic.

It has been said, that corrosive sublimate mercury was frequently adulterated with arsentic; and means have even been pointed out for detecting this supposed adulteration. These means are, to dissolve a little of the suspected salt in water, and add an alkaline lixivium to precipitate the mercury. If the precipitate was of a black colour, it was said to be a certain sign of arsentic. This, however, shows nothing at all, but that either the alkali contains some inflammable matter, which, joining with the precipitate, makes it appear black; or that the sublimate is not perfectly corrosive; for if a volatile alkali is poured on leigeated mercurius dulce, the place it touches is instantly turned black.

Mercurius dulcis, or calomel, is prepared by mixing equal parts, or at least three of quicksilver with four of sublimate; after being thoroughly ground together in a glass or stone mortar, they are to be poured through a long funnel into a bolt-head, and then sublimed. The medicine has been thought to be improved by repeated sublimations, but this is found to be a mistake. Mr. Beanné has found that mercurius dulcis cannot be united with corrosive sublimate in the way of sublimation; the former, by reason of its superior volatility, always rides to the top of the vessel.

XII. Zinc volatilized.

This femimetal dissolves readily in the marine acid into a transparent colourless liquor. It is volatilized, as well as most other metallic substan­ces by this combination, as appears from the following process delivered by Neumann.

"Equal parts of filings of zinc and powdered sal amnoniac being mixed together, and urged with a gradual fire in a retort, at first ardent, in a very gentle heat, an excessively penetrating volatile spirit, so strong as to strike a man down who should inadvertently receive its vapour freely into the nose. This came over in subtile vapours, and was followed by a spirit of falt in dense white fumes. In an open fire, white flowers succeeded; and at length a reddish and a black butter. In the bottom of the retort was found a portion of the zinc in its metallic form, with a little ponderous and fixed butyrous matter which liquefied in the air. The lump was far more brittle than zinc ordinarily is; of a reddish colour on the outside, and blackish within. The bottom of the retort was variegated with yellow and red colours, and looked extremely beautiful. The remaining zinc was mixed with earth with equal its weight of sal ammoniac, and the process repeated. A volatile alkaline spirit and marine acid were obtained as at first; and in the retort was found only a little black matter. When the zinc was taken at first in twice the quantity of the sal ammoniac, the part that preferred its metallic form proved less brittle than in the foregoing experiment, and the retort appeared variegated in the same manner. On endeavouring to rectify the butter, the retort parted in two by the time that one half had distilled." The nature of this combination is unknown.

831. With Regulus of Antimony. This semimetal can. Butter of not be united with the marine acid unleas the latter is antimony, in its most concentrated state. The produce is an exceedingly caustic thick liquid, called butter of antimony. The process for obtaining this butter is similar to that for distilling the smoking spirit of Libavius. Either crude antimony, or its regulus, may be used: for the spirit of falt will attack the regulus part of this mineral without touching the sulphurous. Three parts of corrosive sublimate are to be mixed with one of crude antimony; the mixture to be digested in a retort set in a sand-heat; the marine acid in the sublimate will unite with the regulus part of the antimony. Upon increasing the fire, the regulus arises, dissolved in the concentrated acid, not into a liquid form, but that of a thick unctuous substance like butter, from whence it takes its name. This substance liquefies by heat, and requires the cautious application of a live coal to melt it down from the neck of the retort. By rectification, or exposure to the air, it becomes fluid like oil but still retains the name of butter. If water is added to butter of antimony, either when in a butyrous form, or when become fluid by rectification, the antimony is precipitated in a white powder called powder of algaroth, and improperly mercurius vitreus. This powder is a violent and very un­safe emetic. The butter itself was formerly used as a caustic; but it was totally neglected in the present practice, until lately that it has been recommended as the most proper material for preparing emetic tartar. (See below.) Mr. Dollfus recommends the following method as the best for making butter of antimony; viz. two ounces and a quarter of the grey calc of antimony, eight ounces of common salt, and six of acid of vitriol. By distilling this mixture, ten ounces of the antimonial caustic were obtained; and in order to determine the quantity of metal contained in it, he mixed two ounces of the caustic with four ounces of water; but such a strong coagu­lum was formed, that he was not able to pour off any of the water even after standing 24 hours. The precipitate, when carefully dried, weighed 50 grains. The result was much the same when glass of antimony was used, only that the precipitate was much more confederable, half an ounce of the caustic then yielding 60 grains, and at another time only 50 grains were obtained. In the re­


**S**ympathetic ink.

**XV. With Regulus of Cobalt.** Pure spirit of salt dissolves this semimetal into a phosphoric spirit, which immediately becomes green from a very gentle warmth. On saturating the solution with urinous spirits, the precipitate appears at first white, but afterwards becomes blue, and at length yellow. If the nitrous acid is added to solutions of regulus, they assume a deep emerald green when moderately heated, and on cooling become red as at first. Duly evaporated, they yield rose-coloured crystals, which change their colour by heat in the same manner. This solution makes a curious sympathetic ink, the invention of which is commonly ascribed to M. Helvetius, though he himself acknowledges that he received the first hint of it from a German chemist in 1736. Any thing wrote with this solution is invisible when dry and cold; but assimilates a fine green colour when warm, and will again disappear on being cooled; but if the heat has been too violent, the writing still appears. M. Helvetius observes, that if nitre or borax be added to the nitrous solution, the characters wrote with it become rose-coloured when heated; and if tea-salt is afterwards puffed over them, they become blue; that with alkali sufficient to saturate the acid, they change purple and red with heat. — A blue sympathetic ink may be made from cobalt in the following manner. Take of an earthenware of cobalt, as free from iron as possible, one ounce. Brui[e it, but not to too fine a powder. Then put it into a cylindrical glass, with 16 ounces of distilled vinegar, and set the mixture in hot sand for the space of six days, stirring it frequently; or else boil it directly till there remain but four ounces. Filter and evaporate it to one half. If your solution be of a rose-colour, you may be certain that your cobalt is of the right sort. A red brown colour is a sign of the solution containing iron; in which case the process fails. To two ounces of the solution thus reduced, add two drachms of common salt. — Set the whole in a warm place to dissolve, and the ink is made.

**XV. With Regulus of Arsenic.** This substance is soluble in all acids; but the nature of the compounds formed by such an union is little known. If half a pound of regulus is distilled with one pound of corrosive sublimate, a thin smoking liquid and a brownish gummy substance will be obtained, as in making the smoking liquor of Libavius. By repeated rectifications, this butter may be almost all converted into spirit. If equal parts of the arsenic and sublimate are used, a pungent black oil comes over along with the spirit, which cannot be mixed with it. By rectification in a clean retort they will become clear, but still will not incorporate. If they are now returned upon the red mass remaining in the first retort, and again distilled, a much more pungent oil than the former will be obtained.

**Marine oil.**

**XVI. With Inflammable Substances.** The acid of sea-

falt is very little disposed to contract any union with the phlogiston, while in a liquid state; and much less so, even in its most concentrated state, than either the vitriolic or nitrous. Mr Beaumé, however, has found, that a small quantity of ether, similar to that prepared with the vitriolic and nitrous acids, may be obtained by cauling the fumes of the marine acid unite with those of spirit of wine. Others, and particularly some German Chemists, attempted to make this liquor, by employing a marine acid previously combined with metallic substances, such as butter of antimony. The smoking liquor of Libavius succeeds best. If equal parts of this liquor and highly rectified spirit of wine are distilled together, a considerable quantity of true ether is produced; but which, like the vitriolic and nitrous ether, must be rectified in order to its greater purity. The thin contained in the smoking liquor is separated and precipitated in white powder. In this process, the acid is probably more disposed to unite with the spirit of wine, than having already begun to combine with the inflammable principle of the metal. — For marine ether, Mr Dollfuss recommends to put into a retort four ounces of digestive salt previously well dried and powdered, and two ounces of manganese; pouring upon this mixture of five ounces of spirit of wine and two of oil of vitriol; the first five ounces and a half of the distilled liquor being poured back on the residuum, and the whole afterwards drawn off by a gentle heat. The spirit of salt thus obtained had a very penetrating agreeable odour, somewhat like that of nitrous ether; and at first swam upon the top of water; but at length mixed with it on being agitated for a long time. Towards the end of the distillation a little oil was obtained, which did not mix with the water; and by the addition of four ounces more of spirit of wine, more of the dulced acid was obtained. With regard to this kind of ether, however, Mr Weftromb denies that it can be made by any method hitherto known; and inflets, that all the liquids as yet produced under the name of marine ether are in reality dulced spirit of salt, and not true ether, which will boil upon the top of water.

Dr Priestley has observed, that the pure marine acid, attrac-
ted when reduced to an invisible aerial state, has a strong phlogistic affinity with phlogiston; so that it decomposes many substances that contain it, and forms with them an air permanently inflammable. By giving it more time, it will extract phlogiston from dry wood, crusts of bread not burnt, dry flesh; and, what is still more extraordinary, from flints. From what has been above related, it appears that the dephlogisticated spirit of salt has a very strong attraction for phlogiston.

Essential oil of mint absorbed the marine acid air pretty well, and pretty became one of a deep brown colour. When taken out of this air, it was of the consti-
tituents of treacle, and funk in water, smelling differently from what it did before; but still the smell of the mint was predominant. Oil of turpentine was also much thickened; and became of a deep brown colour, by being saturated with acid air. Ether absorbed the air very fast; and became first of a turbid white, and then of a yellow and brown colour. In one night a considerable quantity of strongly inflammable air was produced.

Having once saturated a quantity of ether with acid air,
FURV. 485

Chems.

2.14.5

New acid discovered by Mr. Homburg.

Air, he admitted bubbles of common air to it, through the quicksilver by which it was confined, and observed that white fumes were made in it, at the entrance of every bubble, for a considerable time. 2. Having at another time, saturated a small quantity of ether with this kind of air, and the phials which contained it happening to be over-turned, the whole room was instantly filled with a white cloud, which had very much the smell of ether, but peculiarly offensive. Opening the door and window of the room, this light cloud filled a long passage and another room. The ether, in the mean time, was seemingly all vanishing: but, sometime after, the surface of the quicksilver in which the experiment had been made was covered with a very acid liquor, arising probably from the moisture in the atmosphere, attracted from the acid vapour with which the ether had been impregnated. This seems to show, that however much dispersed the marine acid may be to unite with phlogistic matters when in its aerial state, the attraction it has for them is but very slight, and still inferior to what it has for water.

Camphor was presently reduced into a fluid state by imbibing this acid air; but there seemed to be something of a whitish sediment in it. After continuing two days in this situation, water was admitted to it, upon which the camphor immediately refumed its former solid state; and to appearance was the same substance that it had been before.

Strong concentrated oil of vitriol, being put to marine acid air, was not at all affected by it in a day and a night. In order to try whether it would not have more power in a condensed state, it was confined with an additional atmosphere; but, on taking off this, the air expanded again, and was not in the least diminished. A quantity of strong spirit of nitre was also put to it without any sensible effect. From these last experiments it appears, that the marine acid is not able to disolve the other acids from their union with water.

Besides the acids already mentioned, Mr. Homburg describes an artificial one generated by mixing two ounces and a half of luna cornua, with an ounce and a half of tin calcined alone and without addition, by means of fire. The mixture is to be exposed to a naked fire in a coated retort, of which two-thirds ought to be let empty; when a brownish matter, an ounce and a half in weight, will adhere to the neck of the retort. This matter is tin combined with the marine acid, and the residuum is silver deprived of the same acid, which may therefore now be melted together without any loss. The sublimate, well powdered and dried, is to be equally divided into two phials, and sublimed; by repeating which operation two or three times, a volatile salt, of an acid nature, very white and transparent, is obtained. The residuum of these sublimations is always calx of tin.

§ 4. Of the Fluor Acid.

This acid was discovered some time ago by Mr. Margraf, and more fully investigated by Mr. Scheele. The experiments by which it was originally produced, and its properties ascertained, are as follows:

I. Two ounces of concentrated vitriolic acid were poured upon an equal quantity of fluor, which had been previously pounded in a gl. mortar, and then put into a retort, to which a receiver was adapted, and the juncture closed with grey blotting paper. On the application of heat, the mass began to effervescence and swell, invisible vapours penetrated everywhere through the joining of the vessels, and towards the end of the process white vapours arose, which covered all the internal parts of the receiver with a white powder. The mass remaining in the retort was as hard as a stone, and could not be taken out without breaking the vessel. The lute was quite corroded and friable.

II. The process was repeated exactly in the same manner, excepting only that a quantity of distilled water was put into the receiver. A white spot began to form on the surface of the water, just in the centre, and immediately under the mouth of the retort. This spot continually increased, till at last it covered the whole surface of the water, forming a pretty thick crust, which prevented the communication of the water with new vapours that came over. On gently agitating the receiver, the crust broke, and fell to the bottom; soon after which a new crust like the former was produced. At last the receiver, and soon after the retort also, became white in the inside. The vessels, when cooled, were found much corroded internally. In the receiver was an acid liquor mixed with much white matter, separable by filtration.

III. This white matter when edulcorated and dried, which showed itself to be siliceous earth by the following properties.

1. It was rare, friable, and white.
2. It was not sensibly soluble in acids.
3. It did not make a tough paste with water, but was loose and incoherent after being dried.
4. It diffolved by boiling in lixivium tartar, and the solution in cooling assumed a gelatinous consistence.
5. In its pure state it suffered no change in the strongest heat; but when mixed with alkali, it boiled, frothed up, and formed a glafs in a melting heat.
6. It diffolved in borax without swelling.

IV. To determine whether this earth was formed during the process, he poured vitriolic acid upon powdered fluor contained in a cylinder of brass which was closed exactly with a cover, after having suspended over the mixture an iron nail and a bit of charcoal. On opening the vessel two hours afterwards, he found the nail and charcoal unchanged; but on moistening them, he found both covered with a white powder in a short time. This powder had all the properties of siliceous earth; and as in the experiment he had made no use of glass vessels, he concluded that it did not proceed from the glasg vessels as might have been suspected from their being so much corroded, but was generated in some other way.

V. Having recomposed fluor by saturating the artificial acid with calcareous earth, he treated the compound in flour yields the same manner as the natural fluor, with a similar similiar result; and repeating the experiment five times over, he constantly found the siliceous earth and acid diminished considerably, so that at last scarce any mark of acidity was left. Thence he concluded, that all the fluor acid united itself by degrees with the vapours of the water, and thus formed the siliceous earth. "It may be objected (says Mr. Scheele), that the fluor acid is perhaps already united by nature with a fine siliceous powder,
Mr Scheele proved the following experiment. Up to this time fluoric acid on one ounce of pure levigated fluoric tartar with alcohol, he poured three ounces of concentrated oil of vitriol, and distilled the mixture in a sand-bath, having previously put 12 ounces of distilled water into the receiver. He then took three ounces of the same acid diluted with 24 ounces of water, to which he afterwards added two ounces of pure levigated fluoric tartar previously weighed, till he attained the exact point of saturation. After the distillation he weighed the remaining lixivium; having kept up such a degree of heat for eight hours as was not sufficient to raise the vitriolic acid. On breaking the retort, and reducing the mass to powder he boiled it in a glass vessel with 24 ounces of water for some minutes; after which it he added just as much lixivium tartar as he had found before to be requisite for the saturation of three ounces of the vitriolic acid, and continued the boiling for a few minutes longer. On examining the solution, it was found to contain a vitriolated tartar perfectly neutralized, neither acid nor alkali prevailing in any degree; which showed that no vitriolic acid had passed into the receiver. The saline matter being then extracted with hot water, the remaining earth was found to weigh 9½ drachms. Two drachms of this distilled in muriatic acid, excepting only a small quantity of matter which seemed to be fluoric undecomposed, and which on being dried weighed only nine grains. Into one part of this solution he poured some acid of sulfur, and into another vitriolic acid. The former produced sedecated lime, and the latter gypsum. A third part was evaporated to dryness, and left a deliquescent salt; and the remaining part of the earth burned in a crucible, produced a real quicklime.

Thus it appeared that the real basis of sulfur is quicklime, and like-wise that the fluoric acid is different from the basis of vitriol, as appears farther from the following considerations: 1. Pure fluoric acid does not precipitate terra ponderosa, nor solution of lead in nitrous acid. 2. The same acid, when saturated with alkali of tartar, evaporated to dryness, and afterwards melted with powdered charcoal, does not produce any bilar fulphur.

Mr Monnet, in order to support his hypothesis, de- creased that flour contains any calcareous earth. In proof Mr Monnet, of which he addsuce the following experiment: Equal quantities of alkali and flour were melted together, with little or no change on the mineral; for, after having taken away by lixiviation the alkali employed, he distilled the flour remaining on the filter in nitrous acid, adding vitriolic acid to the solution; and because he obtained no precipitate, concluded at once, that flour contains no calcareous earth. Mr Scheele on the contrary affirms, that all solutions of flour yield a precipitate of gypsum whenever vitriolic acid is added to them. He explains Mr Monnet's failure, by supposing that he had diluted his solution with too great a quantity of water.

Mr Wiegell, dissatisfied with the hypothesis of Wiegell's Scheele, as well as others, concerning the flour acid, experiments on the origin of the flour acid, and its combinations. He began a new set of experiments on the mineral. Having first accurately repeated those made by Mr Scheele, he proceeded to inquire into the origin of the calcareous earth, in the following manner: Having first weighed the retorts destined for the experiment,
an accurate manner, and found that its weight was

Flour acid and its combinations.

an accurate manner, and found that its weight was
two ounces and five drachms, he put into it two ounces of calcined flour in powder, adding, by means of a glass tube, 2½ ounces of oil of vitriol. The retort was then placed on the furnace; and a receiver, which when empty weighed two ounces, two drachms, and 30 grains, and now contained two ounces of distilled water, was luted to it. The distillation was conducted with all possible care, and at last pulsed till the retort grew red hot; but it was found impossible to prevent a few vapours from penetrating through the tube. Next day the retort, separated from the receiver, was found to weigh, together with its contents, five ounces, five drachms, and 30 grains; and consequently had lost in weight one ounce, three drachms, and 30 grains. The receiver, which, with the water, had originally weighed four ounces, two drachms, and 30 grains, now weighed five ounces and three drachms, and had therefore gained one ounce and 30 grains. This gain, compared with the loss of the retort, shows that the retort lost more by three drachms than the receiver gained; so that these must have undoubtedly passed through the losing in form of vapour.

To determine the point in question, the empty vessel, with what had been put into it, were accurately weighed; when the weights and lots upon the whole were found to be as follows.

<table>
<thead>
<tr>
<th></th>
<th>oz.</th>
<th>dr.</th>
<th>gr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcined flour</td>
<td>2</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Oil of vitriol</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total weight before distillation</td>
<td>7</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>After it</td>
<td></td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>Loss of retort</td>
<td>1</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>The empty receiver weighed</td>
<td>2</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>The water put into it</td>
<td></td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total weight before distillation</td>
<td>4</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Total weight after distillation</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Gain of receiver</td>
<td>1</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Deducting this grain of weight in the receiver from the loss of weight in the retort, we find, that three drachms were wanting on the whole, which must undoubtedly, as already observed, have been dispersed in vapour. The retort being now broken, and the dry earth both in its neck and arch separated as accurately as possible, it was found to weigh three drachms; the residuum in the retort weighed three ounces, two drachms, and 40 grains. Now, as the mass in the retort had originally weighed four ounces and four drachms, it appeared, by deducting the residuum, to have suffered, on the whole, a loss of one ounce, one drachm, and 20 grains. To determine the loss more accurately, the following calculations were made:

<table>
<thead>
<tr>
<th></th>
<th>oz.</th>
<th>dr.</th>
<th>gr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain of receiver</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Lost in vapour</td>
<td>0</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

Here Mr Wieglet was surprised to find, that the material which came from the decomposed to have flour acid by five drachms ten grains that the mass in the retort and its had lost of its original weight; to illustrate which it was necessary to weigh the retort and receiver by themselves. The pieces of the retort now weighed only one ounce seven drachms and 50 grains; whereas, before the process, the weight of the retort was two ounces five drachms. It appeared, therefore, that it had lost five drachms ten grains, the very quantity which had been gained by the receiver. This loss had lost nothing of its original weight.

The fluid in the receiver was next diluted with four ounces of distilled water, and the whole poured on a filter, in order to separate the earthy matter with which it was mixed, and fresh water poured upon it to take out all the acid: after which the earth was dried, and found to weigh 57 grains. The clear liquor was then diluted with more distilled water, and afterwards precipitated with spirit of sal ammoniac prepared with fixed alkali. A brisk effervescence took place before any precipitate began to fall, but ceased soon after the precipitation took place. The whole mixture become gelatinous; and the precipitate, when dry, weighed two drachms. The whole quantity of earth, which was obtained in this process amounting to drachms 47 grains, which is forty-seven grains more than the retort had lost in weight. This excess is, by our author, attributed to part of the acid still adhering to it, and to the accession of some moisture from the air; to determine which he heated each of the parcels of earth red hot separately, and thus reduced them to four drachms 52 grains, which is less by 18 grains than the loss of the retort, and which, he is of opinion, must have escaped in the three drachms of vapour.

From this experiment, Mr. Wieglet concludes, that the earth produced in the distillation of flour proceeds neither from the spar nor from a combination of the acid with water, but from the solution of the glass by the soury acid. To his opinion also Dr. Grell accedes. "In distilling flour (says he), with oil of vitriol, I have found the retort as well as the receiver very much corroded. I poured the acid obtained by the process into a phial furnished with a glass stopper, and observed after some time considerable deposition. I then poured the liquor into another phial like the former; and that it might neither on the one hand attack the glass, nor on the other compose a filmous earth with the particles of water, according to Mr. Scheele's hypothesis, I added highly rectified spirit of wine. I saw, however, after some time, another considerable deposition. This seemed also to proceed from the glass that had been before disdolved, which the acid let fall in consequence of the gradual combination with the spirit of wine; otherwise we must suppose, what to me appears incredible, that the acid decomposes the spirit, attracts the water, and forms the earth."

This singular acid has been still further examined by Mr. Meyer. He informs us, that, among Mr. Scheele's experiments, he was particularly struck by one in which no earthly crust was obtained, after putting spirit of wine into the receiver. Mr. Meyer repeated this experiment, hoping, that when but little spirit was put into the receiver, he might be able to procure a new kind of ether. An ounce of finely powdered flour, which had been previously heated red hot, was put into a glas.
CHEMISTRY.

Flour acid, and its combinations.

The distillation was continued for three hours with a gentle heat: when the acid, having made its way through the bottom, put and end to the process. No crust could be perceived on the surface of the spirit; but in the place where it had been in contact with the receiver there was a thin ring of transparent jelly. The same mixture of oil of vitriol and flour was therefore again put into a retort of very strong glass, and the same spirit put into the receiver. The distillation was conducted two hours with a gentle and afterwards with a stronger, heat. When it was half over, the spirit began to change into a thin jelly; and at the end of the process some smaller pieces were found at the bottom. These were washed with spirit of wine; and in order to obtain the spirit together with the acid in a pure state, it was put into a large retort, and again subjected to distillation. As the retort grew warm, the opal-coloured spirit became clear and swelling, what remained becoming again gelatinous; a good deal of earth remained behind, but did not adhere firmly to the retort, which was smooth in the inside, though full of hollow excoriations. It was also evident, that the glafs was actually corroded, and that the earthy matter is not a mere crust adhering to the inside. The jelly being thoroughly digested, as well as the earth, that remained in the retort after the redistillation, and that which was dissolved in the water precipitated by spirit of sal ammoniac, the whole quantity amounted to two drachms. That which had separated spontaneously was semitransparent. As this earth (says he) showed the properties of silicious earth, and the glafs, which was so much corroded, consists in great measure of it, the greatest part of it might come from the glafs, and the rest of it perhaps be a constituent part of the fluid itself. In order to ascertain this it was necessary to obtain the fluor acid quite free from silicious earth. I therefore exposed the ley, which I had procured by the precipitation of the earth with sal ammoniac, to a gentle evaporation in a slightly covered glafs vessel. The product was one drachm 56 grains of an ammoniacal salt; the glafs did not appear to have been attacked. Half a drachm of this salt was sublimed in a funnel retort, which, towards the end of the operation, was laid on the bare fire. No crust appeared on the surface of the water in the receiver. At the bottom of the retort lay a little flocculent earth of a light grey colour, above which the internal surface was covered with a white pellicle that reflected various colours; and in the neck there was a sublimate. The thin pellicle easily separated in many places from the glafs, which was smooth beneath, though not without some small furrows. I poured water both upon the ammoniacal salt and crust; in consequence of which it acquired a very fine taffe, and coloured the tincture of turnfole red. The white crust that was left behind and dissolved weighed five grains, and melted into a green glafs without addition. This was nothing but the glafs that had been corroded by the flour acid; but as this acid can be set loose only by strong heat, it had done no more than corrode the glafs, without passing over along with it in the form of vapour, and then depositing it again on the water. For, upon pouring two drachms of oil of vitriol upon half a drachm of this ammoniacal salt a little moistened, and placed in a glafs retort, a great flour acid foam arose, and the thick vapours that ascended covered and heated the water in the receiver with a white crust. A scrub of the salt on solution, left behind a grain of earth, which, as I conjecture, had taken up during the evaporation in the glafs vessel.

To prevent this, our author distilled half an ounce of flour with an ounce of oil of vitriol for five hours. The cruffs were separated from th. water; they weighed, after being well washed and dried, eleven grains; they were white and very flocculent; thirty-two grains of silicious earth were precipitated from the filtered water; the ley was then evaporated in a leaden vessel and yielded 68 grains of salt. As glafs vessels were no longer to be trusted, a piece of a gun-barrel furnished with a cover, and terminated by a bent tube, intended to serve instead of the neck of a retort, was afterwards used; and with this apparatus the following experiments were made:

1. Half a drachm of the newly prepared sal-ammoniac was distilled for two hours with two drachms of oil of vitriol, into a glafs receiver containing an ounce of water. No velifice of a crust could be perceived on the water, but some earth was perceived in the receiver, where the vapours having ascended through the tube, came into contact with the wet glafs; and here the surface was become finely rough. On the addition of volatile alkali, a few flocculi of silicious earth, a mounting only to one-fourth of a grain, were thrown down out of the water.

2. A drachm of vitriol was added to a drachm and an half of the salt; but a leaden receiver was now used, containing an ounce of water as before. The water acquired an unpleasant smell, but showed no signs of a crust. On the addition of spirit of sal ammoniac, a little grey earth weighing half a grain fell to the bottom.

3. A scruple of this salt, mixed with an equal quantity of white sand in fine powder, and distilled with a formed by a drachm and an half of oil of vitriol, into an ounce of mixing water in the leaden receiver, showed no sign of a crust. The water had a putrid smell, and left on the filter two grains and an half of grey earth, which ran under the blow-pipe into a grain of lead. Volatile alkali precipitated five grains of grey earth, which melted on the addition of a little salt of tartar into a black globule, though the blow-pipe alone made no change in it.

4. To 13 grains of the fame ammoniacal salt a drachm of oil of vitriol and two scruples of green glafs, broken one by one into small pieces, were added. The iron tube had using powdert to become warm, when a great crust of silicious earth was perceived on the surface of the water, and the fame appearance on the moist sides of the vessel. It did not, however, seem to increase during the remainder of the distillation. A grain and a quarter of earthy matter remained on the filter, confiding partly of white films, and partly ran under the blow-pipe into a greenish glafs.

5. To ascertain this matter still more closely, a different species of mineral flour was used, which being distilled with a double quantity of oil of vitriol, and with a drachm of water in the receiver, yielded a thin pellicle of the appearance of lead, but no silicious crust. Volatile alkali threw down 24 grains of grey earth.
FLOUR ACID AND ITS COMBINATIONS.

C H E M I S T R Y.

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A drachm mixed with the same quantity of pulverized sand afforded a pellucid lead interperfed with a few particles of white earth, which ran into the glafs under the blow-pipe. Volatile alkali precipitated eight grains. A drachm, mixed with an equal quantity of green glafs reduced to powder, swelled a good deal, and yielded a thick silicious crust.

6. To a drachm of green earth that had been heated and powdered were added two drachms of oil of vitriol, still employing the iron tube. A piece of wet charcoal was also suspended in the inside, a cover fixed on the tube, and the latter heated for about 15 minutes in a sand-bath. Observing now that the charcoal was dry, and had no earth upon it, a crepule of sand in fine powder was added, the charcoal was wetted and replaced, but nothing appeared. Some bits of green glafs were then thrown into the mixture which instantly foamed up and ran over. The charcoal was not replaced in the tube, nor was it any longer necessary, as it gained a covering of white powder by being held a very few moments over the orifice.

Mr Scheele, in one of his experiments, observes, that he observed the white powder on a piece of charcoal that had been moistened and suspended over flour to which vitriolic acid was added. As this experiment was made in metallic vessels, Mr Meyer conjectures, that the manner used for reducing the flour to powder was of soft glafs, and that the phenomenon was occasioned by the abrasion of some particles of glafs.

7. To determine whether the acid can carry up much more of the silicious earth than is sufficient to saturate it, an ounce and a half of pure oil of vitriol was added in a retort of glafs, and three ounces of water put into the receiver. The retort was corrodcd through in an hour’s time, and the crust on the water weighed ten grains. The liquid being then filtered and divided into two equal parts, one was precipitated with caustic volatile, and the other with mild fixed vegetable alkali. The former yielded 25 grains of silicious earth, and the latter 66 grains of a precipitate, which flowed under the blow-pipe, ran into the pores of charcoal, and gave off strong vapours of flour acid. The reason of this difference shall be explained when we come to treat of silicious earth.

8. To a mixture of half an ounce of flour and the same quantity of glafs, in powder, 12 drachms of oil of vitriol were put in a small retort, half filled with the mixture. The ingredients acted upon each other so violently that they rose up in the neck of the retort; and the operation being interminable on account of the noxious vapour they emitted, the retort was found next day covered with fuscated crystal-like hoarfrost. The experiment being repeated in a more capacious retort, and the mixture thoroughly blended by agitation, it became a thick mass, and swelled like dough in fermentation: the bottom of the retort grew very hot, and the silicious crust аппаратed on three ounces of water in the receiver. The distillation being continued for three hours, 16 grains of silicious earth were found on the surface, and the precipitate by volatile alkali weighed 66 grains; the retort was much less corroded than usual.

9. Thirty grains of this precipitate, distilled in a

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with the same quantity of silicious earth, produced no silicious earth on the water in the receiver, or that with which the earth was edulcorated. The ley of fluorated volatile alkali was mixed with a solution of chalk in nitrous acid till no more precipitation took place. The mixture was passed through nitrous acid, and the precipitate edulcorated. It weighed, when dry, two drachms and 36 grains.

10. Two drachms of oil of vitriol being added to a drachm of this precipitate contained in a glafs retort, the precipitate was attacked in the cold, but no crust appeared; the heat, however, was scarce applied, when the whole surface of the water was covered, and the same phenomena exhibited which are produced by the natural flour.

11. Mr Scheele having observed that a mixture of Farther flour as transparent as mountain crystal, and oil of proofs that vitriol in a metallic cylinder, produced no appearance of the earthly silicious earth, on a wet sponge suspended on the inside, at Mr Meyer’s request he made a new experiment by adding oil of vitriol to portions of flour of this transparent kind placed in two tin cylinders; some silicious earth was put into one, and a wet sponge suspended in both. The next morning the sponge that was suspended over the cylinder which held the silicious earth, was covered with the white powder, but no appearance of it was seen on the other. The experiment was repeated by Mr Meyer with the same result, but the white crust did not appear till after a night’s standing.

12. A drachm of flour, mixed with two drachmes of oil of vitriol, afforded, after a distillation of two hours, a thin film of lead on the surface of the water in the receiver, but no silicious earth. The same mixture was afterwards distilled with the use only of a glafs receiver instead of a lead one. In the beginning of the distillation a small spot appeared under the neck of the retort, and the neck itself was covered with white powder, but it soon disappeared; and though the empty part of the receiver was corroded, yet no more than half a grain of earth was procured.

These experiments so clearly point out the origin of the silicious crust on the surface of the flour acid, that its existence as a distinct acid is now universally allowed, even by those who formerly contended for its being only the vitriolic or some other acid diffiused. Experiments of a similar kind were made by Mr Wolstenholme, who performed his distillation in a leaden retort, furnished with a glafs receiver. The water was covered with a variegated crust, and yielded a gelatinous precipitate with fixed alkali. On examining the receiver, he found its internal surface corroded, so that it appeared as if it had been rubbed with coarse sand. By substituting a leaden receiver, however, instead of a glafs one, he obtained the acid entirely free from silicious matter, and containing only a small quantity of iron and aluminous earth.

The flour acid may also be procured by the nitrous, fluoric, and phosporic acids. Mr Scheele distilled one part of the mineral with two of concentrated nitrous acid. One part went over into the receiver along with the flour acid, and a thick crust was formed on the water of the receiver. The mafs remaining in the retort was calcareous earth faturated with nitrous acid.
With an equal quantity of marine acid, that of fluor
pallid over into the receiver with a large quantity of
the mucric; the internal surface of the receiver, as
well as the water contained in it, being covered with
a white crust. The residuum was fixed alkali am-
monic acid.

Phosphoric acid digested with powdered fluor, dif-
solved a good deal of it; and on distilling this solu-
tion, the fluor acid went over together with the watery
properties of the ashes of bones.

The fluor acid procured in any of these ways is not
distinguishable from the floe of that of a fluid; in
some cases it acts as mucric acid, in others like that
of tartrar, but in most cases it flows properties pecul-
ar to itself.

With fixed alkali the fluor acid forms a gelatinous
and amorphous matter, which refuses to crystallize.
By evaporation a saline mafs was obtained, which was
in weight only the fifth part of the fixed alkali dif-
solved; did not change the color of syrup of viotars,
but precipitated lime water, and likewise the solutions
of gypsum and Ephom falt. With mineral alkali
the same phenomena were produced as with the ve-
gerable.

Volatile alkali with fluor acid formed likewise a
ejelly, which when separated from the liquor appeared
to be ftillicious earth. The clear liquid tained like vi-
trio ammoniac, and got into very small crystals, which
by sublimation yielded first a volatile alkali; and
then a kind of acid as fii amonic acid. By distillation
with chalk and water, all the volatile alkali quickly came
over. Lime water instantly threw down a regenerated
fluor, which was the cafe also with solutions of lime
in the nitrous and mucric acids.—Solution of silver
let fall a powder, which, before the blow-pipe, re-
formed its metallic form, the acid being diilipated, and
forming a white spot on the charcoal round the re-
duced silver. Solution of quicksilver in nitrous acid
was precipitated, and the powder was entirely volatile
in the fire; but a solution of corrosive sublimates re-
amained unchanged. Lead was totally precipitated
from nitrous acid; and a solution of Ephom falt was
rendered turbid. Oil of vitriol produced a flour acid
dbilled, which formed at the fame time a thick
brust on the water of the receiver. The regenerated
fluor procured either by means of lime water or solu-
tions of the earth in acids, was decomposed by fixed,
but not by volatile alkali.

With lime, magnesia, and earth of alum, this acid
became gelatinous. Part of the two latex were dif-
solved.

Gold was not touched by the flour acid either alone
mixing with that of nitre. Silver, in its metallic
state, underwent no change. Its calx, precipitated by
an alkali, was partly dissolved; but the remainder
formed an infoluble mafs at the bottom. Vitriolic
acid expelled the flour acid in its usual form. Quick-
silver was not dissolved, but its calx precipitated from
the nitrous solution was partially fo. The remaining
infoluble part of the calx united with the acid, and
formed a white powder, from which the flour acid was
expelled by the vitriolic. The fame powder formed,
by means of the blow-pipe, a yellowish glafs; which,
however, evaporated by degrees, leaving a small glo-

...
came in contact with this air, its surface became opaque and white by a foamy film, which retarded the ascent of the water, till the air insinuating itself through the pores and cracks of the crust, the water gradually rose as the air diminished; and breaking the crust, presented a new surface to the air, which was immediately covered with another crust. Thus one foamy incrustation was formed after another till every particle of the air was united to the water; and the different films being collected and dried, formed a white powdery substance, generally a little acid to the taste; but when washed in much pure water, perfectly insipid. The property of corrod ing glafs he found to belong to the fluor acid air only when hot. From some other experiments he concluded, that the fluor acid air was the same with what he had formerly obtained from vitriolic acid: but the experiments made since that time by various chemists, have now convinced him that it is an acid of a nature entirely different from all others.

By means of the fluor acid, a new art has been discovered, viz. that of engraving upon glafs. For this purpose a looking-glafs plate is to be covered with melted wax or mastic; and when the coating becomes hard, it is to be engraved upon by a very sharpened needle or other implement of that kind. A mixture of oil of vitriol and fluor acid are then to be put upon the plate, and the whole covered with an inverted China vessel, to prevent the evaporation of the fluor acid. In two days the glafs plate may be cleared of its coating, when all the traces of the needle will be found upon it.

§ 5. Of the Sal Sedativeus, or Acid of Borax.

Found in a mineral in Germany, &c.

This is a saline substance of a very singular nature, and till lately found nowhere but in borax itself. Its origin in different parts of the world is related under the article Borax; but since that article was printed, we have accounts of its being discovered in a mineral of a peculiar kind found at Lunenburg near Hartz. This is frequently transparent, but sometimes also a little opaque, and strikes fire slightly with steel. It has hitherto been found only in small crystals involved in a gypseous matter. These generally affect the cubical form, though they are sometimes irregular, and from the truncatures frequently appear to be of different kinds. One of them had fourteen faces, six small square planes, and eight hexahedral; though all these are modifications of cubes. Mr Wetttrumb analyzed it with some difficulty; but at last found that 100 parts of the mineral contained 60 of sedative salt, ten of magnesia, and ten of calcareous earth; of clay and flint five parts, sometimes ten of iron, though frequently but five. The same acid has also been discovered in Peru, and a little in Hungary from an analysis of petroleum. This bismuth arises from a rock between Pecklenice and Mofcowina. It seems at first to be white, butsoon grows black by exposure to the air. It was analyzed by professor Winter, who found it to contain a transparent oil in a butyrous form, and a true sedative salt, united with the oil by means of an excess of phlogiton. The sedative salt was first discovered by Bech, and afterwards more accurately described by Homberg; but its nature was at first very much misunderstood, being named the narcotic salt of virtil, on account of the vitriolic acid used in preparing it from the borax. From this it is separable either by sublimation or crystallization. The method of sublimation is that recommended by Homberg.

His process consists in mixing green vitriol with borax, dissolving them in water, filtering the solution, and evaporating till a pellicle appears; the liquor is then to be put into a small glafs alembic, and the sublimation promoted till only a dry matter remains in the cucurbit. During this operation, the liquor passes into the receiver; but the internal surface of the capital is covered with a saline matter forming very small, thin, laminated crystals, very shining, and very light. This is the sedative salt. The capital is then to be unluted, and the adhering salt swept off with a feather; the part of the liquor, which passed last into the receiver, is to be poured on the dry matter in the cucurbit; and a new sublimation is to be promoted as before, by distilling till the matter in the cucurbit is dry. These operations are to be frequently repeated in the same manner, till no more sedative salt can be obtained.

To obtain the sedative salt by crystallization, borax is to be dissolved in hot water; and to this solution any one of the three mineral acids is to be gradually added, by a little at a time, till the liquor be faturated, and even have an excess of acid, according to Mr Beaumé's process. The liquor is then to be left in a cold place; and a great number of small, shining, laminated crystals will be formed; these must be washed with a little very cold water, and drained upon brown paper. The sedative salt obtained by this process is somewhat denser than that obtained by sublimation; the latter being so light that 72 grains are sufficient to fill a large phial.

Sedative salt, though thus capable of being once fixed in sublimed, is not, however, volatile; for it arises only the fire, by means of the water of its crystallization; and when it has once lost its water by drying, it cannot be raised into vapours by the most violent fire, but remains fixed, and melts into a vitreous matter like borax itself. This glafs is soluble in water; and then becomes sedative salt again. A great quantity of water is required to dissolve the sedative salt, and much more of cold than of boiling water; whence it is crystallizable by cold, as it also is by evaporation; a singular property, which scarce belongs to any other known salt.

This substance has not an acid, but a somewhat project biterith, tafte, accompanied with a slight impression of ties, coollness. It neverthelesse unites with alkaline salts as acids do, and forms with them neutral salts. It is soluble in spirit of wine, to which it communicates the property of burning with a green flame. It makes no change on the blue colour of vegetables, as other acids do. It expels the other acids from their bases, when distilled with a strong heat; though these are all capable of expelling it in the cold, the acid of vinegar not excepted.

The composition of sedative salt is very much unknown, and no means sufficient for its decomposition delin's ex have hitherto been found out. Mr Bourdelin, who periments, made many experiments on this salt, found that it was unalterable by treatment with inflammable matters, with sulphur, with mineral acids diffused, or united with metallic substances, and with spirit of wine. He could
could only perceive some marks of an inflammable matter, and a little marine acid. The former discovered itself by its communicating a fulphureous smell to the vitriolic acid employed; and the latter by a white precipitate formed in a solution of mercury in the nitrous acid, by the liquor which came over on distilling the salt with powdered charcoal.

Mr Cadet, in the Memoirs of the Royal Academy of Sciences for 1766, has given an account of some experiments made by him on borax and its acid: from which he infers (1). That the acid contained in borax itself is the marine, and not fedative, salt. (2.) That it is the marine, he proves by having made a corrosive sublimate with this acid and mercurius precipitatus per /?.

That fedative salt does not enter the composition of borax itself, he proves, by the impossibility of recomposing borax from uniting the fedative salt with fossile alkali. The salt so produced, he owns, is very like borax, but unfit for the purposes of soldering metals as borax is. He therefore thinks, that, in the decomposition of borax, the principles of the salt are somewhat changed, by the addition of that acid which extricates the fedative salt; and that this salt is composed of the marine acid originally existing in the borax, of the vitriolic acid employed in the operation, and of a vitriifiable earth. (If this is true, then fedative salt either cannot be procured by any other acid than the vitriolic, or it must have different properties according to the acid which procures it.) The vitriifiable earth, he says, is that which separates from borax during its solution in water, and which abounds more in the unrefined than refined borax, and which he thinks consists of a calx of copper, having obtained a regulus of copper from it.

As he has never been able, however, to compose borax by the union of these ingredients, his experiments are by no means decisive. Mr Beaumé has asserted that it is always produced by rancid oils; but Dr Black thinks his proofs by no means satisfactory.

Sedative Salt COMBINED.

I. With Vegetable Alkali. This salt forms a compound very resembling borax itself in quality; but in what respects it differs from, or how far it is applicable to, the purposes of borax, hath not yet been determined.

II. With Mineral Alkali. This salt has generally been thought to recompose borax: and though Mr Cadet has denied this, yet as his experiments are hitherto imperfect and unsupported, we shall here give the history of that salt, as far as it is yet known.

This salt is prepared in the East Indies. It is said, that from certain hills in that country there runs a green saline liquor, which is received in pits lined with clay, and suffered to evaporate with the sun's heat; that a bluish mud which the liquor brings along with it is frequently stirred up, and a bituminous matter, which floats upon the surface, taken off; that when the whole is reduced to a thick confluence, some melted fat is mixed, the matter covered with vegetable substances and a thin coat of clay; and that when the salt has crystallized, it is separated from the earth by a sieve. In the same countries is found native the mineral alkali in considerable quantity; sometimes tolerably pure, at other times blended with heterogeneous matters of various kinds. This alkali appears to exist in borax, as a Glauber's salt may be formed from a combination of borax with vitriolic acid. For a further account see Borax.

Borax, when imported from the East Indies, consists of small, yellow, and glutinous crystals. It is refined, some fay, by dissolving it in lime-water; others, in alkaline lixivium, or in a lixivium of caustic alkali; and by others, in alum-water. Refined borax consists of large eight-sided crystals, each of which is composed of small, soft, and bitterish scales. It has been said that crystals of this size can by no means be obtained by dissolving unrefined borax in common water; that the crystals obtained in this way are extremely small, and differ considerably from the refined borax of the shops; infomuch that Cramer calls the large crystals, not a purified, but an adulterated borax. When dissolved in lime-water, the borax shoots into larger crystals; and largest of all, when the vessel is covered, and a gentle warmth continued during the crystallization. All this, however, is denied by Dr Black; who says, that in order to accomplish the purification, we have only to dissolve the impure borax in hot water; to separate the impurities by filtration, after which the salt shoots into the crystals we commonly see. During the dissolution, borax appears glutinous, and adheres in part to the bottom of the vessel. From this glutinous quality, peculiar to borax among the salts, it is used by dyers for giving a gloss to silks.

All acids dissolve borax slowly, and without effect. Its properties from them most, but not at all, tinctures metallic substances; along with which a considerable part of the borax is generally deposited. It does not absorb the marine acid of luna cornea, or of mercury sublimate. It melts upon the surface of the former without uniting, and suffers the latter to rise unchanged; the borax in both cases becomes coloured; in the first, milky with red streaks; in the latter, amethyst or purple. Mixed with sal ammoniac, it extricates the volatile alkali, and retains the acid; but mixed with a combination of the marine acid with calcareous earths, it unites with the earth, and extricates the acid. It extricates the acid of nitre without seeming to unite with the alkaline basis of that salt; nor does it mingle in fusion with the common fixed alkaline salts, the borax flowing distinct upon their surface. A mixture of borax with twice its weight of tamar, dissolves in one sixtieth of the quantity of water that would be necessary to dissolve them separately: the liquor yields, on infusion, a viscous, tenacious mass like glue; which refuse to crystallize, and which deliquesces in the air. Borax affords likewise a glutinous compound with the other acids, except the vitriolic; whence this salt is generally preferred for making the sedative salt. It proves most glutinous with the vegetable, and least with the marine. With oils, both expressed and distilled, it forms a milky, semi-faponaceous compound. It partially dissolves in spirit of wine. In conjunction with any acid, it tinges the flame of burning matters green; the precipitate thrown down by it from metallic solutions has this effect. It does not deflagrate with nitre. Puffed with inflammable matters, it yields nothing sulphureous, as those salts do which


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870 **Acetous acid and its combinations.** This combination produces Vegetable a flat to exceedingly deliquescent, that it cannot be procured in a dry form without the greatest difficulty. In a liquid flat, it is well known in medicine, as a sudorific, by the name of *spiritus minuendium.* It may, however, be procured in a dry form, by mixing equal parts of vitriolic salt ammoniac and terra foluta tartari, and subliming the mixture with a very gentle heat. When the flat is once procured, the utmost care is requisite to preserve it from the air.

871 **V. With Earths.** Combinations of this kind are but Anomalous and little known. With the carboaceous and argillaceous salts, earth compounds of an astringent nature are formed. According to the author of the Chemical Dictionary, the salt resulting from a combination of vinegar with carboaceous earth easily crystallizes and does not effervesce. With magnesia the acetous acid does not crystallize; but, when inspissated, forms a tough mass, of which two drachms, or two and a half, are a brisk purgative.

872 **With Copper.** Upon this metal the acid of vine-distilled vinegar does not act briskly, until it is partly at least calcined. If the copper is previously dissolved in a mineral acid, and then precipitated, the calx will be readily dissolved by the acetous acid. The solution is of a green colour, and beautiful green crystals may be obtained from it. The solution, however, is much more easily effected, by employing verdigris, which is copper already united with a kind of acetous or tartaraceous acid, and very readily dissolves in vinegar. The crystals obtained by this process are used in painting, under the name of *distilled verdigris.*

The most ready, and in all probability the cheapest, method of preparing the crystals of verdigris is that proposed by Mr Wenzel, by mixing together the solutions of fugar of lead and blue vitriol, when an exchange of bases takes place; the lead being infantly precipitated by the vitriolic acid, and the acetous acid uniting with the copper. From 15 ounces and two drachms of fugar of lead with twelve ounces of blue vitriol, five ounces of the crystals were obtained. The precipitate of lead, though washed several times with water, never lost its green colour. It may either be used, he says, in this state, as a green pigment, or it may be made perfectly white by digestion in dilute nitrous acid.

873 **VI. With Iron.** Vinegar acts very readily upon iron, and dissolves it into a very brown and almost black liq-


876 **Acetous acid and its combinations.** This acid is plentifully obtained from all vinous liquors, by a fermentation of a particular kind, (see *Fermentation, and Vinegar.* It appears first in the form of an acid liquor, more or less deeply coloured, as the vinegar is more or less pure. By distillation in a common copper-still, with a pewter head and worm, this acid may be separated from many of its oily and impure parts. Distilled vinegar is a pure water but not a stronger acid than the vinegar itself; for the acid is originally left volatile than water, though, by certain operations, it becomes more so. After vinegar has been distilled to about half of its original bulk, it is still very acid, but thick and black. This matter continues to yield, by distillation, a strong acid spirit, but tainted with an empyreumatic oil. If the distillation is continued, a thick black oil continues to come over; and at last some volatile alkali, as in the distillation of animal substanctes. The caput mortuum left that it is not easily preserved, even when put into water; but therefore, recommends the corks to be covered with a slight coating of vitriolic matter; otherwise they would transmit moisture enough to make the flat deliquate.

875 **II. With Fossil Alkali.** This alkali, combined with the acetous acid, forms a flat whose properties are not well known. Dr Lewis affirms, that it is nearly similar to the terra foluta tartari. The author of the Chemical Dictionary, again, maintains it to be quite different; particularly that it crystallizes well, and is not deliquescent in the air; whereas the former cannot be crystallized; and even when obtained in a dry form, unless great care is taken to exclude the air, will presently deliquate.

867 **How procured.** This acid is plentifully obtained from all vinous liquors, by a fermentation of a particular kind, (see *Fermentation, and Vinegar.* It appears first in the form of an acid liquor, more or less deeply coloured, as the vinegar is more or less pure. By distillation in a common copper-still, with a pewter head and worm, this acid may be separated from many of its oily and impure parts. Distilled vinegar is a pure water but not a stronger acid than the vinegar itself; for the acid is originally left volatile than water, though, by certain operations, it becomes more so. After vinegar has been distilled to about half of its original bulk, it is still very acid, but thick and black. This matter continues to yield, by distillation, a strong acid spirit, but tainted with an empyreumatic oil. If the distillation is continued, a thick black oil continues to come over; and at last some volatile alkali, as in the distillation of animal substanctes. The caput mortuum left that it is not easily preserved, even when put into water; but therefore, recommends the corks to be covered with a slight coating of vitriolic matter; otherwise they would transmit moisture enough to make the flat deliquate.

865 **I. With Vegetable Alkali.** The produce of this combination is the *terra foluta tartari,* or salt diureticus of the fops; but to prepare this falt of a fine white faky appearance, which is necessary for falt, is a matter of some difficulty. The best method of performing this operation is, after having saturated the alkali with the vinegar, which requires about 15 parts of common distilled vinegar to one of alkali, to evaporate the liquor to dryness; then melt the saline mafs which remains with a gentle heat; after which it is to be dissolved in water, then filtered, and again evaporated to dryness. If it is now dissolved in spirit of wine, and the liquid abstracted by distillation, the remaining mafs being melted a second time, will, on cooling, have the faky appearance defired.

A good deal of caution is necessary in the first melting: for the acetous acid is easily diffusible, even when combined with fixed alkali, by fire. It is proper, therefore, that, when the salt is melted, a little should be occasionally taken out, and put into water; and when it readily parts with its blackness to the water, must then be removed from the fire. The falt, when made, has a very strong attraction for water, insomuch that it is not easily preserved, even when put into glass bottles. To keep it from deliquating, Dr Black, therefore, recommends the corks to be covered with some bituminous matter; otherwise they would transmit moisture enough to make the falt deliquate.
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Acerous acid and its combinations.

875

Carrous.

to put vinegar into such earthen vessels as are glazed with lead. In the metallic state, only a drachm of lead can be dissolved in eight ounces of distilled vinegar.

If lead is exposed to the vapours of warm vinegar, it is corroded into a kind of calx, which is used in great quantities in painting, and is known by the name of cerufs or white lead. The preparation of this pigment has become a distinct trade, and is practised in some places in Britain where lead is procurable at the lowest price. The process for making cerufs is thus given by the author of the Chemical Dictionary.

"To make cerufs, leaden rolls ought to be so supported in the pots that they do not touch the vinegar, but that the acid vapour may circulate freely between the circumvolutions. The pots are to be covered, and placed in a bed of dung, or in a sand-bath, by which a gentle heat may be applied. The acid of vinegar being thus reduced into vapour, easily attaches itself to the surface of these plates, penetrates them, and is impregnated with the metal, which it reduces to a beautiful white powder, called cerufs. When a sufficient quantity of it is collected on the plates, the rolls are taken out of the pots, and unfolded; the cerufs is then taken off, and they are again rolled up, that the operation may be repeated.

"In this operation, the acid being overcharged with lead, this metal is not properly in a single plate; hence cerufs is not in crystals, nor is soluble in water: but a single property would render it unfit for painting, in which it is chiefly employed."

Though this process may in general be just, yet there are certainly some particulars necessary to make cerufs of a proper colour, which this author has omitted; for though we have carefully treated thin plates of lead in the manner he directs, yet the calx always turned out of a dirty grey colour. It is probable, therefore, that after the lead has been corroded by the steam of vinegar, it may be washed with water slightly impregnated with the vitriolic and nitrous acids.

This preparation is the only white hitherto found fit for painting in oil; but the discovery of another would be very desirable, not only from the faults of cerufs as a paint, but also from its injurious the health of persons employed in its manufacture, by affecting them with a severe colic; which lead, and all its preparations, frequently occasion.

If distilled vinegar is poured on white lead, it will dissolve it in much greater quantity than either the lead in its metallic form, or any of its calxes. This solution filtered and evaporated, yields into small crystals of an aethere sweetish taste called sugar of lead. These are used in dyeing, and externally in medicines. They have been even given internally for sputting of blood. This they will very certainly cure; but at the same time they as certainly kill the patient by bringing on other diseases. If these crystals are repeatedly dissolved in fresh acids, and the solutions evaporated, an oily kind of substance will at last be obtained, which can Acerous acid and its combinations.

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VIII. With Tin. The combination of acerous acid with tin is volatile known, that many have doubted whether distilled vinegar is capable of dissolving tin or not. Dr Lewis observes, "That plates of pure tin put into a common vinegar begun in a few hours to be corroded, without the application of heat. By degrees a portion of the metal was taken up by the acid, but did not seem to be perfectly dissolved, the liquor appearing quite opaque and turbid, and depositing great part of the corroded tin to the bottom, in a whitish powder. A part of the tin, if not truly dissolved, is expulsed divided in the liquor; for, after standing many days and after passing through a filter, so much remained suspended as to give a whiteness and opacity to the fluid. Acid juices of fruits, substituted to the vinegar, exhibited the same phenomena. These experiments are not fully conclusive for the real solubility of tin in these acids, with regard to the purposes for which chemists have wanted such a solution: but they prove what is more important; that tin, or tinned vessels, however pure the tin be, will give a metallic impregnation to light vegetable acids suffered to stand in them for a few hours."

With regard to other metallic substances, neither the degree of attraction which the acerous acid has for them, nor the nature of the compounds formed by the union of it with such substances, are known; only, that as much of the reginule part of antimony is dissolved in this acid as to give it a violent emetic quality. See Regulus of Antimony.

Concentration of the Acerous Acid.

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Common vinegar, as any other weak acid, may be Concentrated advantageously by frost; also may its vert spirit or the distilled vinegar of the shops: but as the gar.

In this country, is seldom or never so intense as to freeze vinegar, this method of concentration cannot be made use of here. If distilled vinegar be left in a water-bath, the most aqueous part will arise, and leave the more concentrated acid behind. This method, however, is tedious, and no great degree of concentration can be produced, even when the operation is carried to its utmost length. A much more concentrated acid may be obtained by distilling in a retort the crystals of copper, mentioned (n° 872) under the name of distilled verdigris. A very strong acid may thus be obtained, which has a very pungent smell, almost as suffocating as volatile sulphurous acid. The Count de Lauraguais discovered that this spirit, if heated in a wide-mouthed pan, would take fire on the contact of flaming substances, and burn entirely away, like spirit of wine, without any residuum.

The same nobleman also observed, that this spirit, when well concentrated, easily crystallizes without ad-

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This may seem to be the most proper method of obtaining the acetic acid in its greatest degree of strength and purity; but as the process requires a very strong heat to be used towards the end of the operation, it is possible that part of the acetic acid may be by that means entirely decomposed. It would seem preferable, therefore, to decompose pure termi foliata tartari by means of the vitriolic acid, in the same manner as nitre or sea-salt are decomposed for obtaining their acids. In this case, indeed, the acetic acid might be a little mixed with the vitriolic; but that could easily be separated by a second distillation. A still better method of preparing the acid seems to be by distilling fugar of lead with oil of vitriol. The proportion used by M. Lorenzen of Copenhagen, is three ounces of vitriolic acid to eight of the fugar of lead. Mr Dollfus recommends two parts of fugar of lead to one of vitriolic acid.

Dr Priestley, who gives us several experiments on the vegetable acid when reduced to the form of air, mentions his being easily able to expel it from some exceedingly strong concentrated vinegar, by means of heat alone. This seems somewhat contrary to the count de Lautaguis's observation of the disposition of the spirit of verdigris, as it is commonly called, to crystallize: but a still greater difference is, that the vegetable acid air extinguished a candle, when according to the Count's observation, it ought to have been inflammable. This most curious property observed by Dr Priestley is, that the vegetable acid air being imbied by oil olive, the oil was rendered less viscid, and clearer, almost like an essential oil. This is a useful hint; and, if purified, might lead to important discoveries.

Acetous acid combined with Inflammable Matter.

The only method yet known, of combining acetous acid with the principle of inflammability, is by mixing together equal parts of the strongly concentrated acid called spirit of verdigris, and spirit of wine. The result is, a new kind of ether, similar to the vitriolic, nitrous, and marine. This ether, however, retains some of the acridity and peculiar smell of the vinegar. By rectification with fixed alkali, it may be freed from this acidity, and then finel. more like true ether, but still retaining something of the smell, not of the acid, but the inflammable part of the vinegar.

If to this process a greater quantity of ether is obtained than by employing the vitriolic acid; which shows that the vegetable acid is essentially fitter to produce ether than the vitriolic. For making the acetic ether readily, Mr Dollfus recommends eight ounces of fugar of lead dried by a very gentle heat, until it looses the water of crystallization, when it will weigh five ounces and fix drachms. It is then to be put into a glads retort and a mixture of five ounces of vitriolic acid, with eight of spirit of wine, poured upon it, and the whole distilled with a very gentle fire. The first ounce that paffes over will be dulcified acetous acid, the next almost all ether; and the third ether in its purest state.

An ether may also be obtained from vinegar of wood. To make it, the most concentrated acid of this kind is to be made use of. For this purpose an em-
Acid of tartar and its combinations. 

This acid of a peculiar kind, joined with a great deal of water, and more liable to the effects of impurities; but really a compound salt, containing an alkali joined with an acid; and that the alkali produced from burnt tartar is not generated in the fire, but pre-existent in the salt.

The whole sediment contained in this experiment, is the calcareous earth combined with the acid of tartar, which may justly be called selenites tartareae. If some diluted vitriolic acid is poured upon this selenites tartareae, the vitriolic acid expels the acid of tartar, forming a true selenite with the earth, while the liquor contains the pure acid of tartar. By inspissation this acid may be made stronger, and even formed into small white crystals, which do not deliquate in the air.

A particular species of tartar extracted from forrel hath been fold for taking spots out of clothes, under the name of effenti.al fall of lemons, and which is now discovered to be the same with the acid of fugar.

This experiment was soon after confirmed by Dr Black, who farther observed, that if quicklime was used instead of chalk, the whole acid would be absorbed by the lime, and the remaining liquor, instead of being a solution of soluble tartar, would be a caustic lixivium. The most ready method, however, of procuring the pure acid of tartar seems to be that recommended by Mr Schiller in the Chemical Annals for 1787. One pound of cream of tartar thrown in as much liquid deal of water, and a quartar of a pound of oil of vitriol added by little and little, by which means a perfect solution will be obtained. By continuing the boiling, all the vitriolated tartar is precipitated. When the liquor is evaporated to one half, it must be filtered; and if, on the renewal of the boiling, any thing farther is precipitated, the filtration is to be repeated. The clear liquor is then to be reduced to the consistence of a syrup, and set in a temperate, or rather a warm place, when very few crystals will be formed, and as much acid obtained as is equal in weight to half the cream of tartar employed. If too small a quantity of vitriolic acid has been employed, the undecomposed cream of tartar falls along with the vitriolated tartar.

Acid of Tartar Combined,

I. With Vegetable Alkali. If the pure acid of tartar be combined with this alkali to the point of saturation, a neutral salt is produced, which deliquesces in the air, and is not easily crystallized, unless the liquor be kept warm, and likewise be somewhat alkaline. This salt, called soluble tartar, is used in medicine as a purgative; but as its deliquescence does not admit of its being kept in a crystalline form, it is always sold in powder.

Hence those who prepare soluble tartar, take no further trouble than merely to rub one part of fixed alkaline salt with three parts of cream of tartar, which renders the compound sufficiently neutral, and answers all the purposes of medicine. Dr Black informs us, that in medical prescriptions, where soluble tartar is ordered as a purgative along with a decoction of tamarinds, the acid of the latter will decompose the soluble tartar, and thus the prescription may perhaps be rendered inefficient. The saline mixture used in fevers is nothing but tartaric soluble salt in solution.

According to Mr Scheele, cream of tartar may be decomposed from the pure acid and alkali in the following manner: "Upon fixed vegetable alkali, a solution of the acid of tartar. Continue this till the effervescence is over; the fluid will then be transparent; but if more of the acid is added, it will become turbid and white, and small crystals like white sand will be formed in it. These crystals are a perfect cream of tartar.

Upon these principles, another method of decomposing cream of tartar might be tried; namely, adding to it as much oil of vitriol as would saturate the alkali, then dissolving and crystallizing the salt: but, by this method, there would be danger of the acid being adulterated with vitriolic tartar.

II. With Fossil Alkali. The salt produced from an Siegnette's union of cream of tartar with fossil alkali, has been long known under the names of Siegnette's salt, salt Ru-pellenfis, or Rochelle salt; but as the cream of tartar is now discovered to be not a pure acid, but adulterated with a portion of soluble tartar, possibly some differences might be observed if the pure acid was used.

This salt was first invented and brought into vogue by one Siegnette, an apothecary at Rochelle, who kept the composition a secret as long as he could. Meilrs Boylduc and Geoffroy afterwards discovered and published its composition.

To prepare this salt, crystals of mineral alkali are to be dissolved in hot water, and powdered cream of tartar added to it, and then the undecomposed, and even formed into small crystals, like white sand, will be dissolved in it. This crystal is easily distinguished from the others, not only by its breadth, but also by two distinct diagonal lines which intersect each other in the middle. The following method of preparing Siegnette's salt, recommended by Mr Scheele, is preferable to any other on account of its ease and cheapness. Thirty six ounces of crystals of tartar are to be saturated with potash, and eleven ounces of common salt dissolved in the ley. When it is grown cold, and the vitriolated tartar has subsided to the bottom, it is filtered and evaporated till a pellicle appears; the two first crystallizations yield a fine Siegnette's salt; the third contains some digestive salt; and the fourth is entirely composed of it. The reason of this formation of Siegnette's salt is, that the vegetable alkali has a greater attraction for acids than the mineral, and therefore decomposes the sea-salt, whose basis is then at liberty to combine with the acid of tartar; while the stronger marine acid takes the vegetable alkali. A salt of the same kind will be produced by adding Glau-bee's salt instead of common sea-salt.

III. With Volatile Alkali. With regard to this combination, we know as yet, that if the alkali is over-faturared with acid, a cream of tartar, almost as difficult of dissolution as that of fixed alkali, will be obtained. When the saturation has been pretty exact, a beautiful salt, composed of four fixed pyramids, and which does not deliquate in the air, is produced. It is instantly depoindown, and emits a pungent volatile smell on being mixed with fixed alkali.
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IV. With Earths. All that is as yet known concerning these combinations, is, that with the calcareous earth a compound not easily soluble in water is formed. The other properties of this substance, and the nature of combinations of tartaric acid with other earths, are entirely unknown.

V. With Copper. In its metallic state, cream of tartar acts but weakly on the metal, but dissolves very readily and completely than diluted vinegar can.

The solution of cream of tartar, being evaporated, does not crystallize, but runs into a gummy kind of matter; which, however, does not affect the moiure of the air. It readily dissolves in water, and makes a beautiful bluish green on paper, which has the property of always thinning, as if covered with varnish. The effects of the pure acid on this metal have not yet been tried.

VI. With Iron. The effects of a combination of iron with the pure acid have not hitherto been tried. Cream of tartar dissolves this metal into a green liquor, which being evaporated runs per deliquium. It has been attempted to substitute a solution of this kind to the liquor used in printing calceoles formed of iron and beer; but this gave a very dull brownish colour with madder. Possibly, if the pure acid was used, the colour might be improved. In medicine, a combination of cream of tartar with iron is used, and probably may be an useful chalybeate.

VII. With Regulus. See Sect. III.

§ 8. Of the Acid of Sugar.

That sugar contains an acid, which on distillation by a strong fire arises in a liquid form, in common with that of most other vegetable substances, has been generally known; but how to obtain this acid in a concrete form, and to appearance as pure and crystallizable as the acid of tartar, we were entirely ignorant, till the appearance of a treatise intitled, Differtatio Chemica, de acido Sacchari, autore Johanne Aftelio Arvidfon, 4to, Upsala.

Of the method of procuring, and the properties of this new acid, we have the following account in the Edinburgh Medical Commentaries, vol. iv. 1. To an ounce of the finest white sugar in powder, in a tubulated retort, add three ounces of strong spirit of nitre.

2. The solution being finished, and the phlogiston of the spirit of nitre mostly exhaled, let a receiver be properly fitted to the retort and luted, and the liquor then made to boil gently.

3. When the solution has obtained a brownish colour, add three ounces more of spirit of nitre, and let the ebullition be continued till the fumes of the acid are almost gone.

4. The liquor being at length empyred in a larger vessel, and exposed to a proper degree of cold, quadrangular prismatic crystals are observed to form; which being collected, and dried on felt paper, are found to weigh about 100 grains.

5. The remaining liquor being again boiled in the same retort, with two ounces of fresh spirit of nitre, till the red vapours begin to disappear, and being then in the same manner exposed to crystallize, about 43 grains of fatty spiculae are obtained.

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"6. To the liquid that still remains, about two. Acid of sucrose more of spirit of nitre being added, and after-wards the whole being, both by boiling and evaporation, reduced to a dry mass, a brown, fatty, gelatinous kind of substance is produced, which, when thoroughly dry, is found to weigh about half a drachm.

"In the same manner, a similar acid, we are told, may be obtained from different faccharine substances, as gum-arabic, honey, &c.; but from none in such quantities, or so pure, as from fine sugar."

This salt possesse some very singular properties, of Presump-
Acid of fugar and its combinations.

Acid of phosphorus and its combinations.

Fia the salt appears in form of a white powder, soluble neither in water nor spirit of wine, unless the acid prevails. It has a stronger affinity with magnesia than any of the alkaline salts. With earth of alum, no crystals are obtained; but a yellow pellucid mask, of a sweetish and somewhat astringent taste; which, in a moist air, liquefies, and increases two-thirds in weight.

This acid acts upon all metals, gold, silver, platina, and quicksilver, not excepted, if they have been previously dissolved in an acid, and then precipitated. Iron in its metallic state is dissolved in very large quantity by the faccharine acid; 42 parts of iron being soluble in 55 of acid. By evaporation, the liquor shrinks into yellow prismatic crystals, which are easily soluble in water. With cobalt, a quantity of yellow-coloured crystals are obtained, which being dissolved in water, and sea-salt added to the solution, form a sympathetic ink. The elective attractions of this singular acid are, first, lime, than the terra ponde roja, magnesia, vegetable alkali mineral alkali, and lastly clays. With spirit of wine an ether is contained, which cannot easily be set on fire unless previously heated, and burns with a blue instead of a white flame.

Towards the conclusion of his dissertation the author observes, that some may imagine that the acid of nitre made use of in these experiments, may have a considerable share in the production of what he has termed acid of fugar. But though he acknowledges that this acid cannot in any way be obtained but by the assistance of spirit of nitre, he is thoroughly convinced that it does not, in any degree, enter into its composition.

What occurs to us on this subject is, that if the acid really pre-exists in the fugar, it must give some tokens of its existence by mixing the fugar with other substances besides spirit of nitre. The author himself thinks that lime acts upon the acid part of the fugar: from whence we are apt to conclude, that by mixing lime, in a certain proportion, with fugar, a compound should be obtained somewhat similar to what was formed by a direct combination of lime with the pure acid. In this case, we might conclude that the nitrous acid produces this salt, by combining with the inflammable part of the fugar, becoming thereby volatile, and flying entirely off, so as to leave the acid of the fugar pure. In the distillation of dulcified spirit of nitre, however, we have an instance of the nitrous acid itself being very much altered. This must therefore suggest a doubt that the acid salt obtained in the present cafe is only the nitrous acid deprived of its phlogiston, and united with some earthy particles.

In a treatise lately published by Mr Rigby, however, we are informed that fugar itself may be reconstituted by uniting the acid of fugar with phlogiston; which assertion, if well founded, undoubtedly decides the dispute in favour of the faccharine acid being originally contained in the fugar. Late experiments have determined it to be the same with that of foor; for which, as well as many other valuable acquisitions, the honour of chemistry is indebted to Mr Scheele.

Having dissolved as much acid of fugar in cold water as the liquor could take up, he added to this solution some lixivium of tartar drop by drop, waiting a little after each drop, and found the mixture, during the effervescence, full of small crystals, which were genuine salt of wood-foor. M. Klaproth having precipitated a nitrous solution of quicksilver with salt of wood-foor, perfectly neutralized by vegetable alkali, obtained a white precipitate; which, when evaporated and dried, and gently heated in a tea-spoon, fulminated with a noise not inferior to that of fulminating gold. Acid of fugar perfectly neutralized with vegetable alkali, afforded the same precipitate, and fulminated in the same manner.

§ 9. Of the Acid of Phosphorus.

This acid was first discovered by Homberg in phosphoric urine; afterwards by Margraaf in mustard and cruciferous plants; M. Bochante discovered it in wheat; and lastly, M. Hassenfratz has traced it in the mineral kingdom with great attention. He has found that phosphorated iron is contained in all the Prussian blues, when not purified; but that this acid is produced by the coals employed in the process, and is no constituent part of the tingeing matter. According to him it occurs almost universally in the minerals of iron which are found in the slimy strata of the earth, as well as those which are undoubtedly modern, whether primary or secondary; unless the iron be so far of a metallic nature as to be attracted by the magnet, or very near that state. It is afforded by the ochry strata, and those which contain haemastics as well as the slimy kind. Into these it is supposed to have come by the decomposition of vegetables; and to investigate this matter he examined the hibiscus palustris, solidago, virga aurea, antirrhinum, lonaria, folanum nigrum, vulgatum, flacchys palustris, artemisia Zeylandica, ruta graveolens, lycopus Europeus, carex acuta, vinca major, nepeta Pannonica, and noa Abyssina. All these plants afforded the acid of wood-foor and the phosphoric acid. The quantity of the former varied from two ounces to two drachms 18 grains of acid salt containing some calcareous earth, to two drachms 24 grains in a pound of each plant; the quantity of calcareous phosphoric salt being from one ounce six drachms 48 grains to one drachm 12 grains. M. Hassenfratz also observes, that the phosphoric acid is procured from all sorts of iron; though in some it seems to proceed from that contained in the earth, and in others from the coals employed in the reduction. The phosphoric acid is also found by Dr Marquart to be contained in the gastric juice of animals. One pound four ounces of the gastric juice of oxen gave 10 grains of a lymopathic matter, exactly like the blood in its qualities; 16 grains and six-sevenths of phosphoric acid, which with a blow-pipe was changed into a very pure and deliquescent glass of phosphorus; five grains of phosphorated lime, two grains of reftin, 14 grains of full ammonis, 29 grains of common salt, a very small quantity of an extract whose nature was difficult to ascertain; one pound three ounces six drachms and 67 grains of water; so that the solid contents were only 166th part of the bulk.

In sheep, the quantity of gastric juice was about eight ounces in quantity, of a deeper and brighter green
Acid of phosphorus and its combinations.

green than that of oxen or calves; but affording the same ingredients, though in a different proportion; though no other acid than that of phosphorus could be discovered. It was also more disposed to putrefaction.

Calves furnished from four to six ounces of gastric juice, which contained very little lymph, but afforded some quantity of dry jelly, though the whole was not equal to the proper proportion of lymph. The phosphorised lime was in the usual quantity, but the difengaged phosphoric acid in a very small proportion. The tincture was found in great quantity; to which, along with that of phosphorus, our author supposes the property of curdling the milk in the animal's stomach to be owing.

The phosphoric acid has also been found in very large quantity in the calcareous flounces of Andalusia; and Mr Klaproth has found the same combined with calcareous earth in a kind of beryl, crystallized in hexagonal prisms, called by M. Martin sparites. Formerly the best method of obtaining it was from urine, where it is contained in very considerable quantity in combination with the volatilate calcareous earth, and forming a salt called the microcosmic, or essential salt of urine.

To procure this, a large quantity of urine is to be evaporated to the consistence of a thin syrup; which, being set in a cold place, will yield, in three or four weeks, four brown-coloured crystals, which are the microcosmic salt, mixed with the urine, and other salts of urine. These crystals are to be distilled in hot water; the solution filtered whilst it continues hot, and set to crystallize again; and the solution, filtration, and crystallization, repeated till the salt becomes pure and white. In all the crystallizations the microcosmic salt flows first, and is easily distinguished and separated from the others. If the urine which remains after the first crystallization be further evaporated, and again set in the cold, it will yield more crystals; but browner and more impure than the former; and therefore requiring to be purified by themselves. From 20 gallons of urine may be obtained four ounces of pure salt; a considerable part being still left in the retortum.

In these operations the heat ought to be gentle, and the vessels either of glass or compact fome-ware. Urine being evaporated in a copper vessel, afforded only a green solution of that metal.

Concerning the nature of the microcosmic salt obtained by the above process, Mr Margraff gives the following account in the Berlin memoirs for 1746.

"Sixteen ounces of the salt, distilled in a glass retort, in a heat gradually raised, gave over eight ounces of a volatile urinous spirit, resembling that made from malm ammoniac by quicklime. The retortum was a porous brittle mass, weighing eight ounces. This, urged with a stronger fire in a crucible, bubbled and frothed much, and at length sunk down into the appearance of glasis, without seeming to suffer any further diminution of its weight in the most vehement heat.

The vitreous matter dissolved in twice or thrice its quan­ty of water, into a clear, transparent, acid liquor, somewhat thick, not ill resembling in consistence concentrated oil of vitriol. This liquor totally corroded zinc into a white powder, which, being diluted with water, appeared in great part to dissolve, fixed alkalies occasioning a plentiful precipitation. It acted powerfully upon iron, with some effervescence; and changed the metal into a kind of muddy substan­ce inclining to bluish, in part soluble in water like the preceding. It dissolved likewise a portion of regulus of antimony, and extracted a red tincture from cobalt. On lead and tin it had very little action. Copper it corre­oded but slightly. On bismuth, silver, and gold, it had no effect at all, either by strong digestion, or a boiling heat. Nor did the adding of a considerable portion of nitrous acid enable it to act upon gold."

"The vitreous salt in its dry form, melted with metal­lic bodies with a strong fire, acts upon them more powerfully. In each of the following experiments, two drachms of the salt were taken in two crucibles of the metal reduced to small parts. (1.) Gold communicated a purple colour to the vitreous salt; on weighing the metal, however, its diminution was not considerable. (2.) Silver lost four grains, or \( \frac{1}{6} \); and rendered the salt yellowish, and moderately opaque. (3.) Copper lost only two grains, or \( \frac{1}{3} \), though the salt was tinged of a deep green colour. It seemed as if a portion of the salt had been retained by the metal, which, after the fusion, was found to be whiter and more brittle than before. (4.) During the fusion with iron, flashes like lightning were continually thrown out; a phosphorus being generated from the combination of the acid with the inflammable principle of the iron. Great part of the mixture rises up in froth; which, when cold, appears a vitreous sioria, covered on the surface with a kind of metallic skin, which, on being rubbed, changes its green colour to a yellowish. The rest of the iron remains at the bottom of the crucible, half melted, half vitrified, and fpongy. (5.) Tin lost 18 grains, or nearly one-half its weight, and rendered the salt whitish; the remaining metal being at the same time remarkably changed. It was all over leavy and brilliant, very brittle, internally like zinc. Laid on burning coals, it first began to melt, then burnt like zinc, or phosphorus. (6.) Lead lost 16 grains, and gave the same whitish colour to the sioria that tin does. The remaining lead was in like manner inflammable, but burnt less vehemently than the tin; from which it differed also in retaining its malleability. (7.) Mercury precipitated from aquafortis, and well edulcorated, being treated with the salt in a glass retort, with a fire raised to the utmost, only 12 grains of mercury sublimed; 28 remaining united with the acid, in a whitish, semi-opaque mass. A solution of this mixed in distilled water, deposited a quantity of a yellowish powder; which, by distillation in a glass retort, was in great part revived into a running mercury. A part also remained dissolved in the clear liquor; for a drop let fall on polished copper instantly whitened it. (8.) Regulus of antimony melted with the vitreous salt, lost eight or nine grains, (about \( \frac{1}{6} \ )); the regulus afforded a fine, brilliant, striated appearance; the sioria were somewhat opaque. (9.) Bismuth lost eight grains; the sioria were like the preceding, but the bismuth itself suffered little change. (10.) Zinc, mixed with the salt, and distilled in a glass retort, yielded a true phosphorus, which arose in a very moderate heat. The retortum was of a grey colour, a little melted at the
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the bottom, in weight not exceeding two drachms; so that two cements had sublimed. This residuum, urged further in a small Hemian crucible to perfect fusion, emitted an infinity of phosphoric flames, with a kind of detonation. The matter, grown cold, looked like the scori- no of melted glafs. (11.) White arsenic, mixed with this salt, separated in the fire, greatest part of it subliming, and only as much remaining behind as increased the weight of the salt eight or nine grains. The compound appeared at first transparent; but, on being exposed to the air, became moist, and of an o- paque white, much resembling crystalline arsenic. (12.) Cinnabar totally sublimed; suffering no change itself, and occasioning none in the salt. Sulphur did the same. (13.) One part of the salt, mixed with ten of manganse, and melted in a clofe vessel, gave a semi-transparent mafs, some parts of which were bluishe. The crucible was lined with a fine purple glaze, and the edges of the mafs itself appeared of the same colour.

The vitreous salt dissolved also, in fusion, metallic calces and earths. Chalk, with one-third its weight of the salt, formed a feelimtransparent vitreous mass: calcined marble, with the same proportion, flowed so thin as to run all through the crucible; gypsum, likewise, ran moistly through the crucible; what remained was feelimtransparent. Lapis specularis ran entirely through the vessel. Spanish chalk gave a feelimtransparent mass, which sparkled on breaking; and fine white clay, a similar one. Saxon topaz and flint were changed into beautiful opal-coloured masses; the earth of alum into a feelimtransparent mass, and quicklime into an opaque white one. The masses with flints imbued moisture from the air; the others not.

Oil of vitriol, poured upon one-fourth its weight of this salt in a retort, raised an effervescence, acquired a brownish colour, and afterwards became turbid and white. On raising the fire, the oil of vitriol diffused, and the matter in the bottom of the retort melted. In the neck was found a little sublimate, which grew moist in the air; as did likewise the remaining salt, which was opaque and whitish. Concentrated spirit of nitre, diffused with this salt in the above proportion, came over unchanged; no sublimate appeared; the residuum looked like glafs of borax. The diffused spirit did not set in the leaf upon gold, even by coction. Strong spirit of sea-salt being diffused in the same manner, no sensible change was made either in the spirit or the salt.

Equal parts of the vitrified microcosmic salt and salt of tartar being urged with the strongest fire that a glafs retort could bear, nothing feible came over, nor did the mixture appear in thin fusion. Dissolved in water, filtered, and duly evaporated, it afforded, very difticult, oblong crystals, somewhat alkaline; the quantity of alkali having been more than enough to ftaturate the acid. A whitish matter remained on the filter, amounting to seven or eight grains, from two drachms of the mixture; this, after being washed and dried, melted before a blow-pipe, as did likewise the mixture.

This salt seems to exerminate, in part, the acids of vitriolated tartar, nitre, and sea-salt. (1.) On diffus- ting a mixture of it with an equal quantity of vitriolated tartar, there came over some ponderous acid drops, which, faturated with fixed alkali, formed a neutral salt of greatly resembling the vitriolated tartar. The residuum readily dissolved in water, and diftically crystallized. (2.) Nitre, treated with the fame proportion of the salt, began to emit red vapours. The residuum was of a pech-blooming colour, appeared to have melted less perfectly than the preceding, and dissolved more difficultly in water. The solution deposited a little earthy matter; and, on being slowly evaporated, shot into crystals, which did not defagglize in the fire. (3.) Sea-salt, diffused in the same manner, manifestly parted with its acid; the residuum was whitish, readily dissolved in water, and afforded some cubical crystals. (4.) Sal ammoniac suffered no change. (5.) Borax, with an equal quantity of vitreous salt, run all through the crucibles.

"Solutions of this salt precipitate the earthy part of lime-water, of solution of alum, of flint dissolved in fixed alkali, and the combination of marine acid with chalk or quicklime. The precipitate from this last liquor is tenacious like glass, and does not difsolve even in boiling water; exposed to a strong fire, it froths prodigiously, and at last melts into a thick scoria."

"Solutions of this salt precipitate alkaline metallic solutions; as butter of antimony, solutions of silver, copper, lead, iron, mercury, and bismuth, in the nitrous acid; and of tin in aqua-regis. The precipitate of iron from spirit of salt is a tenacious mass; that of silver from aquafortis, sometimes a white powder, sometimes tenacious. Copper from aquafortis is sometimes thrown down in form of a white powder, and sometimes in that of a green oil, according to the proportions and dilutene[s] of the liquor. Silver is not precipitated at all by this acid from its solution in vinegar, nor gold from aqua-regis."

"An ounce of the vitreous salt, well mixed with half an ounce of foot, and committed to distillation, yielded a drachm of fine phosphorus. The black residuum, being elixated with boiling water, and the liquor passed through a filter, there remained upon the filter eight scruples of a black matter; and, on evaporating and crystallizing the liquor, about seven drachms were obtained of oblong crystals, which did not deliquesce in a moist air, but became powdery in a warm one. Thee crystals, treated asher with inflammable matter, yielded no phosphorus. Before a blow-pipe they melted into a transparent globular mass, which on cooling, became turbid and opaque. Dissolved in water, they precipitated solutions of silver, mercury, copper, and of chalk; though they did not act upon the latter so powerfully, nor produce with it a gluey mafs, as before they had been deprived of their phosphoric acid."
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§ II. Of the Acid of Amber.

The nature of this acid is as yet but little known, and Mr Pott is the only chemist who seems to have examined it with accuracy. We shall therefore give an abstract of the principal observations and experiments he has made on this salt.

"Salt of amber requires a large quantity of water Mr Pott's for its solution. In the first crystallization (being experiment much impregnated with the oil which rives from the amber along with it), it shews into fowy flakes, in colour resembling brown sugar-candy; the crystals which succeed prove darker and darker coloured. On repeating the depuration, the crystals appear at top of a clear yellow or whitish colour, in form of long needles or feathers; at bottom, darker, and more irregular, as are likewise the crystals which shew afterwards. The crystals neither liquefy nor become powdery in the air: rubbed, they emit a pungent smell like that of radishes, especially if warmed a little; their taste is acid, not in the least corrosive, but with a kind of oily pungency.

"This salt, kept in the heat of boiling water, loses nothing of its weight, and suffers no alteration. In a great heat it melts like oil; after which a little oily acid arises, then oily fumes appear in the lower part of the retort, and the salt sublimes into the neck, partly in the form of a dark yellow botter, and partly in that of feathers, a black coaly matter remaining at bottom; so that, by this process, a part of the salt is destroyed.

"Oil of turpentine has no action on this salt. Highly rectified spirit of wine gains from it a yellow colour in the cold; and, on the application of heat, dissolves a considerable quantity, but deposits great part of it on cooling. The salt thus deposited is somewhat whiter than before, but still continues sensibly yellow. The dulcified spirit of salt ammoniac dissolves it readily, without effervescence, into a yellow liquor; if the salt was foul, the solution proves of a red colour; on burning of the visous spirit, a neutral liquor remains.

"A solution of salt of amber in water, saturated with a pure alkaline lixivium, yielded, on insufflation, a saline matter, which would not crystallize, and which when exsiccated by heat, deliquated in the air, leaving a considerable proportion of an earthy, unctuous matter. Being again gently insufflated, it left a brownish salt very soluble, weighing one half more than the salt of amber employed. This salt effervesced with the vitriolic and nitrous acids: the vapour, which exhaled, was not acid, but oily and sulphurous. On repeating the experiment, and fully saturating the alkali with the salt of amber, the neutral salt made no effervescence with these acids. This salt did not perfectly melt before a blow-pipe; continued in the fire for some time, it effervesced with aquafortis. In distillation it yielded a bitter, oily, alkaliescent spirit, much resembling the spirit of tartar; and towards the end, an empyreumatic oil. The residuum eluted, yielded the alkaline salt again of a brown colour.

"Salt of amber effervesces strongly with volatile alkalies; and, on saturation, forms with them an oily am-
CHEMISTRY.

Acid of Ammonia and its combinations.

Ammoniacal liquor, which, in distillation, totally arises in a fluid form, except that a small portion of a penetrating, oily, fatty matter, concretes towards the end.

On distilling salt of amber with an equal quantity of common salt ammonia, on the application of heat, the whole coagulates into the consistence of a jelly. In distillation, the spirit of salt arose first; then almost the whole of the salt of amber, partly like firm butter, partly like long-striated plumose alundum, very pure, and of a fine white colour, its oily matter being changed into a liquid form at the bottom. The salt, thus purified, makes no precipitation in the solution of silver, and concomitantly retains nothing of the marine acid; nor does it precipitate solution of quicklime made in spirit of ammonia.

Mrs. Scheele first perceived, from some experiments on manganese, that arsenic contained phlogiston; from whence he was led to an analysis of this substance, which produced an acid of a very singular kind; by uniting with which it phlogiston in certain proportions, either white arsenic or its regulus may be composed at pleasure.

White arsenic may be decomposed in two ways. Two ways

1. Put two ounces of it reduced to a fine powder in a vessel glafs mortar into a retort of the same materials; pour upon it seven ounces of pure muriatic acid, whole specific gravity is to that of water as 10 to 8; and let it upon a receiver. The arsenic is quickly dissolved in a boiling heat, which must be brought on as quickly as possible. After the solution is accomplished, while the nitrous acid is capable of dissolving arsenic behind. The nitrous acid is capable of dissolving arsenic; but this cannot be done without solution, and the nitrous acid is capable of dissolving arsenic only in

Practice.

Acid of arsenic and its combinations.

Solution of salt of amber makes no precipitation in solution of silver or quicksilver. It dissolves zinc as all acids do: fixed alkalies precipitate the zinc; the volatile do not; and when a sufficient quantity of the volatile has been added, the fixed make no precipitation. It acts exceedingly slowly and difficulty upon copper; but corrodes calcined copper in a shorter time. It foons corrodes iron, by coction, into a crocus, and dissolves a part into a liquid form: the solution has little colour; but alkaline salts readily discover that it holds iron, by rendering it turbid and whitish, and throwing down a considerable quantity of a greenish calx.

§ 12. Of the acid of arsenic.

The receiver is then to be put on again, but not luted; the mixture soon begins to effervescence, and red vapours go over into the receiver. The distillation is to be continued till these vapours cease; when an ounce of finely powdered arsenic is again to be added, the receiver applied as before, and a gentle ebullition continued till the second quantity of arsenic be dissolved. The ounce and an half of nitrous acid is then to be added, and the mixture distilled to dryness, increased the fire towards the end, so as to make the retort red hot. The acid which comes over into the receiver may serve again several times. The white mafs which remains in the retort is the dry acid of arsenic. It may be reduced to a liquid form by pouring upon it, in coarse powder, twice its weight of distilled water, and boiling for a few minutes, pouring back the liquor which comes over, and afterwards filtering the solution through blotting paper, which has been previously washed in hot water.

In this process the nitrous acid attacks the phlogiston of the arsenic, is volatilized in consequence of its union with it, and leaves the more fixed but less powerful acid of arsenic behind. The nitrous acid would alone be sufficient for this purpose, could it accurately come into contact with the particles of arsenic; but this cannot be done without solution, and the nitrous acid is capable of dissolving arsenic only in
Acid of arsenic and its combinations.

By dephlogisticated spirit of salt.

Acid of arsenic equal-ly poison-ous with the white arsenic it-self.

Proportion to the water it contains. Too great a quantity would therefore be required were this acid to be used by itself; but by the use of muriatic acid for the solution, a smaller quantity of spirit of nitre is admitted to intimate contact with all the arsenic particles, and has an opportunity of depriving them of their phlogiston. Aqua-regia might be poured upon the arsenic at once; but the greatest efficacy it excites would throw the mineral up to the top in such a manner that the menstruum could not act upon it. By the operation of dephlogistication, arsenic loses a fifth part, which is supposed to be pure phlogiston.

The other method of decomposing arsenic is, by means of the dephlogisticated spirit of salt. For this purpose, take one part of powdered manganese, and mix it with three of the muriatic acid above-mentioned. Put it into a retort, of which it may fill one-fourth; a receiver containing one-fourth of powdered arsenic, with one-eighth of distilled water, is to be luted on, and the retort put into a cold bath. The dephlogisticated muriatic acid, going over into the receiver, is instantly absorbed by the arsenic; which some hours afterwards will be dissolved, and two different liquid sirups, which cannot be mixed together, will be perceived in the receiver. This solution is now to be put into a clean glass retort, and distill'd to dryness; increasing the fire at last to such a degree as to make the whole red hot: and in this process also two different liquids pass over into the receiver which do not unite together.

Here the manganese attracts the phlogiston of the muriatic acid; and as this dephlogisticated acid has a very firm attraction for phlogiston, it deprives the arsenic of its phlogiston, and thus recomposes the ordinary dephlogisticated muriatic acid. This portion of recomposed acid dissolves part of the arsenic, forming with it what is called butter of arsenic. The other part of the arsenic which has been decomposed, dissolves in the water, and forms a liquid specifically lighter than the butter, and therefore swims above it. On rectifying the two liquids, the undecomposed portion of the arsenic arises along with the muriatic acid, and goes over into the receiver in form of an heavy oil, while the acid of arsenic remains behind in the retort.

The acid obtained in this way is precisely the same with the former; and one would hardly believe that it is an acid, because it has no acid taste; but after some days it grows moist in the air, and at last deliquesces, assuming the appearance of oil of vitriol. As the deliquesce, however, is very slow, it is proper to distil off in a certain quantity of water, when a small quantity of white powder remains undissolved, after preparing it by the fire, which is siliceous earth derived from the retort. This ought to be carefully separated from the acid by filtration; and in order to prevent the glue of the blotting-paper from mixing with the acid, it was directed to wash the filter with hot water previous to the operation.

The first experiment of Scheele tried on this acid after he had obtained it, was to discover if it was as noxious to animals as when combined with phlogiston. Having mixed a little with honey, the flies that eat of it died in an hour; and eight grains reduced a cat to the point of death in two hours. Some milk, however, being then given to the animal, it vomited violently, and ran away.

2. An ounce of dry acid of arsenic, heated in a small phial near the point of ignition, melts into a clear liquid, which congeals when cold; but if the heat be increased till the vessel begins to melt, the acid begins easily to boil, fumes its phlogiston, and arsenic sublimes in greater quantity as the heat is longer continued. After subjecting the acid to this violent heat in a retort for an hour, the vessel melted, and the acid had risen up as high as the neck.

3. In a crucible the arsenic attracts phlogiston in greater quantity, and is entirely disfigur'd in arsentic vapours; a little clear and difficultly fusible glass, consisting of clay and the acid of arsenic, remaining in the crucible.

3. With powder of charcoal the arsentic acid undergoes no change; but if the mixture be put into a and sub-retort, the moisture all driven off, a receiver then luted on, and the heat increased till the bottom of the retort coal. The arsenic becomes red hot, the whole mafs takes fire with violence; all the acid is reduced, and sublimed into the neck of the retort; a shining regulus is obtained, mixed with a little arsenic and charcoal dust. A few drops of water are found in the receiver, but they do not contain a particle of acid.

4. The arsentic acid, after some days digestion, appears with oil of turpentine, unctuous oil, and sugar, becomes once with black and thick. If some muriatic acid be distilled with oil of turpentine, &c., with this little nitrous acid added, and the distillation repeated, some acid of arsenic is left behind. Spirit of wine undergoes no change either by digestion or distillation with arsentic acid.

5. Six parts of acid digested with one of sulphur with sulphur, no change; but when the mixture is evaporated phlegmonously, to dryness, and then subjected to distillation in a glass retort, the two unite with great violence at that degree of heat in which sulphur melts; and the whole mafs rises almost in the same instant, in form of a red sublimate; a little sulphureous acid in the mean time going over into the receiver.

6. Acid of arsenic, saturated with vegetable fixed Combined alkali, forms a deliquecent salt which does not cry with vegetable, but turns syrup of a violet green, though it table fixed alkali produces no change on the tincture of lacmus.

On the addition of a little more acid, however, it redissolves lacmus, but makes no alteration on the syrup of violets, the liquor will afford fine crystals like Mr Macquer's neutral salt of arsenic. On keeping this salt for an hour in fusion in a crucible covered with another layer upon it, the inside of the vessel was found covered with a white glazing, and a salt remained, which was still the same arsentic salt with excess of acid.

7. On distilling this salt in a retort with an eighth of this part of charcoal-dust, it began to boil violently decomposing as soon as the retort became red-hot, and a very fine fire fed by regulus of arsenic sublimed. The black residue contained the alkali entirely separated from the arsentic acid.

8. With mineral alkali the acid of arsenic forms Combined crystals when perfectly neutralized, but not if added with minute excess. In that case, the mafs becomes deliquecent alkali like the former when neutral.

9. With volatile alkali a salt much resembling the With voila- two side alkali.
two former is produced. It does not change lacmus, but turns the syrup of violets green. A gentle heat drives off part of its volatile alkali, and leaves the remainder supersaturated with acid; in which case it shows into long radiated and deliquescient crystals. Thence, urged by a stronger heat, part with the whole of their alkali, which is partly decomposed; some arsenic is formed by the union of the phlogiston of the alkali with part of the arsenic acid; the remainder of which assumes a milky colour, and lies in the bottom of the retort.

10. Acid of arsenic diffused with vitriolated tartar expels the vitriolic acid in a violent heat, which comes over in a concentrated but sulphuriculate state, leaving the arsenic falt formed of the acid and alkali united. With Glauber's salt the vitriolic acid also rises, and with the fublimated earth, with a little sulphuric acid, it passes over into the receiver. The refiduum diffuses with difficulty in the vitriolic acid, though some crystals of alum will form in the space of two months.

20. Four parts of arsenic acid mixed with one with white powdered white clay, did not dissolve any part by clay digestion for a fortnight. By distillation in a retort till the vessel began to melt, it was converted into a thick flux, and a little arsenic sublimed. By mixing the refiduum with a little powdered charcoal, a shining regulus was sublimed.

21. Terra ponderosa diffuses readily in the acid of With terra arsenic, but precipitates again as soon as it has attained ponderosa, the point of saturation. The solution is precipitated by acid of vitriol, and forms regenerated ponderous spar.

22. Gold is not acted upon by acid of arsenic, either With gold, by digestion or otherwise; nor is its solution precipitated, though the retorts used in the operation were stained with red and yellow spots, which could not be taken off; nor is its action increased by mixture with muriatic or with nitrous acid.

23. Pure platina is not acted upon. Its solution Platina, is not precipitated by the pure arsenic acid, but readily by the arsenic farts. The precipitate is yellow, and diffuses in a large quantity of water, but contains no mark of arsenic acid. Addition of muriatic or of nitrous acid makes no change in its effects.

24. Pure silver is not acted upon by the arsenic acid in digestion. On augmenting the fire till the acid melted, and keeping up this degree of heat for half an hour, the metal dissolved, and on breaking the retort, a colourles glassy mass, nearly transparent, was found in it; the retort being covered with a flame-coloured glazing, which could not be separated from it. By a great degree of heat the silver was reduced without addition. Solution of silver is precipitated by pure acid of arsenic, but more effectually by the neutral arsenic farts: the precipitate is of a brown colour, and by digestion in muriatic acid is changed into niter corne; it is also soluble in spirit of fal ammoniac prepared with quicklime. The action of the arsenic acid upon silver is considerably increased by mixing it with spirit of sea-falt; the former attacking the phlogiston of the metal, while the latter attacks its earthly basis.

25. Quicksilver is not acted upon by digestion with Quick-arsenic acid. On putting the mixture into a retort, silver distilling to dryness, and then increasing the fire, the mass becomes yellow, quicksilver rises into the neck of the retort, with a little arsenic, and some yellow sublimate; but though the fire was augmented till the retort began to melt, the mass could not be fused. Three drachms and an half of quicksilver were obtained out of six employed in the experiment: the arsentic acid, therefore, contained while in the mass was somewhat yellow; it diffused very readily in muriatic acid, but scarcely at all in the nitrous or vitriolic; on evaporation to dryness and distillation, some corrosive sublimate
With copper.

27. Arsenical acid dissolves copper by a digesting heat. The solution is of a green colour; a quantity of light blue powder is deposited, and attaches itself to the copper. This powder consists of the acid of arsenic and calcined copper. On mixing two parts of dry acid of arsenic, in fine powder, with one of filings of copper, and digesting the mixture, some arsenic rose into the neck, and the mass melted and turned blue. On boiling it with water, the solution was similar to one made directly from acid of arsenic and copper. A little copper remained in the bottom of the retort, which was tinged with brown, red, and yellow spots, insoluble in any menstruum. The solutions of this metal are not precipitated by arsenical acid, but the action solution is neutral. Arsenical fahs throw down a blue precipitate, which by exposure to a strong fire, turns brown and covers the inside of the containing vessel with a yellow enamel. On mixing the scoria in a fine powder with a little lamp-black, some fine regulars of arsenic sublimed, and the copper in the residuum was reduced.

28. With iron. Iron the acid of arsenic forms a gelatinous solution, which by exposure to the air grows so thick that in two hours' time it will not flow out at the mouth of a phial. With alkali of tartar a whitish green powder is thrown down; which being edulcorated and distilled in a glass retort, yields some arsenic, and leaves a red ochre behind. On distilling four parts of arsenical acid with one of iron filings, the mass effervesces strongly towards the end; and when it became dry, took fire in the retort upon increasing the heat, when both arsenic and regulars of arsenic were sublimed. The residuum was black, friable, and contained but little acid of arsenic; the retort was covered with yellowish brown spots. Solutions of iron in mineral acids are not precipitated by acid of arsenic, but the acetic solution lets fall a dark brown powder. All the solutions are precipitated by the arsenical neutral fahs, the precipitates by a strong fire, converted into black scoria; which mixed with powdered charcoal, and calcined, yield copious vapours of arsenic, and are afterwards attracted by the magnet.

29. With lead. Lead digested with arsenical acid turns black at first, but in a few days is surrouned with a light greyish powder, containing some arsenic which may be separated by sublimation. On distilling one part of shavings of lead with two of dry acid of arsenic, the lead was dissolved, the mass flowed clear, and a acid of little arsenic rose into the neck of the retort. A part of the milky glass was found in the bottom, which by boiling in distilled water, let fall a quantity of white powder, the supernous acid being dissolved in the water; the edulcorated powder yielded regulars of arsenic by distillation with charcoal. Solutions of lead in nitrous and muriatic acids are precipitated by arsenical acid.

30. Tin digested with acid of arsenic becomes first with tin, black, then is covered with a white powder, and afterwards becomes gelatinous. One part of tin filings distilled with two of acid of arsenic, took fire as soon as the retort became red-hot, and immediately after both arsenic and a little regulars were sublimed. The tin was dissolved into a limpid liquor, which became milky when cold.—By washing in water, a quantity of white powder was separated, insoluble in any acid, and containing very little of that of arsenic.

31. Arsenical acid dissolves zinc with effervesence. With zinc. The metal grows black, and the transparency of the acid is destroyed by a quantity of black powder. This powder edulcorated, dried, and put on an iron plate heated nearly red-hot, emits a blue flame and white arsenical smoke in the dark, leaving behind a white powder; thus manifesting itself to be mostly regular of arsenic. One part of filings of zinc distilled with two of acid of arsenic, took fire in the retort with a very bright flame, and burst the vessel with an explosion. Some regulars of arsenic and flowers of zinc were found in the neck.

32. Bismuth digested with acid of arsenic is covered with bismuth precipitated by the pure acid, while precipitates the solution and the precipitate consists of calcined bismuth and acid of arsenic. On distilling one part of the bismuth with three of arsenical acid, the mass melted, the metal was calcined, but remained undissolved in the bottom of the vessel; a little arsenic rose into the neck; and after the retort became cool, water was poured on the residuum, which dissolved the acid, but the calc of bismuth remained unchanged. Solution of this metallic in the acid of nitre was precipitated by arsenical acid. This precipitate, as well as the calx, are very difficult of fusion, but on adding a little powdered charcoal, the mixture instantly melts, the arsenic goes off in vapours, and the bismuth is reduced.

33. With regulars of antimony a quantity of white regulars of powder is produced by digestion, and the clear solution is likewise precipitated by dropping it into pure water. This powder is soluble only by muriatic acid, and may be precipitated again by the addition of water. One part of regulars of antimony digested with three parts of arsenical acid, took fire as soon as the mass melted, and regulars of arsenic with a red matter were sublimed; a little volatile sulphureous acid came over into the receiver. On boiling the residuum in water, the acid was dissolved, a white flaming powder remained behind, which on being mixed with charcoal powder and distilled, an ebullition took place, some regulars of arsenic rose into the neck of the retort, and the antimony being reduced. Bottle of antimony was not precipitated by the pure acid, but very readily by the arsenical fahs. Acetas and tartaraceus solutions of glas of antimony are precipitated by arsenical acid.
Acid of arsenic and its combinations.

With cobalt.

34. Cobalt is partially dissolved, and the solution assumes a rose-colour; on putting the whole mass into a retort, distilling off the liquid, and then augmenting the fire, the mass melted, and a little arsenic was sublimed. The residue when cold had a semi-transparent violet colour. On pouring water upon it, and putting it on hot sand, the acid was dissolved, the violet colour disappeared, and the solution assumed a dark-red colour. The bottom of the retort had a blue tinge, which could not be taken off. Solutions of cobalt in mineral acids are readily precipitated by the arsenical neutral salts. The precipitate is of a rose-colour, but melts with difficulty into a dark blue liquor.

With nickel.

35. Nickel, with acid of arsenic, assumes a dark green colour, and lets fall a green powder containing arsenic in its substance, which may be separated from it by a gentle heat. One part of nickel diffused with two of dry arsenical acid, melted with some appearance of inflammation, yielding some arsenic at the same time. The mass was yellow, with a number of grey elevated streaks upon it, which appeared like vegetation, and were formed during the distillation. On boiling the yellow mass in water, the acid was dissolved, leaving a yellow powder behind; which, when treated with charcoal-powder, yielded regulars of arsenic, but was not reduced itself. The solutions of nickel in acids are not precipitated by arsenical acid, nor even that in vinegar, but the usual arsenical falls throw down a white green powder.

With manganeous.

36. Manganese in its natural state is dissolved only in small part; but when phlogisticated it dissolves readily and totally; though, whenever the acid arrives at the point of saturation, the solution coagulates into small crystalls.

With regulus of arsenic.

37. Regulus of arsenic digested with its own acid soon becomes covered with a white powder, which is arsenic in substance. On distilling one part of the regulus with two of the acid, the former sublimed and the latter melted. If small pieces of regulus of arsenic be gradually added to the acid of arsenic in fusion, an inflammation takes place, and arsenic is sublimed.

Strange phenomenon of arsenic with terra-follitacea tarratii.

On distilling a mixture of equal parts of terra-follitacea tarratii and arsenic, a limpid liquid like water first came over, settling strongly of garlic; on changing the receiver, a liquor of a brownish red colour was collected, which filled the receiver with a thick cloud, emitting an intolerable smell of arsenic. On pouring this upon a filter, hardly a few drops had passed when a very thick thinning broke suddenly arose as high as the ceiling of the room; an effusion ensued towards the edge of the filtering-paper, and a fine red-coloured flame broke out, that lasted for some moments.

§ 13. Of the Acid of Molybdena.

We owe this, as well as the succeeding acids to the industry of the late Mr Scheele. The substance from which he extracted it is named by Cronstedt molybdena membranacea nitris. As this substance is of a flaky nature, and incapable of pulverization by itself, our author mixed some pieces of vitriolated tarratii along with it in a glass mortar; by the action of which it was at last reduced to a fine powder, and which was afterwards freed from the vitriolated tarratii by washing with hot water. He then treated this powder with all the known acids, but found none of them to have any effect upon it except those of arsenic and nitre. No sensible effect was perceived from the action of nitric acid; but when the acid was heated to a red heat, after which, by increasing the fire, a little yellow orpiment was sublimed in the neck of the retort, and some sulphureous acid passed over into the receiver. On pouring two parts of concentrated nitrous acid upon one part of powdered molybdena, the mixture was scarce warm in the retort, when it passed altogether into the recipient with great heat, and in the form of dark red vapours. Had the quantity been larger, he had no doubt that it would have taken fire; for which reason the experiment was repeated with diluted nitrous acid. Six ounces of diluted nitrous acid being poured on an ounce and a half of powdered molybdena, no effect was perceptible till the liquor began to boil, after which a great number of red elastic vapours began to appear, and the mixture swelled considerably. The distillation being continued to dryness, the residuum appeared of a grey colour; the same quantity of nitrous acid was poured on, and the process repeated, when the residuum was whiter; and on still repeating the operation a fourth and fifth time, the remaining powder became at last as white as chalk. This residuum, after being edulcorated with hot water, was quite tasteless and inoffensive when dry. The limpid liquor which ran from it being evaporated to half an ounce, first assumed a fine blue colour, and then grew thick. On being examined, it was found to contain some iron, and was otherwise chiefly acid of vitriol. The colour disappeared on diluting the acid with water.

The white powder just mentioned is the true acid of molybdena, and may be obtained by the help of fire alone. A small piece of molybdena exposed on a silver plate to the blow-pipe, makes a beautiful appearance, when the white vapours attach themselves to the plate in the form of small shining scales, in the direction of the flame. This white sublimate becomes blue whenever it is in contact with the blue flame; but changes to white whenever the point of the flame is directed against it. An ounce of powdered molybdena was mixed with four ounces of purified nitre, and detonated in a crucible heated thoroughly red hot. The mass thus obtained was of a reddish colour. On diluting it in water, the solution was clear and colourless. A small quantity of red powder fell to the bottom of the vessel; which, when dry, weighed 11 grains, and showed itself to be an iron ochre; by evaporation vitriolated tarratii and nitre were obtained; but a good deal of liquivium remained, which refused to crystallize, though no mark of superfluous alkali remained. It was then mixed with some water, to which diluted acid of vitriol was added, until no more precipitate fell. The while powder which precipitated weighed three drachms; but if too much acid be added, the precipitate will be redissolved, and the water itself retains a part of it in solution. A precipitate is likewise obtained by means of nitrous or muriatic acid.

The precipitate thus obtained, like those which result from the two former processes, is the true acid of calamine molybdena, and has the following chemical properties.
The solution reduces lacmus, coagulates a solution of brass, and precipitates their sulphur. 2. If this solution be boiled with the filings of any of the imperfect metals, it affumes a bluish colour. 3. By the addition of a little alkali of tartar, the earth becomes soluble in greater quantity in water; and after evaporation shoots into small, pointed crystals. 4. Under the blow-pipe this earth is blackened by charcoal but, when placed on a silver plate it melts, and evaporates with the same phenomena as molybdæna itself. 5. By the addition of alkali, the earth is deprived of its property of being volatilized in the fire. 6. The solution, whilst hot, shows its acid power more evidently than when cold, and tinges lacmus of a deeper colour. It effervesces with chalk, with magnesia, and with earth of alum; with all of which it forms fumes very difficult of solution in water. 7. It precipitates, from the nitrous acid, silver, quicksilver, and lead, as also lead disolved in marine acid. These precipitates are reduced on burning charcoal, and the melted metal runs into the pores. Corrosive sublimate is not precipitated; neither are the solutions of the other metals. 8. Terra ponderosa is also precipitated from the nitrous and marine acids; and the precipitate is soluble in a large quantity of cold water. None of the solutions of the other earths are precipitated. 9. Fixed air is also expelled by this acid from the fixed and volatile alkalies, and forms with them neutral farts which precipitate all other metallic solutions. Gold, corrosive sublimate, zinc, and manganese, are precipitated in form of a white powder; iron and tin, from their solution in marine acid, of a brown colour; cobalt of a rose colour; copper of a blue; the solutions of alum and quicklime, white; and if the ammoniacal salt formed by the earth of molybdæna and volatile alkali be distilled, the earth parts with its alkali in a gentle heat, and remains in the retort in form of a grey powder. 10. Concentrated vitriolic acid dissolves a great quantity of this earth by means of heat. The solution acquires a fine blue colour; which, however, disappears on being heated, or by diluting the acid with water. In a stronger heat the acid flies off, leaving the earth unaltered behind. This solution becomes thick on cooling. 11. The nitrous acid has no effect upon the earth of molybdæna. 12. Boiled with the muriatic acid it dissolves in considerable quantity; and, on distilling the mixture to dryness, a dark-blue residue remains. On increasing the heat, white flowers arise, with a little blue sublimate, and a smoking muriatic acid is found in the receiver. The residue is of a grey colour. These flowers are only the earth of molybdæna volatilized by means of the muriatic acid, and therefore manifests the same properties. 13. If one part of this earth be distilled with two parts of vitriolated tartar, a little vitriolic acid passes over, at least when the heat is very strong; and the remaining earth is more soluble in water than before. With two parts of nitre it expels, by means of distillation, a strong nitric acid; the residue disolved in water is a neutral salt which precipitates all metallic solutions; and is similar to that formed by a direct union of the acid and fixed alkali. 15. Distilled with two parts of pure common salt, the acid is expelled in a smoking state, and white, yellow, and violet-coloured flowers arise, which become moist in the air, and when sprinkled on metals give them a blue colour. These flowers, as has been already remarked, are only the acid of molybdæna volatilized by that of sea salt. The blue colour acquired by this earth on the contact of lime, also in the moist way in some cases, shows that it is capable of contracting an union with the phlogiston. To reduce this to certainty, Mr Scheele distilled some of the earth of molybdæna in boiling water, with the addition of a little alkali. In this solution he poured some drops of muriatic acid, and divided it into several parts, into each of which he put filings of several metals. The solutions soon acquired a bluish colour, which grew deeper and deeper; and in a short time, during which the bottle was now and then shaken, the liquor assumed a dark blue. That this colour depends on phlogiston, he infers from the following circumstances: 1. If, instead of the metals themselves, you take their calces, no blue colour is produced. 2. If there be dropped into the blue solution a few drops of acid of nitre, and the solution be then put into a warm place, the colour disappears. It is therefore no matter of surprise, that both silver and quicksilver should be attacked, since a double selective attraction takes place; the muriatic acid uniting with the metallic calx, and the earth of molybdæna with the phlogiston of the metals. Gold, however, is not attacked in this way. 3. Too great a quantity of muriatic acid produces not a blue but a yellowish colour, which, at last turns brown if the mixture be digested; but in adding this solution to a solution of the earth of molybdæna, a blue colour as usual is produced. 4. Lithium fanginis, in which the acid prevails, throws down the earth of a brown colour, and the infusion of galls of a dark brown. The acid of molybdæna, treated with various fluxes, shows no effect, and with charcoal, shows no signs of containing any sign of corrosive sublimate, but remained in the retort in the form of a black powder; which, on being calcined in a crucible, sublimed in white flowers as usual. On inverting another crucible into the former, and luting the juncture, the earth remained unchanged and of a black colour, without any sign of fusion. This black powder did not dissolve in boiling water, nor even with alkali, which on other occasions so readily dissolves it; but when mixed with a triple quantity of salt of tartar, a great effervescence ensued; the produce was a neutral salt resembling that formed by the direct union of the acid and alkali.
Molybdaena recomposed by uniting its acid with sulphur.

§ 14. Of the Acid of Lapis Ponderosus, Tungsten, or Wolfram.

This substance has been analysed both by Mr Scheele and Mr Bergman, though the former has the merit of discovering the acid contained in it; which the latter considers, as well as the earth of molybdaena, not as truly acid, but as metallic earths. Mr Scheele's experiments for analysing this substance were as follow:

1. On one part of finely powdered tungsten were poured three parts of concentrated acid of vitriol. By distillation the acid passed over unchanged; the residuum, which was of a bluish colour, after being boiled for a short time, and the liquor filtered off, deposited some vitriolated lime or gypsum by standing.

2. Twelve feruples of common nitrous acid, or pure aquafortis, being poured on two of finely powdered tungsten, it became a little from the vitriolated tartar; and consequently there can appear but a slight vestige of vitriolic acid. This small quantity of acid likewise occasioned its more easy solubility in water.

3. The pure acid of molybdaena recomposes that substance by being combined with sulphur. Mr Scheele having mixed some very fine powder of this earth with sulphur, he subjected the mixture to distillation in a glass retort, the receiver was filled with the superfusible sulphurous vapours, which had also the feitid smell of volatile spirit of sulphur. In the retort a black powder remained, which on every chemical trial was found to be a true molybdaena; so that there is no doubt of this substance being composed of a particular kind of acid united to sulphur.

4. Boiled with a small portion of the nitrous or marine acids, the powder becomes yellow, and with the acid of vitriol bluish.

5. By faturating a solution of the acid with fixed alkali, a neutral salt is obtained.

6. With volatile alkali this acid forms an ammoniacal salt, that of nitre with the acid of tungsten.

7. Tungsten forms a salt very difficult of solution.

8. It precipitates a white colour from solutions of iron, zinc, and copper, in the vitriolic acid; silver, quicksilver, and lead, in that of nitre; and lead in the acid of caustic tartar. In combined with the same acid is thrown down of a blue colour; but corrosive sublimate and solutions of gold undergo no change. 9. On calcining the acid of tungsten in a crucible, it loses its solubility in water. 10. It turns black by calcination with inflammable matters and with sulphur, but in other respects continues unaltered.

11. Solution of hepar sulphuris is precipitated of a green colour by this acid, and the phlogificated alkali white; the latter precipitate being soluble in water. On the addition of a few drops of muriatic acid to a solution of the acid
Differences between the acid of tungsten and molybdæna.

Why he supposed the acids to be metallic.

Practice.

Acid of lapis ponderosus and its combinations.

Differences between the acid of tungsten and molybdæna.

Mr. Bergman observes, that the acid of tungsten is nearly allied to that of molybdæna; and both are in a state much resembling that of white arsenic. "It is well known (says he) that arsenic, in its gemmetalic state, is nothing but a peculiar acid saturated with phlogiston; and that the white calx is an intermediate state between acid and metal, containing just phlogiston enough to coagulate the acid, but remaining still soluble in water, and showing signs of acidity. If a conclusion from analogy be admissible, all the other metals should confide in a combination of the same nature of the different radical acids, which with a certain quantity of phlogiston are coagulated to a dry earthy substance; and on full saturation are reduced to the state of complete metals." The reasons which induced Mr. Bergman to suppose that the acids in question are metallic earths, are as follow: 1. They both show a striking resemblance to white arsenic in form, in producing effects like acids, and in their difficult solubility in water. 2. Their specific gravity; that of arsenic being 3750, the earth of molybdæna 3460, and the acid of tungsten 3000. 3. Their precipitation with phlogistated alkali; a property hitherto deemed peculiar to metallic calces. Arsenic also, properly dissolved in muriatic acid, gives, with the phlogistated alkali, a precipitate soluble in water, in the same manner as the acid of tungsten. 4. From their property of tinging vitreous matters; which, as well as that of precipitating with the phlogistated alkali, is reckoned to be a peculiar property of metals. The acid of tungsten produces by itself some effervescence with mineral alkali. With micrometallic salt it produces a globule at first of a light blue; more of the acid makes it a dark blue; but still it remains free from redness by refraction. A further addition makes it brown. Borax requires a flight tinge of blue, and with more of the acid becomes of a yellowish brown colour; but remains transparent, provided no further addition be made. This ultimate brown colour cannot be driven off either by nitre or the point of the flame urged by a blow-pipe. Acid of molybdæna is no less powerful; for with micrometallic salt it produces a beautiful green colour: borax well suffused with it appears grey when viewed by the reflected rays, but of a dark violet by the refracted.

§ 15. Of the Acid of Milk.

It is universally known, that in the summer-time milk grows four and thick in a few days, and that this frounness continues for some time to increase. It is strongest after a fortnight has elapsed; after which, if the whey be filtered and evaporated to one-half the quantity, a few curds will settle to the bottom. By saturating the whey with volatile alkali, a small quantity of animal earth precipitates; and the same thing takes place on the addition of lime-water. On the addition of a small quantity of acid of tartar, the latter foam becomes partially saturated with vegetable alkali, and is converted into tartar. Thus the acid of Component milk besides its proper acid part, contains animal earth and vegetable alkali in a loose state, and which is attracted by the acid of tartar; besides all these it has also a small quantity of the same alkali saturated with muriatic acid. It is no easy matter to separate those substances from one another; because the acid is not sufficiently volatile to rise in distillation by a gentle heat, nor are its principles sufficiently fixed to bear the action of a strong fire. With the one therefore it remains almost entirely in the retort, and with the other it is destroyed. Mr. Scheele therefore used the following process.

He evaporated four whey till only one-eighth part Scheele's remained; when the cheesy part being totally separated from the pure acid of milk, he employed the acid of sugar, which has a stronger attraction than any other for lime. This earth therefore being separated, the matter was evaporated to the consistence of honey, and highly rectified spirit of wine poured upon it to dissolve the acid part; which being accomplished, the other saline substances were left by themselves: and, lastly, the acid solution being diluted with pure water, and the spirit separated by distillation, the pure acid remained in the retort.

The properties of the acid of milk are, 1. Evaporated to the consistence of a syrup, it yields no crystals; of this acid, and when evaporated to dryness, it deliquesces. 2. By distillation it yields first water, then a weak acid like spirit of tartar; afterwards some empyreumatic oil, with more of the same acid, fixed air, and inflammable air; in the retort was left a fixed coal. 3. By saturation with fixed vegetable alkali it yields a deliquescent salt, soluble in spirit of wine. 4. A salt of a familiar kind is obtained by combining it with mineral alkali. 5. With volatile alkali a deliquescent salt is produced, which by distillation yields a great deal of its alkali before the acid is destroyed by heat. 6. It forms deliquescent salts with terra ponderosæ, lime, and clay; but with magnesia it forms small crystals, which, however, are again deliquescent. 7. It has no effect either by digestion or boiling in balsam, colbat, regulars of antimony, tin, quicksilver, or gold. However, after digestion with tin, it precipitated gold from its solution in aqua-regia, in the form of a black powder. 8. It dissolves iron and zinc, producing inflammable air during the solution. The liquor produced by the distillation of iron was brown, and yielded no crystals; but the solution of zinc crystallizes. 9. Copper dissolved in this acid communicates to the liquor a blue, then a green, and then a dark blue colour, without crystallizing. 10. Lead was dissolved after
The acid of milk is of a peculiar kind; and though it expels the vinegar from the acetated vegetable alkali, yet it seems defined, if I may so speak, to be vinegary; but from the want of such substances as, during fermentation, produce some spiritious matter, it seems not to be volatilized, though a portion of it indeed arrives at this point, and really becomes vinegar: for without a previous spiritious fermentation, or without brandy, there never arises any vinegar. But that the milk enters into a complete fermentation though there be no sign of brandy present, appears from the following experiment: If a bottle full of fresh milk be inverted into a vessel containing so much of the same liquor that the mouth of the bottle reaches below the surface of the latter, and if you expose this bottle to a degree of heat a little greater than that of summer, you will find, in the space of 24 hours, that the milk is not only coagulated, but in part expelled the greater part of it. It was said above, that the acid of milk cannot be converted into vinegar, from the want of such substances as during fermentation produce brandy; which appears to be evident from this: If to a kanne of milk you add five spoonfuls of good brandy, and expose the vessel, well corked, in such a manner, however, that you now and then give vent to the air developed during fermentation, you will find in a month, sooner or latter, that the whey will be changed into good vinegar, which, strained through a cloth, may be kept in bottles. The acid of sugar of milk is considerably different from that just now described. To procure it, Mr. Scheele poured 12 ounces of diluted nitrous acid on four ounces of finely powdered sugar of milk contained in a glass retort, to which a receiver was adapted. The retort was placed in a sand-bath, and as soon as the mixture acquired a certain degree of heat, it began to effervesce violently; for which reason, the retort and receiver were taken away from the fire. The mixture, however, continued to grow hotter and hotter, with a great emission of dark red vapours continually increasing, for half an hour. A considerable quantity of nitrous air and aerial acid were extricated during that time. Care must be taken, therefore, to have the retort and receiver both of a sufficient size, and not to make the retort too large. When the effervescence had subsided, the retort was again placed in the sand-bath, and the nitrous acid thus distilled off till the mass acquired a yellowish colour; on which the retort was immediately taken away from the fire. In two days time the solution seemed to have undergone no remarkable change, nor was there any appearance of crysals. Eight ounces more of the same nitrous acid were therefore added, and the whole exposed to the same degree of heat as before. When the mass grew warm, another, effervescence, though weaker than the former, ensued; the yellow colour disappeared, and the nitrous acid was again abstracted, till the solution, which had been rendered opaque by the appearance of a white powder in it, was boiled with a yellowish colour, on which the retort was again removed from the fire. It was redistilled in eight ounces of water, and filtered. Seven and a half drachms of white powder remained on the filter; the solution passed through the filter was very acid. It was evaporated to the conclusion of a syrup, four ounces more nitrous acid poured upon it, and the evaporation repeated in a sand-bath. After the whole was cool, some small long aerial crysals were found, together with a small quantity of white powder which was separated from it, and some more nitrous acid poured on the remaining mafs, and on evaporation, more such crysals made their appearance. The same process was repeated several times; by which means the whole mass was at last changed into such crysals, and weighed about five drachms, showing in every respect the same phenomena produced by acid of sugar. The white powder, weighing seven and a half drachms, was the true acid of sugar of milk; and its properties are,

1. It burns in a red hot-crucible like oil, without properties leaving behind it any mark or ashes. 2. It dissolves in boiling water in the proportion of one of salt to 60 of the liquid. 3. One fourth part of the distilled powder separates from the liquid on cooling, in form of very small crysals. 4. Half an ounce of the salt was dissolved in a glass vessel in 30 ounces of boiling water, and the solution filtered when cold. It had a yellow taffe, reddened the tincture of lacmus and effervesced with chalk. 5. Two drachms of the salt exposed to an open fire i a glass retort, melted, grew black, and fothed very much; a brown salt was found sublimed into the neck of the retort, which smelt like a mixture of salt of benzon and salt of amber, eleven grains of coal remaining in the retort. The receiver contained a brown liquid without any mark of oil, smelling like the sublimed salt. It contained also some of the salt dissolved, which was separated from it by a gentle evaporation. The sublimed salt weighed 35 grains, had a four taffe, and was easily solubel in spirit of wine, but with more difficulty in water, and burned in the fire with a flame. 6. Concentrated vitriolic acid, distilled with this salt, became very black, frothed much, and decomposed the salt entirely. 7. Acid of sugar of milk, gradually added to a hot solution of alkali, occasioned an effervescence and coagulation in consequence of the formation of a vast number of crysals, which require eight times their weight of water to dissolve them, and separate again in a great measure from the liquid on cooling. The same phenomena took place with the mineral alkali, only the salt was somewhat more soluble, requiring only five times its weight of water for solution. If to a solution of it a solution of alkali of tartar be added, a number of small crysals will soon be formed at the bottom of the vessel, on account of the greater attraction of this acid with the vegetable alkali. 8. With volatile alkali it forms a kind of salt amoniac, which, after being gently dried, has a four taffe. By distillation, the volatile alkali is first separated, the lime-water precipitates, and the residue yields the same products by distillation as the pure acid. 9. With all the earths, acid of sugar of milk forms insoluble salts.
Practice.

CHEMISTRY.

§ 16. Of the Lithiasic Acid, or Acid of the human Calculus.

The calculi examined by Mr Scheele, with a view to discover their constituent parts, were, as he informs us, all of the same nature, whether flat and polished, or rough and angular. A small quantity of calculus in powder was put into a retort, and some diluted vitriolic acid, poured upon it. The powder was not affected by a digesting heat; however, it was dissolved when the acidity was abated by distillation. After the dissipation of the acid, a black coal was left in the retort, and the vitriolic acid which had passed into the receiver became sulphureous. The marine acid, whether diluted or concentrated, had no effect upon the calculus, not even when boiled with it. The nitric acid diluted, or aquafortis, had some effect on the calculus, even when cold. On the application of heat, an effervescence ensued with red vapours, and the calculus was dissolved. Repeating the experiment in a retort with line-water, the latter was precipitated. The solution of calculus is acid, though the menstruum be boiled with a supersaturated quantity of powder, so that there may remain a portion of it undissolved. It produces deep red spots on the skin in half an hour after it is applied; and if the saturated solution be a little more evaporated, it assails of itself a blood-red colour, which however, disappears on dropping in a single drop of nitrous acid. Terra ponderosa is not precipitated by it from the muriatic acid; nor are metallic solutions feebly changed. With alkalies it becomes somewhat more yellow when the alkal is supersaturated. The mixture, in a strong digesting heat assumes a rose colour, and stains the skin in the same manner, without any sensation of burning. The mixture likewise precipitates metals of different colours; vitriol, grey, black; of copper, green; solutio of silver, grey; corrosive sublimate, zinc, and lead, of a white colour. Lime water precipitates a white powder soluble in muriatic and nitrous acids without effervescence; and though there be an excess of precipitated powder, the solution will be acid. This white powder, therefore, is the acid of the calculus itself, the existence of which is also confirmed by Mr Bergman's experiments. The further analysis of this is related under the article CALCULUS, below.

§ 17. Of the Flowers of BENZOIN, Acid of LEMONS, with other anomalous vegetable acids, and the resemblance which the vegetable acids in general bear to one another.

It has long been known, that the resinsous sub斯坦ce, improperly called gum benzoin, yields by sublimation with a gentle heat a quantity of fine saline matter of a most agreeable odour, and slightly acid taste, called flowers of benzoin. Another method of obtaining this substanoe is by lixiviating the gum with water, by lixiviation and crystallizing the salt. Mr Scheele, determined to try what quantity of the flowers could be obtained from the resin, that, by sublimation, he was able to obtain from one pound of benzoin between nine and twelve drachms of flowers. By lixiviation the quantity obtained was considerably less than that of the mer, owing to the saline particles being so much covered by the resin, that the water could not have sufficient access to dissolve them. It was next attempted to procde all the flowers which the benzoin was capable of yielding. This was first done by boiling the flowers with pounded chalk and benzoin in water, and then filtering the yielding. benzoin from afterwards precipitated (for this salt, which is an acid, was wanted to the chalk); but the quantity of salt was no greater than that obtained by lixiviation. Alkaline was next tried, and the solution saturated with an acid, thus the salt of benzoin was obtained by precipitation, but here this inconvenience was met with, that the powder of benzoin lay together during the boiling, and floated on the surface like a tenacious resin. One only method, therefore, remained to be tried, and that was to boil the lime benzoin with quick-lime; and as the particles of lime, the belt by intermixing themselves between those of the benzoin would prevent their running together, and lime has likewise the property of acting upon the resinosous particles, this forms to be the best method of procuring the flowers of benzoin in the greatest quantity, and also of the best quality; and thus we may obtain from 12 to 14 drachms of flowers from a pound of benzoin. Mr Scheele's receipt for preparing them after Mr new method, is as follows: "Pour 12 ounces of Scheele's water upon four of unaltered lime, and after the bulb for preparation is over, add eight pounds of 12 ounces each) of preparing the flowers of water; put then a pound of finely powdered resin of benzoin into a tinned pan, pour upon it first about six ounces of the lime-water above-mentioned, mix this method well together, and thus add all the thod. lime-water in succession. The reason of adding the lime-water thus by portions, is, that it be poured in all at once, it will not mix with the benzoin, which will likewise coagulate and run together into a mass. This mixture must be boiled over a gentle fire for half an hour, agitating it constantly; then taking it from the fire, let it stand quiet for some time to settle, after which the clear liquor is to be poured off into a glass vessel. Pour then eight pounds of water more upon the lime in the vessel, and use this lime-water as before, repeating this process twice more, making four times.
Chemistry.

Practice.

Flowers of benzoin, &c.

995 Flavour of the flowers may be taken away and produced at pleasure.

996 Anomalous vegetable acids how divided.

997 Of the essential acids.

998 Empyreumatic acids.

999 Salt of lemon can not be converted into acid of furgar.

1000 Product of acid of tartar, and caustic earth.

1001 May not the acetic acid be mere acid of tartar, which did not meet with alkaline salt, and earthy enough with which it might combine and become more fixed; but, on the contrary, it would not fulfill its office, and thus become more volatile? In distilling terra liata tartari in the dry way, the acid of vinegar which enters its composition is almost entirely destroyed; but, after the residue, as well as the rest of that which comes over into the receiver, being entirely alkaline, and the same process of distillation is repeated, you have an acid of such a nature that it may be employed for the distillation of spirituous liquors.
same thing happens to the acid of tartar, the empyromeatic acid abovementioned being extremely weak. Mr Beaumé likewise informs us, that if any calcareous earth, egg-shells, for instance, be diffused in vinegar, and the crystallized salt be distilled, we obtain $\frac{1}{3}$ of a red and very fiery inflammable fluid, smelling like empyromeatic acetone ether, which reddeneth tincture of turnip. Mutlly, distilled before fermentation, yields only an empyromeatic acid resembling spirit of tartar. The conjecture therefore seems reasonable, that vinegar and tartar have for their basis the same species of acid, which in the case of vinegar is combined with a greater proportion of oil, and in tartar with more earth. To bring vinegar therefore nearer the state of tartar, we must deprive it of its fine volatilizing phlogiston, combine it with more fixed matter, and restore its greater oil. All this, however, is extremely difficult to be effected. Mr Wetrumb, who attempted it, added nitrous acid in various proportions, but could only produce a phlogification of the latter, and dephlogification of the vinegar; but as he could not think of any method of separating the two acids from one another, he was unable to investigate the properties of vinegar thus dephlogificated. Dr Crelle is of opinion, that this might have been done by vegetable alkali, lime, and terra ponders, as it would have been to the ordinary hexagonal crystals of nitre: the acco,

Mr Wetrumb's unsuccessful attempt. 
Dr Crelle's opinion of the possibility of transformation.

Method recommended by him for attempting the experiment.

Requisites for bringing vinegar nearer the state of tartar.

Mr Wetrumb's dephlogistication of the vinegar; but though the acid of vinegar is comb beside the cerebral fluid, which will not shoot, and hearerf the Dr Mr tranverse a, feparating the ley, which will not shot, Mr Weftrumb's dephlogistication of the vinegar; but Dr Trub's dephlogistication of the vinegar; but though the acid of vinegar is comb beside the cerebral fluid, which will not shot, and hearerf the Dr Mr tranverse a, feparating the ley, which will not shot, Mr Weftrumb, who attempted it, added nitrous acid in various proportions, but could only produce a phlogification of the latter, and dephlogification of the vinegar; but as he could not think of any method of separating the two acids from one another, he was unable to investigate the properties of vinegar thus dephlogificated. Dr Crelle is of opinion, that this might have been done by vegetable alkali, lime, and terra ponders. The nitrous acid, with vegetable alkali, would have been to the ordinary hexagonal crystals of nitre: the acco,

1. If the residuum of dulcified spirit of nitre be boiled with a large quantity of nitrous acid, care being taken at the same time to condense the vapours by a proper apparatus; and if the liquid which has passed over be saturated with vegetable alkali, nitre and terra foliata tartari will be obtained; and on separating the latter by means of spirit of wine, the vinegar may be had in the ordinary way of decomposing the salt.

2. On boiling the residuum over again with nitrous acid, the same products are obtained; and the more frequently this process is repeated, the less acid of fugar is procured, until at length no vestige of it is to be met with.

3. Pure acid of sugar, boiled with 12 or 14 times its quantity of nitrous acid, is entirely decomposed, and the receiver is found to contain phlogificated nitrous acid, vinegar, fixed air, and phlogificated air, while of fugar. From the residuum of dulcified spirit of nitre with chalk, there is formed an infoluble salt, spirit of which by treatment with vitriolic acid yields a real acid of tartar, constituting a cream of tartar with vegetable alkali.

6. On evaporating the liquor from which the tartarous selenite was obtained, a dark-coloured matter remains, yielding on distillation an empyromeatic acid of tartar, and a spongy coal. Hence it would seem, that from that spirit of wine conitls of acid of tartar, of water, the liquor and phlogiston; so that it is a native dulcified acid; in which tartarous and nitrous acid, on being mixed with it in moderate quantity, dissolves the acid of tartar. On the addition of more nitrous acid, the acid of tartar is resolved into acid of fugar and phlogiston; and by a still greater addition, the faccicatic acid is changed into solution of vinegar.

7. On boiling one part of the acid of sugar with one and a half of manganse and a sufficient quantity of nitrous acid and a sufficient quantity of nitrous acid.
Acid of fat. nitros acid, the manganese will be almost entirely dissolved, and phlogificated nitrous acid along with vinegar will pass over into the receiver.

From the solution of the same with vitriolic acid and that of tartar.

If acid of tartar be boiled along with vitriolic acid and manganese, the latter will be dissolved, and vinegar with vitriolic acid will pass over into the receiver.

On digesting acid of tartar and spirit of wine for several months, the whole is converted into vinegar, the air in the vessel being partly converted into cretaceous acid, and partly into phlogificated air.

On boiling spirit of wine with vitriolic acid and manganese, it will be converted into vinegar and phlogificated air.

By distilling spirit of wine upwards of 20 times from caustic alkali, it was changed into vinegar, and a considerable quantity of water was obtained.

From the solution of manganese with vitriolic acid and spirit of wine.

From the distillation of spirit of wine with caustic alkali.

This may be obtained from suet by means of many repeated distillations. A small quantity is separated at each distillation; but by distilling the empyreumatic oil into which the fat is thus converted over and over, a fresh quantity is always obtained. The acid of fat in some respects has a resemblance to that of sea-salt; but in others is much more like the vegetable kind, as being destructible in a strong fire, forming compounds which do not deliquece with calcareous earth, and uniting intimately with oily substances. With alkalis it forms salts entirely different; from those yielded by the other acids; with the volatile alkali, particularly, it produces a concrete volatile salt. When saturated with calcareous earth, it yields brown crystals; and a salt of the same kind was obtained by Dr Crel by a mixture of quicklime and fat distilled to dryness, and boiling up the residue with water. The crystals were hexagonal, and terminated by a plane surface; their taste was acid and salty; they did not deliquece in the air, and were easily and copiously dissolved in water. With magnesia and earth of alum a gummy mass is obtained, which refuses to crystallize.

With regard to the metals, Dr Crel informs us, that the acid of fat copiously dissolves manganese into a clear and limpid liquor. It dissolves the precipitate of cobalt, but not the regulus. White arsenic is acted upon sparingly, and nickel not at all, though it forms a green solution with the precipitate from nitrous acid. Regulus of antimony, by the influence of heat is dissolved into a clear liquor, which became milky in the cold; it crystallized on evaporation.

and did not deliquece in the air. Zinc readily dissolved, and imparted a peculiar metallic taste, falling line into the bottom in the form of a white powder on the addition of an alkali. Bismuth in the metallic state was not dissolved; but the precipitate was. It acted upon mercury after being twice distilled from it, and poured afresh upon the metal. The mercury could not be entirely precipitated by common salt. It acted more vigorously upon a precipitate from corrosive sublimate; from the solution of which a white sublimate was obtained after the liquor had been drawn off by distillation. A gold-coloured solution was obtained from platinia by distilling the acid from it to dryness, and then pouring it back again; the precipitate of this acid from aqua-regia by spirit of wine was dissolved in great abundance. Iron was very easily dissolved in it, and exhibited a liquor of an astringent taste, which scum into needle-like crystals that did not deliquece in the air. Lead was corroded and rendered the acid turbid. Minium was converted into a white powder, and then dissolved with greater ease. The solution has a sweet taste, and cannot be precipitated by sea-salt. Tin was corroded into a yellow calx, and dissolved but in very small quantity. Copper was dissolved, even in the cold, into a green liquor; but the solution was greatly promoted by heat. On evaporation it showed some disposition to crystallize, but again attracted moisture from the air. Silver-leaf was attacked only in a very small degree; however, some was precipitated by means of copper, and the mineral acid rendered the liquor turbid.

The calx precipitated from aquafortis was dissolved more copiously. Silver was precipitated of a white colour from aquafortis by the pure acid itself, as well as by its ammoniacal salt. Half an ounce of the acid distilled four times almost to dryness from some gold leaves, and it length poured back upon them, the precipitate of a dilute solution of tin obtained by it, gained almost only a faint colour, rather inclining to red; but a mixture of two parts of acid with one of aquafortis, dissolved gold very readily.

Of Fixed Alkaline Salts.

Of these there are two kinds; the vegetable and how prepared from the ashes of burnt vegetables. It is got in the greatest quantity from crude tartar; from which, if horned with proper care and attention, we may obtain one pound of alkali out of 2 of the tartar. The latter is found native in some parts of the earth. It is likewise found in very large quantities combined with the marine acid, in the waters of the ocean, and in the bowels of the earth; thus forming the common alimentary salt. It is also produced from the ashes of certain sea-plants, and of the plant called kali; from whence both the mineral and vegetable alkali have taken their name.

The vegetable alkali difficultly assumes a crystalline vegetable form; nevertheless, it may be partially united with alkali crystalline acids in such a manner as to crystallize, and lose its property of deliquescing in the air, without at the same time ceasing to be an alkali. Of this we have an example in the acid of ants abovementioned. Something
Practice.

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Fixed alkaline salts and their combinations. thing of the same kind we have observed in treating vegetable fixed alkali with spirit of wine. A gallon of pretty strong spirit of wine being drawn over from a pound of salt of tartrar, a black unctuous liquor was left, which soon into crystals very much resembling vitriolated tartrar, and which did not deliquesce in the air, but were nevertheless strongly alkaline. Dr. Black, however, informs us, that the vegetable alkali may be formed into fine crystals; but which cannot be preserved, on account of their great attraction for moisture, unless closely shut up from the air. They have not such a quantity of water as to undergo the aqueous fusion.

The mineral alkali in its natural state always assumes a crystalline form, somewhat resembling that of salt mirabile. It does not deliquesce in the air, nor does it seem to have so strong an attraction for water, even when in its most caustic state, as the vegetable alkali; hence mineral alkali is preferable to it in making soap, which is always of a firmer consistence with mineral than with vegetable alkali. If vegetable alkali is combined with spirit of salt, some change seems to be thereby induced upon it, as the vegetable alkali is preserved of the marine acid by means of the vitriolic, and then crystallizing the masses, crystallizes differently from vitriolated tartrar. Whether the vegetable alkali might be this means be entirely converted into the mineral, deserves a further inquiry.

Both mineral and vegetable alkalis, when applied to the tongue, have a very sharp, pungent, and urinous taste; but the vegetable considerably more so than the mineral. They both unite with acids, and form different neutral salts with them: but the vegetable alkali seems to have rather a greater attraction for acids than the other; although this difference is not so great as that a neutral salt, formed by the union of mineral alkali with any acid, can be perfectly decomposed by an addition of the vegetable alkali, unless in considerable excess.

Fixed Alkalies combined. Fixed alkaline salts and their combinations. Composed of a caustic salt and fixed air.

Hepar sulphuris. I. With Sulphur. The produce of this is the red ferric compound called hepar sulphuris, or liver of sulphur. It may be made by melting sulphur with a gentle heat, and filtering it into water. The whole readily melts and forms a red mass of a very feric smell, and which deliquesces in the air. If sulphur is boiled in a solution of fixed alkaline salt, a like combination will take place.

In this process, when the hepar is made either in the dry or the moist way, the fixed air of the alkali is discharged, according to Dr. Priestley's observation. Neither does a fixed alkali, when combined with fixed air, seem capable of uniting with sulphur; nor will the union be accomplished without heat, unless the alkali is already in a caustic state. Hence a cold solution of hepar sulphuris may be decomposed, partly at least, by fixed air. On adding an acid, however, the decomposition takes place more rapidly; and the sulphur is precipitated to the bottom, in form of a white powder.

During the precipitation of the sulphur from an alkali, by means of acids, a thick white smoke arises, of a moist fetid smell and suffocating nature. It burns quietly, without explosion, on a candle's being held in it. Calkes of silver, lead, iron, or bismuth, are rendered black by it. Hence, if any thing is wrote with a solution of lead, and a solution of hepar sulphuris is passed over it, and the writing, formerly invisible, will immediately appear of a blackish brown colour. Silver, in its metallic state, is prodigiously blackened either by the contact of this vapour, or by being immersed in a solution of the hepar sulphuris itself. Litharge is instantly reduced to its metallic state, on being immersed even in a cold solution of hepar sulphuris, the salt being disolved from the solid.

By being united with an alkali, the acid of sulphur phlogiston seems very much diffused to quench the phlogiston. If a of sulphur diffused is exposed to the air for some time, it is spontaneously decomposed; the phlogiston of the sulphur flying off, and the acid remaining united with the alkali into a vitriolated tartar. This decomposition takes place so remarkably, when liver of sulphur is dissolved in water, that by a single evaporation to dryness, it will be almost totally changed into vitriolated tartar. If this substance, in a dry state, be exposed to a moderate degree of heat, and the mass kept constantly frittering, a like decomposition will follow; the phlogiston of the sulphur will fly off, and the acid unite with the alkali.

Liver of sulphur is a great solvent of metallic matters; all of which, except zinc, it attacks, particularly in fusion. It seems to dissolve gold more effectually than other metals. This compound also dissolves vegetable coals, even by the humid way; and these solutions, if suffered to stand in the open air, always precipitate a black powder, no other than the coal they had dissolved, in proportion to the quantity of hepar sulphuris decomposed. When vegetable coal is thus dissolved by liver of sulphur in fusion, it is of a much deeper red than in its natural state. The solution in water is of a green colour. II. With Express'd Oils. The result of this combination is soaps; for the preparation of which in large quantities in the way of trade, see Soap. The soap which is used in medicine is prepared without heat, in the following manner, according to the author of the Chemical Dictionary.

"One part of quicklime, and two parts of good Spanish soda (the salt prepared from the ashes of the herb kali), are boiled together during a short time in an iron caldron. This lixivium is to be filtered, and evaporated by heat, till a phial, capable of containing an ounce of water, shall contain an ounce and 216 grains of this lixivium. One part of this lixivium is to be mixed with two parts of oil of olives, or of sweet almonds, in a glass or stone-ware vessel. The mixture soon becomes thick and white, and must be filtered from time to time with an iron spatula. The combi

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Chemistry.

Fixed alkaline salts and their combinations.

Fixed alkali salts are gradually completed, and in seven or eight days a very white and firm soap is obtained."

In attempting combinations of this kind, it is absolutely necessary that the alkali be deprived of its fixed air as much as possible; otherwise the soap will be quite unctuous and soft: for fixed alkalies have a greater attraction for fixed air than for oil, and hence soap is decomposed by blowing fixed air into a solution of it in water. It may be made either with tallow, wax, spermaceti, butter of cocoa, the cores of resinous substances, or animal oils.

III. With Essential Oils.

The volatility of these oils in a great measure hinders them from being acted upon by alkalies: nevertheless, combinations of this kind have been attempted; and the compounds so produced have been called Starkey's soap, from one Starkey a chemist, who endeavoured to volatilize fat of tartrar by combining it with oil of turpentine. His method was to put dry salt of tartrar into a mortar, and pour upon it essential oil of turpentine at the height of two or three fingers breadth. In five or six months, a part of the alkali and oil were combined into a white polynaceous compound. This must be separated from the mixture, and more of it will afterwards be formed by the same method.

Chemists, imagining this soap to be possessed of considerable medical virtues, have endeavoured by various methods to shorten this tedious process. Of those one of the most expedients is that recommended by Mr Beaumé; which consists in triturating, for a long time, alkali salt upon a porphyry, and adding oil of turpentine during the triturating. According to him, the thick resinous part of the oil only can combine with the salt; and, during the time this combination is effected, the more soluble and attenuated parts will fly off. Hence he finds that the operation is considerably abridged by the addition of a little turpentine or common soap. The most expedients of all, however, is that mentioned by Dr Lewis; which consists in heating the alkali red hot, and then throwing it into oil of turpentine, stirring them well together; on which they immediately unite into a faponaceous mass.

This kind of soap is subject to great alterations from keeping; particularly the loss of its colour, and a kind of decomposition occasioned by the extraction of an acid from the oil of turpentine, which unites with the alkali and crystallizes not only all over the surface, but in the very substance of the soap. The nature of this salt is unknown, but certainly deserves consideration.

IV. With Phlogivirus. This combination is effected by calcining them with the charcoal either of vegetable or animal matters. The consequence is, that they are greatly altered in their properties; sometimes so much as to be enabled to precipitate calcareous earths from their solutions in acids. Metallic solutions precipitated by them in this state, assume different colours.

Differences observed between Fixed Alkalies obtained from different Vegetables.

These differences we must conceive to arise from some proportion of the oily and phlogistic matter of the vegetable remaining in the ashes from whence the salts are extracted; for when reduced to their unmodified purity, by repeated calcinations in a strong fire, and dilutions in the air, all of them, the marine alkali excepted, appear to be the very same.

On this subject Mr Gmelin has given a great number of experiments in the fifth volume of the Commentaria Petropolitana; and found very considerable differences, not only between the alkaline salts, but likewise the pure vegetable earths obtained from different vegetables by burning. The salts of the several plants examined were prepared with great care, and of all of them exactly in the same manner; each vegetable being burnt in a separate crucible, with the same degree of fire, till no remains of coaly matter could any longer be perceived; and the ashes elixated in glass vesicles with cold distilled water. The salts, thus obtained, were found to produce different colours on mixture with certain liquors, and to effervesce in very different degrees with acids: certain metallic solutions were by some precipitated, by others only rendered thicker, by others both precipitated and rendered thick; whilst some occasioned neither the one nor the other of these changes, but left the fluid clear and transparent. Thus, with the vitriolic acid, the salts of southerwood and sage struck a pale brown colour; those of pine-tops and rose, a yellow; that of fern, a reddish yellow; and that of citren, a deep-green, that of dill yielded a lead-green precipitate, with elegant green flakes floating in the liquor. This last also gave a greenish precipitate with the marine acid, and a red one with the nitrous. Solution of corrosive sublimate was changed yellow by salt of southerwood; of a brownish colour, by that of colt's-foot; of a deep red, by that of wormwood; and of a pitch-colour, by that of dill. That of fern threw down an opal-colour; of sage, a sulphur-yellow; of elder flowers, a citron yellow; of sanicle, a fennon colour; and of milfoil, a deep-red precipitate. From solution of silver, salt of cardui benedictus threw down a white; of camomile, a grey; of hyssop, a brownish; of dill, a blackish brown; of scabious, a yellowish; and that of pine-tree tops, a sulphur yellow precipitate.

Solution of vitriol of copper was changed by salt of southerwood to a bright sea-green; by that of dill, to an unlight green; of agrimony, to a greenish blue; and by that of milfoil, to a bright fly-blue: the salt of pennyroyal made the liquor thick as well as blue, and that of feverfew made it thick and green; the salt of hyssop threw down a green precipitate, that of fennon-grass a blue one, and that of fummory a greenish blue; whilst the salt of fern made scarcely any change either in the colour or consistence of the liquor.


This is a kind of salt obtained from all animal, whence some vegetable substances, from fruit by distillation obtained, with a strong heat, and from all vegetable substances by putrefaction. Though a volatile alkali is procurable from all putrid animal substances by distillation, yet the putrefactive process does not seem to prepare volatile alkali in all of these. Putrid urine, indeed, contains a great quantity of alkali ready converted, whence its use in scouring, &c., but the case is not so with putrid blood or flesh. These afford no alkali till after the phlegm has arisen; and this they would
Volatile alkali and its combinations.

Volatile alkali would do, though they had not been purified. According to Mr Wiegble, volatile alkali is found in limonite, lapis fulvus, chalk, mable, coals, turf, loam, clay, and many other kinds of earth. Its existence in these substances may be discovered merely by distilling them with a brisk fire, but still better by the addition of some quantity of fixed alkali or quicklime before the distillation. It has even been found in all mineral salts and their acids, as virriol, nitre, common salt, and the acid liquors drawn from these substances, also in gypsum and sulphur: from all which it may be separated by means of quicklime. In the vegetable kingdom it is produced by dry distillation from mustard-seed, elder flowers and leaves; the leaves of the wild cherry-tree, white water-lilies, tobacco, and fage; as well as from many other plants. According to our authors, the plainest proof of its existence is seen in our chimneys, where a volatile alkali is discharged, either with or without quicklime.

Volatile alkali, when pure, appears as a snowy whiteness, has a very pungent smell, without any disagreeable apprenna; is very easily evaporable, without leaving any residue; effervescences with acids much more strongly than fixed alkali; and forms with them neutral compounds called ammoniacal salts, which we have already described, and which are different according to the nature of the acid made use of. It is a volatile alkali, perfectly purified, to appear to be very same, without the smallest difference.

Like fixed alkalis, these salts contain a great quantity of fixed air, on which their solidity depends; and which may be so increased as perfectly to neutralize, and deprive them of their peculiar taste and smell. When neutralized by fixed air, they have a very agreeable pungent taste, somewhat resembling that of weak fermenting liquors. When totally deprived of fixed air, by means of lime, they cannot be reduced to a solid form; but are dissipated in an invisible and exceedingly pungent vapour, called by Dr Priestley alkaline air. When volatile alkaline salt is dissolved in water, the solution is called volatile alkaline spirit.

Distillation and Purification of Volatile Alkalis.

The materials most commonly used for preparing volatile alkalis are the solid parts of animals, as bones, horns, etc. These are to be put into an iron pot of the shape recommended for solution; to this must be fixed a flat head, having a hole in the middle about two inches diameter. From this a tube of plate iron must issue, which is to be bent in such a manner that the extremity of it may enter an oily jar, through a hole made in its upper part, and dip about half an inch under some water placed in the lower part. The mouth of the jar is to be fitted with a cover, luted on very exactly; and having a small hole, which may be occasionally stopped with a wooden peg. The junctures are to be all luted as close as possible, with a mixture of clay, sand, and some oil; and those which are not exposed to a burning heat, may be further secured by quicklime and the white of an egg, or by means of glue. A fire being now kindled, the air contained in the distilling vessel is first expelled, which is known by the bubbling of the water; and to this vent must be given by pulling out the wooden peg. A considerable quantity of phlegm will then come over, along with some volatile alkali, a great quantity of fixable air, and some fixed alkali. The alkali will unite with the water, and like wise the fixed alkali and some part of the fixed air, the oil floating above. A great many incoercible vapours, however, will come over, to which vent must be given from time to time, by pulling out the peg. The distillation is to be continued till all is come over; which may be known by the effervescence, or very slow bubbling of the water. The iron pipe must then be separated from the cover of the distilling vessel, and the liquid in the jar should return into it, on the arm being condened by its cooling. In the jar will be a volatile spirit, more or less strong according as there was left or more water put in, with an exceedingly fbid black oil floating upon it.

The rectification of the volatile alkali is most commodiously performed at once by combining it with an amnification, and, as spirit of salt has the least affinity with inflammable matter, it is to be chosen for this purpose, in preference to the vitriolic or nitrous. As the spirit is excessively oily, though already much weakened by the admixture of the water in the jar, if a very large quantity was not originally put in, an equal quantity of water may be added, on drawing off the spirit. That as little may be possible, the spirit should be received in a stone bottle; and the marine acid, likewise in a distilled state, added by little and little, till the effervecees cease. The liquor, which is now an impure solution of salt ammoniac, is to be left for some time, that the oil may separate itself; it is then to be filtered, evaporated, and crystallized in a leaden vessel. If the crystals are not sufficiently pure at the first, they will easily become so on a second distillation.

From salt ammoniac thus obtained pure, the volatile volatile salt alkali may be extricated by distillation with chalk, alkaline salts, or quicklime. Alkaline salts are more briskly than chalk, and give a much stronger volatile alkali. The strength of this, however, we know may be altered at pleasure, by adding to, or depriving it of, its natural quantity of fixed air. Hence, perhaps, the best method would be, to prepare volatile alkalis altogether in a fluid state, by means of quicklime; and then add fixed air to them, by means of an apparatus similar to that directed by Dr Priestley for impregnating water with fixed air. To prevent lime from adhering to the distilling vessels in which it is put, the translator of Wiegble's chemistry recommends the putting in three or four ounces of common salt along with the other ingredients.

Volatile alkalies combined.

1. With Metals. There are only three metals, viz. Cuprum, copper, iron, and lead, upon which, while in their ammoniacal metallic form, volatile alkalies are capable of acting. Copper-filings are dissolved by volatile alkali, especially in its caustic state, into a liquor of a most admirable blue colour. It is remarkable, that this colour depends entirely upon the air having access to the solution; for if the bottle containing it is close stoppt, the liquor becomes colourless; but, however, refumes its blue colour on being exposed to the air. On evaporation, a blue ftable mel is obtained, which, mixed with fat, or other inflammable matters, form their flame green, leaving a red calc of copper, ftable again in volatile spirits as at first. This is the substance...
CHEMISTRY.

Practise.

Spiritus volatilis succinatus.

Volatile alkali and its combinations.

Sal volatile used for removing pains, and sometimes with success.

With essential oils, volatile alkalies may be united, either in their dry or liquid form, by means of distillation.

Composition of this kind are frequently employed in a bottle, and the volatile spirit is called "sal volatile oleosum," it is much more frequently used in a liquid than in a dry form. The general method of preparation is by distilling volatile alkali along with essential oils and spirit of wine, or the aromatic substance from whence the essential oils are drawn. These compositions are volatile alkali and its combinations.

F. Eau de Luce. This is a name given to a very exceedingly volatile spirit, which some years ago was pretty much in vogue; and indeed seems very well calculated to answer all the purposes for which volatile alkalies can be used. It was of a thick white colour, and smelled somewhat of oil of amber. A receipt appeared in Lewis's Dispensatory for the preparation of this fluid, under the name of spiritus volatilis succinatus. The method there directed, however, did not succeed; because, though the alkaline spirit is capable of keeping a small quantity of oil of amber suspended, the colour is greatly more dilute than that of genuine eau de luce.

In the Chemical Dictionary we have the following receipt: "Take four ounces of rectified spirit of wine, and in it dissolve 10 or 12 grains of white soap; filter this solution; then distill off in it a draught of rectified oil of amber, and filter again. Mix as much of this solution with the stronger volatile spirit of ammoniac as will be sufficient, when thoroughly shaken to give it a beautiful milky appearance. If upon its surface be formed a cream, some more of the oily spirit must be added."

This receipt likewise seems insufficient. For the oil of amber does not distill in spirit of wine: neither is it probable that the small quantity of soap made use of could be of any service; for the soap would distill perfectly in the alkaline spirit, without suffering any decomposition. The only method which we have found to answer is the following. Take an ounce, or any quantity at pleasure, of balsamum Canadensif, place it in a small china basin, in a pan of boiling water, and keep it there till a drop of it taken out appears of a resinosous consistence when cold. Extract a tincture from this resin with good spirit of wine; and having impregnated your volatile spirit with oil of amber, lavender or any other essential oil, drop in as much of the spirituous tincture as will give it the desired colour. If the volatile spirit is very strong, the eau de luce will be thick and white, like the cream of new milk; nor is it subject to turn brown with keeping.

IV. With Volatile Tincture of Sulphur. This is a Volatile combination of the caustic volatile alkali, or spirit alkali composed of sal ammoniac, with sulphur. It is usually distilled with rectified water or with spirit, and the spirit sulphur and afterwards with the sal ammoniac, and distilling the whole in a retort, but the produce is by this method very small, and even the success uncertain. A preferable method seems to be, to impregnate the strongest caustic volatile spirit with the vapour which arises in the decompositions of hcpur sulphur by means of an acid, in the same manner as directed for impregnating water with fixed air.

This preparation has a most nauseous fetid smell, sympathetic which spreads to a considerable distance; and the effec of the fluid will blacken silver or copper, if barely placed in the neighbourhood of the untoppffed bottle. This property renders it capable of forming a curious kind of sympathetic ink; for if paper is wrote upon with a solution of saeccharum saturni, the writing, which disappears when dry, will appear legible and of a brownish


CHEMISTRY.

Phenomena from mixtures of acids, &c. salts.

1. If concentrated oil of vitriol is mixed with strong spirit of nitre, or spirit of salt, the weaker acid will become exceedingly volatile, and emit very elastic fumes; so that if a mixture of this kind is put into a close stop bottle, it will almost certainly burst it. The same effect follows upon mixing spirit of salt and spirit of nitre together. In this case, both acids become surprizingly volatile; and much of the liquor will be distilled in fumes, if the mixture is suffered to stand for any considerable time. Such mixtures ought therefore to be made only at the time they are to be used.

2. If vitriolated tartar is dissolved in an equal quantity of strong spirit of nitre, by heating them together in a mortar, the stronger vitriolic acid will be dissolved by the weaker nitrous one, and the liquor, on cooling, will shew into crystals of nitre. The same thing happens also upon dissolving vitriolated tartar, or Glauber's salt, in spirit of salt. This observation we owe to Mont. Beaumé, and the reason of it has been already explained. See n° 285.

3. If vitriolated tartar, or Glauber's salt, is dissolved in water, and this solution mixed with another containing calcareous earth, silver, mercury, lead, or tin, dissolved in the nitrous or marine acids, the vitriolic acid will leave the fixed alkali with which it was combined, and, uniting with the calcareous earth or metal, fall with it to the bottom of the vessel. This decomposition takes place only when the vitriolic acid meets with such bodies as it cannot easily dissolve into a liquid, such as those we have just now mentioned; for though vitriolated tartar is mixed with a solution of iron, copper, &c. in the nitrous or marine acids, no decomposition takes place. The case is not altered, whatever acid is made use of; for the marine acid will effectually separate silver, mercury, or lead, from the vitriolic or nitrous acids.

4. According to Dr Lewis, if a solution of vitriolated tartar is dropped into lime-water, the acid will unite with the lime, and precipitate with it in an indiffusible felinite, the alkali remaining in the water in a pure and caustic state.

5. If green vitriol is mixed with any solution containing substances which cannot be dissolved into a liquid by the vitriolic acid, the vitriol will be immediately decomposed, and the liquor will become a solution of iron only. Thus, if green vitriol is mixed with a solution of faccharum fustrem, the vitriolic acid immediately quits the iron for the lead, and falls to the bottom with the latter, leaving the vegetable acid of the faccharum fustrem to combine with the iron.

6. If solution of tin in aque-regia is mixed with solution of faccharum fustrem, the marine acid quits the tin for the lead contained in the faccharum; at the same time, the vitriolic acid, which was combined with the lead, is unable to dissolve the tin which was before kept suspended by the marine acid. Hence, both the faccharum fustrem, and solution of tin, are very effectually decomposed, and the mixture becomes entirely useless. Dyers and calligraphers ought to attend to this, who are very apt to mix these two solutions together; and no doubt many of the faults of colours dyed or printed in particular places, arise from injudicious mixtures of a similar kind. See DYEING.

7. If mild volatile alkali, that is, such as remains in a concrete form, by being united with a large quantity of fixed air, is poured into a solution of chalk in the nitrous or marine acids, the earth will be precipitated, and a true ful ammoniac formed. If the whole is evaporated to dryness, and a considerable heat applied, the acid will again part with the alkali, and combine with the chalk. Thus, in the purification of volatile alkalis by means of spirit of salt, the same quantity of acid may be made to serve a number of times. This will not hold in volatile spirits prepared with quicklime.

8. If equal parts of ful ammoniac and corrosive sublimate mercury are mixed together and sublimed, they unite in such a manner as never to be separable from one another without decomposition. The compound is called ful alumbreth; which is said to be a very powerful solvent of metallic substances, gold itself not excepted. Its powers in this, or any other respect, are at present but little known. By repeated sublimations, it is said this salt becomes entirely fluid, and resolves in the strongest heat.

9. If vitriolic acid is poured upon any salt difficult solution of solution in water, it becomes then very easily soluble, and only by means of vitriolated tartar, or cream of tartar, may be dissolved in a very small quantity of water.

SECT. II. EARTHS.

The general divisions and characters of these substances we have already given; and most of the combinations with saline substances have been mentioned, excepting only those of the terra ponderosa; a substance whose properties have been but lately inquired into, and are not yet sufficiently investigated. In this section, therefore we have to take notice of their various combinations with one another, with inflammable, or metallic substances, &c. As they do not, however, act upon one another till subjected to a vitrifying heat, the changes then induced upon them come more properly to be treated of under the article GLASS. Upon metallic and inflammable substances (fulphur alone excepted), they have very little effect; and therefore what relates to these combinations shall be taken notice of in the following sections. We shall here confine ourselves to some remarkable alterations in the nature of particular earths by combination with certain substances, and to the phosphoric quality of others.
§ 1. The Terra Ponderosa.

This earth is of the true calcareous kind, and capable of being converted into a very acid lime; but in other respects is very different. It is most commonly met with in the veins of rocks, united with the vitriolic acid in a mass somewhat resembling gypsum, but much heavier and more opaque; and from the great weight of this substance the earth itself has its name, though when freed from the acid it is by no means remarkable for this property. Its properties were first taken notice of by Thomas Fermor; but they have been more accurately investigated by Dr Withering, who has published his observations in the 74th volume of the Philosophical Transactions. His experiments were not made on the gypseous substance above-mentioned; but on a combination of the earth with fixed air, which is much more uncommon, and like the other possesses a very considerable degree of specific gravity. Both these combinations have the general name of *fractum ponderosum,* or *ponderous spar;* the former being also called barofeltenite, &c.

The spar used by Dr Withering was got out of a lead mine at Allon Moor in Cumberland. Its appearance was not unlike that of a lump of alum; but on closer inspection it appeared to be composed of slender flakes in close contact, more or less diverging, and so thin that it might be cut by a knife; its specific gravity from 4.200 to 4.338. It effervesced with acids, and melted, though not very readily, under the blow-pipe. In a common fire it lost its transparency; and on being urged with a stronger heat in a melting furnace, it adhered to the crucible, and showed signs of fusion; but did not appear to have lost any of its fixed air, either by diminution in weight, becoming caustic, or losing its power of effervescing with acids.

Five hundred grains of this spar, by solution in muriatic acid, lost 104 grains in weight, and left an infusible residuum of three grains. In another experiment, 100 grains of spar lost 21; and there remained only 0.6 of a grain of infusible matter.

On dissolving another hundred grains in dilute muriatic acid, 25 ounce-measures of air were obtained, which by proper trials appeared to be pure aerial acid; and, on precipitating the solution with mineral alkali, 100 grains of earth were again obtained; but on dissolving the precipitate in fresh muriatic acid, only 20 ounce-measures of air were produced.

Mild vegetable alkali precipitated a faturated solution of this spar in marine acid, with the escape of a quantity of fixed air; and the same effect took place on the addition of fosili alkali; but with caustic alkalis there was no appearance of effervescence, though a precipitate likewise fell.

Fifty parts of spar, dissolved in marine acid, lost 105; and with caustic vegetable alkali, a precipitate weighing 45; was obtained. Phlogilificated alkali precipitated the whole of the earth, as appeared by the addition of mild fixed alkali afterwards, which occasioned no further precipitation.

Part of the precipitate thrown down by the mild alkali was exposed to a strong heat in a crucible, and then put into water. The liquid was instantly converted into a very acid lime-water, which had the following remarkable properties: The smallest portion of vitriolic acid, added to this water, occasioned an immediate and copious precipitation, which appeared even after the liquid was diluted with 200 times its bulk of pure water. 2. A single drop let fall into a solution of Glauber’s salt, vitriolated tartar, alum, vitriolic ammoniac, Epom salt, or felinite, occasioned an immediate and copious precipitate in all of them: the reason of which was the superior attraction of the ponderous earth for the acid of these salts, which forming with it an indissoluble concrete, infanty fell to the bottom.

The precipitate thrown down by the caustic vegetable alkali was put into water, but exhibited no foeh appearances as the other; even the mixture was boiled nor had it any acrimonious taste. On adding the three mineral acids to separate portions of the precipitate itself, neither effervescence, nor any sign of solution, appeared. After standing an hour, water was added, and the acids were suffered to remain another hour on the powder; but on decanting them afterwards, and adding fosili alkali to the point of saturation, no precipitate appeared.

The precipitate thrown down by the phlogilificated alkali, mixed with nitre and borax, and melted with a blow-pipe on charcoal, formed a black glass; on frit-glas, a white one; and on a tobacco-pipe, a yellowish white one. Another portion, melted with soaps and borax in a crucible, formed a black glass.

The small quantity of infusible residuum formerly mentioned, appeared to be the combination of ponderous earth with vitriolic acid, called heavy gypsum, marmor metallicum, barofeltenite, &c.

From these experiments the Doctor concludes, that Analysis 100 parts of this spar contain 78.6 of pure ponderous earth, 4½ of a grain of marmor metallicum, and 20.8 grains of fixed air. 2. The quantity of mild alkali necessary to saturate any given portion of acid, contains a greater quantity of fixed air than can be absorbed by that quantity of terra ponderosa which the acid is able to dissolve. 3. The terra ponderosa, when precipitated by means of a mild alkali, readily burns to lime; and this lime-water proves a very nice test of the presence of vitriolic acid. 4. In its native state the terra ponderosa will not burn to lime; when urged with a strong fire, it melts and unites with the crucible, without becoming caustic; nor can it be made to part with its fixed air by any addition of phlogiston. He conjectures, therefore, that as caustic lime cannot unite to fixed air without moisture, and as this spar seems to contain no water in its composition, it is the want of water which prevents the fixed air assuming its elastic aerial state. "This supposition (says he) becomes still more probable, if we observe, that when the solution of the spar in an acid is precipitated by a mild alkali, some water enters into the composition of the precipitate; for it has the same weight as before it was dissolved, and yet produces only 20 ounce-measures of fixed air, while the native spar contains 25 of the same measures; so that there is an addition of weight equal to five ounce-measures of air, or three one-half grains, to be accounted for; and this can only arise from the water. 5. The precipitate formed by the caustic alkali, taking some of the latter down with it, forms a substance neither soluble in acids nor water. This infusible compound is also formed by adding the lime-water already
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Dr Withering having exposed 100 grains of the Terra ponderosa and its combinations to a red heat for an hour in a black crucible, found that it had lost five grains of its weight; but as a sulphureous smell was perceptible, he suspected that a decomposition had taken place, and therefore exposed another portion to a similar heat in a tobacco-pipe, which had no smell of sulphur, nor was it diminished in weight. It melted with borax into a white opaque glass, but was barely fusible by itself under the blow pipe. It did not seem to dissolve in water, nor in any of the acids, except the vitriolic, when by long boiling it had become very concentrated in the dry and almost red hot. It then appeared perfectly dissolved; but separated again unchanged on the addition of water. On exposing the vitriolic solution to the atmosphere for some days, beautiful radiated crystals were formed in it.

On adding a solution of mild vegetable alkali to this precipitated vitriolic solution, a precipitate appeared; but it consisted of marmor metallicum unchanged. An ounce of it in fine powder was then fused with two of salt of tartar until it ran thin, when six drachms of a residuum insoluble in water were left. On the addition of nitrous acid, only 52 grains were left, which appeared to be marmor metallicum unchanged. On saturating the alkaline solution with distilled vinegar, and warming under the precipitate, the liquor was found to contain terra roffa tartar, formed by the union of the acetous acid with part of the alkali; and of vitriolated tartar, formed by that of the alkali with the native acid of the marmor metallicum.

The salt formed by the nitrous acid that readily entered into beautiful permanent crystals of a rough bitterniss nature.

Some of the salt degenerated with nitric and charcoal, left by washing the terra ponderosa very white, capable of being burnt into lime, and again forming an insoluble compound with vitriolic acid. An hundred grains of aerated terra ponderosa, dissolved in marine acid, and precipitated by the vitriolic, were augmented 17 grains in weight. Hence it appears,

1. That the marmor metallicum is composed of vitriolic acid and terra ponderosa.
2. That this compound has very little solubility in water.
3. That it is the only one of this kind that can only be dissolved in highly concentrated oil of vitriol, from which it separates unchanged on the addition of water.
4. That it cannot be decomposed in the moist, by mild fixed alkali, though it may be so in the dry.
5. That it may be decomposed by the union of inflammable matter to its acid, by which sulphur is formed, though the acid cannot be distilled by mere heat.
6. An hundred parts of this substance contain 32.8 of pure vitriolic acid, and 57.2 of terra ponderosa. The marmor metallicum, our author remarks, may possibly be useful in some cafes where a powerful flux is wanted; for having mixed some of it with the black flux, and given the mixture a strong heat in a crucible, it ran entirely through the pores of the vessel.

Dr Withering describes two other kinds of this substance, known by the name of Cauck, and found in the mines of Derbyshire, and other places. These differ from the other only in containing a small proportion of iron. On the whole, he concludes, that the terra ponderosa seems to lay claim to a middle place between the earths and metallic calces. Like the forma-
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Transmutation of flints into an earth soluble in acids.

This is effected by mixing powdered flints with an earth soluble in acids, and melting the mixture by a strong fire. The melted mass dissolves in the air, like alkaline salts; and if the earth be then precipitated, it becomes soluble in acids, which it entirely refists before.

In this process the alkali, by its union with the flint, is deprived of its fixed acid, and becomes caustic. To this causticity its solvent power is owing; and therefore the flint may be precipitated from the alkali, not only by acids, but by any substance capable of furnishing fixed air, such as magnesia alba or volatile alkali. The precipitate in both cases proves the same; but the nature of it hast not hitherto been determined. Some have conjectured that the vitriolic acid existed in the flint; in which case, the alkali made use of in this process ought to be partly converted into vitriolated tartar.

The above process is delivered on the authority of Mr Bergman, who has published a dissertation on this subject, affirms that it cannot be dissolved except by the alkali. The vitriolic, nitrous, or marine acids, have no effect upon it, even when newly precipitated from the liquor of flints washed and still wet, and though a thousand parts of acid be added to one of the earth, and boiled upon it for an hour; but when three parts of alkaline silt are melted in a crucible with one of quartz, the salt dissolves at the same time about seven hundred parts of its own weight of the clay which composes the crucible; and the solubility of this is given occasion to the mistake above mentioned. If the fusion be performed in an iron vessel, no soluble part will be obtained, excepting the very small portion of clay which the quartz contains; and when this is once exhausted by an acid, no more can be procured by any number of fusions with alkali.

The flour acid, he observes, is never obtained entirely free from siliceous earth, and consequently its power as a menstruum must be weakened in proportion to the quantity it contains. In order to observe its solvent power, however, our author, in the year 1772, put some quartz, very finely powdered, into a bottle containing 3 of a kame of flour acid. The bottle was then tightly corked, and set by in the corner of a room. Two years afterwards it was examined; and on pouring out the liquor there found concreted at the bottom of the vessel, besides innumerable small prismatic spicules, 13 crystals of the size of small peas, but mostly of an irregular form. Some of these resembled cubes, whose angles were all truncated, such as are often found in the cavities of flints. These were perfect siliceous crystals, and very hard, but not comparable with quartz, though they agreed with it in essential properties. "Possibly (says he) the length of a century may be necessary for them to acquire, by excretion, a sufficient degree of hardness."

The bottom itself, as far as the liquor had reached, was found covered with a very thin siliceous pellicle, which was scarcely visible, but separated on breaking the bottle. It was extremely pelliculose, flexible, and showed prismatic colours. These phenomena show that much siliceous matter is dissolved and suspended in the flour acid. "Whether any of the quartz was taken up in this experiment is uncertain; but it appears probable that little or none was dissolved; since, by the help of heat during the distillation, the acid had previously taken up so much siliceous earth, that upon flow evaporation it was unable to retain it. Hence appears the origin of the crystals and the pellicle; and hence appears the canite which impedes the action of flour acid upon flint; namely, that the acid obtained in the ordinary way is already saturated with it."

The volatile alkali precipitates siliceous earth merely from flour acid; and thus we find, that one part of it is contained in 600 of the acid, diluted to such a degree, that its specific gravity is only 1.064. This precipitate has all the properties of pure flour; but that precipitated either by vegetable or mineral fixed alkali does not afford a pure siliceous earth, but a peculiar kind of triple salt, formed of the earth, flour acid, and fixed alkali, which dissolves, though with difficulty, in warm water, especially the earth procured by vegetable alkali, but is easily decomposed by lime-water and leaves the mineral flour regenerated.

Fixed alkaline salts attack this earth by boiling, but not unless it be reduced to very fine powder, and newly precipitated from the liquor. Oil of tartar per diem takes up about one-sixth of its weight, and the liquor becomes gelatinous on cooling, though at first diluted with 16 times its weight of water. This solution is effected only by the caustic part; for when fully saturated with fixed acid, it cannot enter into any combination with it. Volatile alkali, even though caustic, has no effect.

The attraction between siliceous earth and fixed alkali is much more remarkable in the dry way; for it is thus melted with one half its weight of alkali into an hard, firm, and transparent glass, the aerial acid and water going off in a violent effervescence. In proportion as the alkali is increased, the glass becomes more soft and lax, until at last it dissolves totally in water, as has been already mentioned. The siliceous matter thus precipitated is of a very rare and pungent texture, and so much swelled by water, and its bulk of water when wet is at least twelve times greater than when dry; nor does it contract more than suffices to remain a long time in the water. Hence it is easy to reduce the liquor of flints to a jelly, by boiling it with four or eight times its weight of water, and adding a sufficient quantity of precipitate; but if an over proportion of water be used, for instance, 24 times the weight, the liquor will then remain limpid though we add as much acid as is sufficient for saturating the alkali. The reason of this Mr Bergman supposes to be, that the siliceous particles are removed to such a distance from one another, that they cannot overcome the heat.
From attending to the qualities of this stone, and Phosphoric the requited for making this phosphorus, we are naturally led to think, that the Bolognian phosphorus is no other than a compose of sulphur and quicklime. The stone itself, in its natural state, evidently contains the phos-

vitic acid, from its not ever sepicing with acids of any kind. This acid cannot be expelled from earthy substances by almost any degree of fire, unless inflammable matter is admitted to it. In this case, part of the acid becomes sulphurous, and flies off; while part is converted into sulphur, and combines with the earth. In the above mentioned process, the inflammable matter is furnished by the coals in contact with which the cakes are calcined, and by the mucilage of gum tragacanth with which the cakes are made up. A true sulphur must therefore be formed by the union of this inflammable matter with the vitriolic acid contained in the stone; and part of this sulphur must remain united to the earth left in a calcareous state, by the dilution, or conversion into sulphur, of its acid.

In the year 1730, a memoir was published by Mr. Allcalcado Fay; wherein he afferts, that all calcareous stones, whether they contain vitriolic acid or not, are capa-

ble of becoming luminous by calculation: with this difference only, that the pure calcareous stones require a stronger, or more frequently repeated, calculation to convert them into phosphors; whereas those which contain an acid, as seifines, gypsum, spars, &c., become phosphoric by a lighter calculation. On the contrary, Mr. Margraaf afferts, that no other stones can be rendered phosphoric but those which are fatu-

rated with an acid; that purely calcareous stones, such as marble, chalk, limestone, stalactites, &c., cannot be rendered luminous, till saturated with an acid previously to their calculation.

We have already taken notice, that the compounds formed by uniting calcareous earths with the nitrous and marine acids become a kind of phoshor: the former of which emits light in the dark, after having been exposed to the fun through the day; and the latter becomes luminous by being struck. Signior Signior Beccaria found, that this phosphoric quality was capa-

ble of being given to almost all substances in nature, metals perhaps excepted. He found that it was widely diffused among animals, and that even his own hand and arm poiselled it in a very considerable degree. In the year 1775, a treatise on this kind of phosphor was published by B. Wilson, F. R. S. and a member of the Royal Academy at Upal. In this treatise, he shows, that oyster-stills, by calculation, acquire the phosphoric quality in a very great degree, either when combined with the nitrous acid or without it.

The first experiment made by our author was the pouring some aquafortis, previously impregnated with copper, on a quantity of calcined oyster-stills, so as to form them into a kind of paste; he put this paste into a crucible, which was kept in a pretty hot fire for about 40 minutes. Having taken out the mass, and waited till it was cool, he presented it to the external light. On bringing it back suddenly into the dark, he was surprized with the apparence of a variety of colours like those of the rainbow, but much more vivid. In consequence of this appearance of the prismatic colours,
Vegetable earth.

Dr Lewis's opinion.

Mr Gmelin's experiments.

§ 4. Of the Vegetable Earth.

§ 5. Of Metallic Substances.

Gold.
Practice.

Gold.

Fusion for half an hour, during which time a full quarter of the tin was calcined; yet the gold remained altogether unchanged.

7. The mixture of gold and tin produced in exp. 1, was melted a second time in a stronger fire than at first, and kept in fusion for half an hour; during which time six grains of weight were lost, but the gold remained perfect as before.

8. and 9. The mixtures of exp. 2, and 4, viz. 90 and 140 grains to 12 ounces of gold, were re-melted separately, and an ounce of copper added to each. On being cast as usual, they bore all the operations of manufacturing as before, though sensibly harder. The last cracked at the edges as it had done without the copper, but bore cutting rather better than in its former state.

10. and 11. A quarter of an ounce of the last mixture, being tin 140 grains, and copper an ounce, and gold 12 ounces, with as much of the bar from experiment 3, consisting of 140 grains of tin to 12 ounces of gold, were each melted by a jeweller in a common sea-coal fire, into small buttons, without any loss of weight. These buttons were afterwards forged into small bars, healing them often with the flame of a lamp, and afterwards drawn each about twenty times through the apertures of a steel plate, into fine wire, with as much ease as coarse gold commonly passes the like operation.

12. Sixty grains of tin were added to 12 ounces of standard gold; fine; and the compound passed every one of the operations already described, without showing the least alteration from the tin.

Several other trials were made with different mixtures of copper, tin, and silver, with gold, even as low as two ounces and a half of copper, with half an ounce of tin, to twelve ounces of gold; all of which bore hammering and flatting by rollers to the thinnes of stiff paper, and afterwards working into watch-castes, cane-heads, &c. with great ease. They grew more hard and harsh in proportion to the quantity of alloy; but not one of them had the appearance of what workmen call brittle gold. Mr Alchorne therefore is of opinion, that when brittleness is occasioned by the addition of tin to gold, the former has been adulterated with arsenic; as he has found, that by adding 12 grains of regulus of arsenic to as many ounces of fine gold, the compound has been rendered altogether unmeliable.

When gold is struck during a certain time by a hammer, or when violently compressed, as by the wire-drawers, it becomes more hard, elastic, and less ductile; so that it is apt to be cracked and torn. Its ductility is, however, restored by the same means, with other metals, namely, heating it red hot, and letting it cool slowly. This is called annealing metals; and gold seems to be more affected by this operation than any other metal. The ductility of the parts of gold is also very surprising; for a wire of 1/16 of an inch in diameter will support a weight of 300 pounds.

Gold is unalterable by air or water. It never contracts ruff like other metals. The action of the fiercest waters and acids has no alteration in it. Kunckel kept gold in a glaas Furnace for four months, and Boyle kept some exposed to a great heat for a still longer time, without the loss of a single grain.

It is said, however, to be dissipable in the focus of a large burning mirror.

Mr Boyle relates a very curious and extraordinary experiment, which he thought was sufficient to prove the total destructibility of gold. About an eighth part of a grain of powder, communicated by a stranger, was projected upon two drachms of fine gold in fusion, and the matter kept melted for a quarter of an hour. During the fusion, it looked like ordinary gold; except only once, that his assistant observed it to look exactly of the colour of opal. When cold, it was of a dirty colour, and, as it were, overcast with a thin coat, almost like half-vitriified litharge: the bottom of the crucible was overlaid with a vitriified substance, partly yellow, and partly reddish brown; with a few small globules, more like impure silver than gold. The metal was brittle, internally like brass or bell-metal; on the touchstone more like silver than gold: its specific gravity was to that of water only as 15; to 1. There was no absolute loss of weight.

By cupellation, 60 grains of this mafs yielded 32 grains of pure gold, with seven grains of a ponderous substance, fixed, dark-coloured substance.

We have already mentioned, that in certain circumstances gold is soluble in the nitrous and marine acids separately. It is, however, always soluble by the two united, but dissolves slowly even then. The most commodious method of obtaining this solution is, by putting the gold, either in leaves, or granulated, or cut into small thin pieces, into a proper quantity of aquafortis; then adding, by degrees, some powdered sal ammoniac, till the whole of the gold is dissolved. By this means a much smaller quantity of the menstruum proves sufficient, than if the sal ammoniac was previously dissolved in the aquafortis; the conflict, which each addition of the salt raises with the acid, greatly promoting the dissolution. Aquafortis of moderate strength will, in this way, take up about one-third of its weight of gold; whereas an aqua-regis, ready prepared from the same aquafortis, will not take up above one-fifth its weight. Common salt answers better for the preparation of the aqua-regis than sal ammoniac.

This solution, like all other metallic ones, is corrosive. It gives a violet colour to the fingers, or to any of the solubil animal matters. If the solution is evaporated and dried, yellow transparent crystals will be formed: but, if the evaporation is carried too far, the acids with which the gold is combined may be driven from it by heat alone; and the gold will be left in the state of a yellow powder, called calx of gold.

Gold may be precipitated from its solution by those substances which commonly precipitate metals, such as alkali salts and calcarious earths. It may also from its solution, be precipitated in a fine purple powder, by tin or its solution.

When fixed alkalies are made use of, the precipitate weighs about one-fourth more than the gold employed. With volatile alkalies also, if they are added in no greater proportion than is sufficient to saturate the acid, the quantity of precipitate proves nearly the same; but if volatile spirit is added in an over-proportion, it redissolves part of the gold which it had before precipitated, and the liquor becomes again considerably yellow. The whole of the precipitate, however,
Aurum fulminans. — Gold precipitated from its solution in aqua-regia explodes by heat with much greater violence than any other substance in nature. This property was known in the 15th century; but whether the ancient alchemists knew anything of it or not, is a matter of uncertainty. Basil Valentine first gave any distinct account of it. He directs the gold to be dissolved in aqua-regia made with fæt ammoniac, and then precipitated by vegetable fixed alkali, to be twelve times washed with water, and lastly dried in the open air, where the sun's rays cannot reach it. He forbids it to be dried over a fire, as it explodes with a gentle heat, and flies off with inconceivable violence.

Succeeding chemists have performed this operation with some little differences; but the necessity of employing volatile alkali was but little regarded till the beginning of the present century. The calx of gold is always somewhat increased in weight by being converted into aurum fulminans; but authors are not agreed about the quantity of augmentation. Becher makes it heavier by one-fifth part; Lefery by one-fourth; and Juncker by one-fourth. All agree, however, that it explodes with a violence almost inconceivable. Crollius relates, that 20 grains of this powder explodes with more force than half a pound of gun powder, and exerts its force downwards, though M. Teykmeyer frequently flowed in his lectures that it would throw a florin upwards above six feet. A great number of experiments were made before the Royal Society at London, in order to determine the comparative forces of these two powders.

Equal parts of gunpowder and aurum fulminans were included in iron globes placed among burning coals; those which contained the former burst with great violence, but the globes containing the aurum fulminans remained perfectly silent. But though no explosion takes place in close vessels, the utmost caution is necessary in managing this substance in the open air; especially when it is subjected to friction, or to a flight of dust, for such is the nature of the calx we speak of, that it is not necessary, in order to cause it to explode, to touch it with an ignited substance; or to make it red-hot. The heat requisite for this purpose is, according to Dr Lewis, intermediate between that of boiling water and the heat which makes metals of an obscure red. With friction, however, it seems still more dangerous; for in this case it explodes with what we should think scarce sufficient to communicate any degree of heat whatever. Orfchel relates, that this powder ground in a jasper mortar, exploded with such violence as to burst the vessel in a thousand pieces; Dr Lewis gives an instance of a similar kind in England; and Dr Birch tells us of doors and windows torn to pieces by the violence of this explosive matter. Mr Macquer relates the following accident to which he was witness. "A young man, who worked in a laboratory, had put a drachm of fulminating gold into a bottle, and had neglected to wipe the inner surface of the neck of the bottle, to which some of the powder adhered. When he endeavoured to close the bottle, by turning round the glass stopper, the friction occasioned an explosion of part of the powder. By this the young man was thrown some steps backward, his face and hands wounded by the fragments of the bottle, and his eyes put out; yet, notwithstanding this violent explosion, the whole drachm of fulminating gold certainly did not take fire as much of it was afterwards found scattered about the laboratory."

It has already been mentioned, that some imagine the force of this explosion to be directed downwards; but Dr Lewis is of opinion that it is equally directed every way. Certain it is, that the quantity of from 10 to 12 grains of aurum fulminans, exploded on a metallic plate, lacerates it; a smaller quantity forms a cavity, and a still smaller only scratches the surface; effects which are never produced by gunpowder in ever so large a quantity. A weight laid upon the powder is thrown upwards in the moment of explosion. If it be of silver or copper, this weight is marked with a yellowish spot, as the supports will also be, if made of either of these metals. A large grain, says Mr Bergman, brought near to the side of the flame of a candle, blows it out with great noise; and a few ounces exploding together by incautious drying, has been known to shatter the doors and windows of the apartment; hence it is evident, that aurum fulminans expels its force in all directions; yet it cannot be denied, that it strikes bodies with which it is in contact more violently than those which are at a small distance, though in its vicinity; thus, if a small portion of it explodes in a paper box, it lacerates only the bottom, unless the top be pressed down close, in which case it perforates both the top and bottom. When carefully and gradually exploded in a glass phial or paper box, it leaves a purple foot, in which are found many particles of shining gold; and if the quantity exploded be large, several grains remain totally unchanged, as it is only the lowermost stratum that is inflamed.

Aurum fulminans, when moist, does not explode at all; but as it dries, the grains go off in fuscussion like of mois, the deprecation of common salt,—In glass vessels closed, or with their mouths immersed in water, it explodes, but with a very weak report. An elastic vapour, in the quantity of seven inches, from half a drachm of the powder, broke forth in the moment of explosion, which, but for our authors account, seems to be phlogisticated air. In metallic vessels sufficiently strong, the gold is silently reduced when they are perfectly...
Gold

Causes of this explosion attributed to a faîne principle.

This opinion shown to be erroneous by Mr. Bergman.

Aurum fulminans can be made without nitrous or marine acids.

Fixed air not the cause of the explosion.

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Gold has been attributed chiefly to a faîne principle, viz. The combination of nitrous acid with volatile alkali; and this opinion has been supported by an affinity, that the fulminating property is destroyed by treating the calx with vitriolic acid or with fixed alkali; the former expelling the nitrous acid, and the latter diffusing the volatile alkali. Mr. Bergman allows that fixed alkali destroys the fulminating property; but affirms, that it acts only by separating the particles when the two are triturated together; and this might be done by many other substances as well as fixed alkali; but when the alkali, instead of being triturated in the dry way with the calx, was boiled in water along with it, the explosion not only took place, but was much more violent than usual. It must be observed, however, that heat alone destroys the fulminating property of this calx; and therefore, if the alkaline solution be made too strong, the additional heat which it then becomes capable of sustaining, is sufficient to deprive the calx of its fulminating property. The case is the same with the vitriolic acid; for this has no effect upon the calx, either by digestion in its concentrated state, or by boiling in its diluted state. If it be boiled in its concentrated state indeed with the fulminating calx, the heat conceived by the acid is sufficient to destroy the fulminating property of the former; and in like manner, unless the calx be in some measure destroyed, or reduced to its metallic state, it can never be deprived of its fulminating property.

It was further proved, that the fulminating property did not depend on the presence either of nitrous or marine acids, for it can be made without them. A calx of gold, not fulminating, dissolved in vitriolic acid, and precipitated by caustic volatile alkali, had acquired this property. A solution of the same calx in nitrous acid, let fall a precipitate by the addition of pure water, and this precipitate is precipitated and digested with volatile alkali, fulminated as if it had been originally precipitated with that alkali. The experiment was repeated on the other non-fulminating precipitates with the same success. Left any faticitie, however, should remain, that a small quantity of aqua regia might still be left, which, by combining with the volatile alkali, would make a proportionable quantity of nitrous flammans, the precipitate was digested 24 hours in vitriolic acid, then washed in pure water, and immerced in aqueous and spirituous solutions of alkali, both mild and caustic; but the event was the same. Lastly, an inert calx of gold may always be made to fulminate by digesting it with volatile alkali; nor can this property be communicated to it by any means without the use of this alkali.

It has been suppos'd some very eminent chemists, among whom we may number Dr. Black, that fixed air is the cause of the fulmination of gold; but it is evident that this cannot be the case: because, 1. Gold fulminates as well when precipitated by the caustic volatile alkali, as by that which contains fixed air, 2. This metal does not combine, during precipitation, with fixed air. 3. Gold, when precipitated by mild fixed alkali, does not fulminate, unless the menfrum contain volatile alkali.

The fulminating calx of gold may be prepared either with the compound aqua regia of pure nitrous and marine acids; or of pure nitrous acid and almaniac; or of a compound of alum, nitre, and sea-salt. When this kind of liquor is made use of, the acid of the alum expels the other two, and thus forms an aqua regia. This was formerly called menfrum fine firepsiti. By whatever method the gold is dissolved, it always affords a yellow calx with alkalis, but the volatile alkali most readily throws down the metal. The phlogitecated spirit of salt very readily dissolves gold, and produces a fulminating precipitate as well as aqua regia.

We shall conclude this account of aurum fulminans with an abstract of Mr. Bergman's theory of the explosion. - He observes, that volatile alkali contains phlogiston; an undoubted proof of which is given by Dr. Priestley, by covering alkaline into phlogisticated air. This phlogiston, says he, may be separated by means of a superior attraction; so that the volatile alkali is decomposed, and the residuum diffus'd in form of an elastic fluid, altogether similar to that which is extricated during the fulmination; the source from whence the elastic fluid is derived must be obvious; and it only remains to examine the medium by which the volatile alkali is dephtlogitecated.

In those metals which are called perfect, so great is the firmness of texture, and so close the connection of the earthly principle with the phlogiston, that by means of fire alone these principles cannot be diffus'd: but when dissolved by acid menfrus, they must necessarily lose a portion of their phlogiston; and therefore, when afterwards precipitated by alkalis which cannot supply the loss, they fall down in a calcined state, though they attract phlogiston so strongly, that they can be reduced to a metallic state, merely by an intense heat penetrating the vessels. It may therefore be laid down as a fundamental position, that gold is perfect and contains phlogiston.

Let us now consider the consequence of expounding the powder consisting of calx of gold and volatile alkali the alkali intimately united, to an heat gradually increasing of the fed. The calx which is united with the volatile alkali, by the assistance of a gentle heat, excites its phlogiston; and when this is taken away, the residuum of the falt is instantly expanded into the form of an elastic fluid, which is performed with so much violence, that the air muf t yield a very acute sound.

Our author proceeds to explain this phenomenon upon the principles ascribed to him and Mr. Seebree, exhibits of heat being a composition of light, and the phlogiston or principle of inflammability; but as this hypothesis is by no means satisfactory, we shall omit his reasoning founded upon it; That the volatile alkali, however, is really capable of producing a flash is easily proved, because it exhibits one when thrown into a hot crucible. A single cubic inch of gun-powder generates about 244 of elastic fluid; but the same quantity of aurum fulminans yields at least four times as much; and hence we may easily understand the difference in their explosive force.

That careful calculations should destroy the fulminating power of the fixed alkali; therefore, the volatile alkali must be employed, if the fulminating property be to be produced.
...tion for phlogiston; it also acts upon the phlogiston of the volatile alkali, and lefions its connection; which two circumstances must tend to the union producing the explosion. But this effect has a maximum; and at this period the slightest friction supplies the defect of necessary heat, and produces the fulmination. The calcined gold also seems to collect and fix the matter of heat, though still insufficient by means of its phlogiston, in a certain degree; so that by means of friction, though but very slight, it becomes capable of exerting its force; but when the heating is often repeated without procuring its effect, the volatile alkali is by degrees dissipated, and at length so much diminished that the calx becomes inert.

"But if aurum fulminans is capable of producing such a prodigious quantity of elastic fluid, how does it happen that it remains mute and inert when reduced in close vessels? Of this the reason may be, that every elastic fluid, in the act of breaking forth, requires a space to expand in; and if this be wanting, it remains fixed. Taking this for granted, a calx of gold cannot be reduced in close vessels either by heat or by the phlogiston of volatile alkali; for in either case it must evolve its elastic fluid, which by suppulsion it cannot do. Nothing remains to solve this difficulty but the ignition of the surrounding metal; by means of which the calx, in virtue of its superior attraction, seizes the phlogiston of the metal, which that substance here, as well as in other instances, is capable of losing without the eruption or absorption of any fluid whatever."

Several chemists have asserted, that the calces of copper or silver may be made to fulminate like that of gold. But Mr. Bergman informs us, that these experiments never succeeded with him; "so (says he) they have either been silent upon some circumstances necessary in the operation, or perhaps have been deceived by the detonation of nitrum flammos, or some other accidental occurrence. It is not sufficient for the volatile alkali to adhere to the precipitate; for platina thrown down by this alkali retains a portion of it very obstinately, but yet does not fulminate on the exposition of fire — Besides the presence of volatile alkali, it seems to be necessary that the metallic calx should be reducible by a gentle heat, in order to decompose it; but every explosion is not to be derived from the same cause; nay, in this respect, aurum fulminans, gold-powder, and pulvis fulminans, differ very much, though they agree in several particulars." Of late, however, it has been found that the calx of silver may be made to fulminate in a manner still more extraordinary than that of gold. See the next article.

If gold is melted with an hepur sulphur, composed of equal parts of sulphur and fixed alkaline salt, the metal readily unites with it into an uniform mass, capable of dissolution in water without any separation of its parts. The solution, besides a nauseous taste from the sulphur, has a peculiar penetrating bitterness, not discoverable in any other metallic solution made by the same means.

Though the compositions of sulphur and alkali seem to unite more intimately with gold than any other metal, their affinity with it is but slight; copper, or iron, added to the matter infusion, dissolute, and precipitate the gold. The metal thus recovered, and purified by the common processes, proves remarkably paler-coloured than at first. In an experiment related by Dr. Brandt, in the Swedish Memoirs, the purified gold turned out nearly as pale as silver, without any diminution of weight.

Gold has been thought to be possessed of many ex-traordinary virtues as a medicine; which, however, virtues of are long ago determined to be only imaginary. It is not indeed very easy to prepare this metal in such a manner that it can be safely taken into the human body. The solution in aqua-regia is poisonous; but if any efferential oil is poured on this solution, the gold will be separated from the acid, and united to the efferential oil; with which, however, it contracts no lasting union, but in a few hours separates in bright yellow film to the sides of the glasses. Vittorio ether disolves the gold more readily and perfectly than the common efferential oils; and keeps it permanently suspended, the acid liquor underneath appearing colourless. The yellow ethereal solution poured off, and kept for some time in a glass stop with a cork, so that the spirit may slowly exhale, yields long, transparent, prismatic crystals, in shapes like those of nitre, and yellow like topaz. What the nature of these crystals is, either as to medicinal effects, or other purposes, is as yet unknown.

Rectified spirit of wine mingle uniformly with the solution of gold made in acids: if the mixture is suffered to stand for some days in a glass slightly covered, the gold is by degrees revived, and arises in bright pellicles to the surface. Groffer inflammable matters, wine, vinegar, solutions of tartar, throw down the gold, in its metallic form, to the bottom. It is the only metal which is thus separable from its solution in acids by these substances; and hence gold may be purified by these means from all admixtures, and small proportions of it in liquors readily discovered.

When the colour of gold is by any means rendered pale, it may be recovered again by melting it with gold red-copper, and afterwards separating the copper; or by red.

A mixture of verdigris and sal ammoniac with vitriol or nitre. The colour is also improved by fusion with nitre, injecting sal ammoniac upon it in the fusion, quenching it in urine, or boiling it in a solutition of alum. When borax is used as a flux, it is customary to add a little nitre or sal ammoniac, to prevent its being made pale by the borax. Juncker reports, that by melting gold with four times its weight of copper, separating the copper by aquafortis unpurified, then melting the gold with the same quantity of fresh copper, and repeating this process eight or nine times, the gold becomes at length of a deep red colour, which sustains the action of lead, antimony, and aquafortis.


## Practice.

### Silver.

I

#### The density of silver.

This, next to gold, is the most perfect, fixed, and durable of all the metals. Its specific gravity is to that of water nearly as 11 to 1. A single grain has been drawn into a wire three yards long, and flated into a plate an inch broad. In common fire it suffers no diminution of its weight; and, kept in the vehement heat of a glafs-house for a month, it loses no more than one sixty-fourth. In the focus of a large burning-glafs, it smokes for a long while, then contracts a greyish ash on the surface, and at length is totally distillated.

Silver is somewhat harder and more fonorous than gold, and is fusible with a less degree of heat. The tenacity of its parts also is nearly one half less than that of gold; a silver wire of . of an inch diameter being unable to bear more than 270 pounds.

Mercury unites very readily with silver-leaf, or with the calx of silver precipitated by copper; but does not touch the calces precipitated by alkaline salts. The vapours of sulphureous solutions stain silver yellow or black. Sulphur, melted with silver, debases its colour to a leaden hue, renders it more easily fusible than before, and makes it flow so thin as to be apt in a little time to penetrate the crucible: in a heat just below fusion, a part of the silver-flows up, all over the surface, into capillary efflorescence. Aquafortis does not act upon silver in this compound; but fixed alkaline salts will absorb the sulphur, and from a heap of sulphur, which, however, is capable of again dissolving the metal. If the sulphurated silver is mixed with mercury sublimated, and exposed to the fire, the mercury of the sublimate will unite with the sulphur, and carry it up in the form of cinnabar, whilst the marine acid of the sublimate unites with the silver into a luna cornes, which remains at the bottom of the glafs. Fire alone is sufficient, if continued for some time, to expel the sulphur from silver.

From the bafer metals, silver is purified by copulation with lead. (See refining.) It always retains, however, after that operation, some small portion of copper, sufficient to give a blue colour to volatile spirts, which has been erroneously thought to proceed from the silver itself. It is purified from this admixture by melting it twice or thrice with nitre and borax. The fcoria, on the first fufion, is common blue; on the second, green; and on the third, white, which is a mark of the purification being completed.

The most effectual means, however, of purifying silver, is by reviving it from luna cornes; because spirit of falt will not precipitate copper as it does silver. The silver may be recovered from luna cornes, by fusion with alkaline and inflammable fluxes; but, in these operations, some fofs is always occasioned by the diffusion of part of the volatile calx, before the alkali or metal can absorb its acid.

Mr. Margraaf has discovered a method of recovering the silver with little or no loss; mercury affiited by volatile falt, imbuing it by trituration without heat. One part of luna cornes, and two of volatile falt, are to be ground together in a glafs-mortar, with a much

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### Silver.

#### The attraction of lead.

Silver is purified and whitened externally by boiling it in a solution of tartar and common falt. This is no other than an extraction of the cuprous particles from the surface of the silver, by the acid of the tartar acuated by the common falt.

M. Berthollet has lately discovered a method of purifying the calx of silver a fulminating property, ting silver, and that much more terrible than fulminating gold itself. His receipt for making it is, 

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CHEMISTRY. Practice.

Silver.

It has been informed how the atoms came there, considering what we have just now related, "the portion touched by the hand fulminated, and of course that which fell upon the ground. A drop of water which fell upon this powder caused it to fulminate. A single grain of fulminating silver, which was in a glass cup, reduced the glass to powder, and pierced several dozen of paper.

If the volatile alkali, which has been employed with the above powder, be put into a thin glass matraps and boiled, then, on standing in the cold, small crystals will be found sublimed on the interior sides of the vesel, and covering the liquor. On touching one of these crystals the matraps will be burnt with considerate explosion.

The dangerous properties of this powder suggest the necessity of not preparing it but when the face is covered with a mask with glass eyes; and to avoid this rupture of the glass cups, it is prudent to dry the fulminating silver in small metallic vessels." To this we may add, that as the powder does not fulminate when wet, it may in that state be put up in very small quantities on paper, to be fulminated afterwards as occasion offers. This will perhaps account for the appearance of the few atoms abovementioned on the paper which the wind over Turned.

With regard to the case of this extraordinary fulmination we can say nothing satisfactory; the following curious fact is alligned by the antiphlogists; which at once shows the futility of their theories, and sets in a very ridiculous light the hard words with which they would obviate the science of chemistry.

"The oxygenous principle* (say they) unites with the hydrogenous principle† of the volatile alkali, and forms water in a vaporous state. This water (in a vaporous state) being infaunaneously thrown into a state of vapour, polluting elasticity and expansive force, is the principal cause of this phenomenon, in which the actoæ air which is detached from the volatile alkali, with its whole expansive power, has a great share."

But this, as well as other theories, in which elastic fluids are alleged to be the cause of the phlogiston, it is obvious to remark, that should we allow this to be the case, we are utterly at a loss to find a source of heat sufficient to rarefy the vapour to such a degree as is necessary for producing the effect ascribed to it. In the present cafe, we can scarce suppose a grain weight of metallic salt, already dry, to contain as much either of fire or water as is necessary to produce the effect; nor can we explain why the touch of any cold body, and which may be supposed to contain less fire than the salt itself, should produce such an effect. As to the oxygenous and hydrogenous principles, they were there before the touch, and ought to have produced their effects, not to mention that the water produced by them could not have amounted to the thousandth part of a grain. It is much more probable, therefore, that the whole is to be considered as an effect of electricity, though we cannot tell how the fluid comes here to be excited in such a violent manner.

§ 3. COPPER.

This is one of those metals which, from their destructibility by fire, and contragging rust in the air, are called imperfect. Of these, however, it is the most perfect and indestructible. It is of a reddish colour when pure; easily tarnishes in a moist air, and contracts a green rust. It is the most famous of all the metals, and the hardest and most elastic of all but iron. In some of its states, copper is as difficultly extended under the hammer as iron, but always proves softer to the file; and is never found hard enough to strike a spark with flint or other stones; whence its use for chiefls, hammers, hoops, &c. in the gunpowder works. When broke by often bending backwards and forwards, it appears internally of a dull red colour without any brightness, and of a fine granulated texture resembling some kinds of earthen ware. It is considerably ductile, though lefs so than either gold or silver; and may be drawn into wire as fine as hair, or beaten into leaves almost as thin as those of silver. The tenacity of its parts is very considerable; for a copper wire of 51⁄₄ of an inch diameter will support a weight of 399 pounds without breaking. The specific gravity of this metal, according to Dr Lewis, is that of water as 8.830 to 1.

Copper continues malleable when heated red; in which respect it agrees with iron; but is not, like iron, capable of being welded, or having two pieces joined into one. It requires for its fusion a stronger heat than either gold or silver, though less than that requisite to melt iron. When in fusion, it is remarkably impatient of moisture; the contact of a little water occasioning the melted copper to be thrown about with violence, to the great danger of the by-standers. It is, nevertheless, said to be granulated in the brass-work at Bristol, without explosion or danger, by letting it fall in little drops, into a large cistern of cold water covered with a brass-plate. In the middle of the plate is an aperture, in which is secured with Sturbridge clay a small vessel, whose whole capacity is not above a spoonful, perforated with a number of minute holes, through which the melted copper paffes. A stream of cold water paffes through the cistern. If suffered to grow hot, the copper falls liquid to the bottom, and runs into plates.

Copper, in fusion, appears of a blufh green colour, nearly like that of melted gold. Kept in fusion too long, it becomes gradually more and more brittle; but does not scorify considerably, nor lose much of its weight. It is much lefs destructible than any of the imperfect metals, being very difficulty subdued even by lead or bisnuth. If kept in a heat below fusion, it contracts on the surface thin powdery scales; which, being rubbed off, are succeeded by others, till the whole quantity of the metal is thus changed into a scoria or calx, of a dark reddish colour. This calx does not melt in the strongest furnace fires; but, in the focus of a large burning mirror, runs easily into a deep red, and almost opaque, glass. A flaming fire, and strong draught of air over the surface of the metal, greatly promote its calcination. The flame being tinged of a green, blufh, or rainbow colour, is a mark that the copper burns.

This metal is very readily fusible by almost all fuid substances; even common water, suffered to stand long in copper-vessels, extracts so much as to gain a coppery taffe. It is observable, that water is much more impregnated with this taffe, on being suffered to stand in the cold, than if boiled for a longer time in the vessel. The fame thing happens in regard to the mild vegetable acids. The confectioners prepare the most acid syrups, even those of lemons and oranges, by
CHEMISTRY.

Practice.

Copper.

by boiling in clean copper-vessels, without the preparations receiving any ill taste from the metal; whereas, either the juices themselves, or the syrups made from them, if kept cold in copper vessels, soon become impregnated with a disagreeable taste, and with the pernicious qualities of the copper.

1151 Altered by combination with vegetable acids.

By combination with vegetable acids, copper becomes in some respects remarkably altered. Verdigris, which is a combination of copper with a kind of acetic or tartaraceous acid, is partially soluble in distilled vinegar; the residuum, on being mixed with borax and linseed oil, yields a brittle metallic substance, of a whitish colour, not unlike bell-metal. The copper also, when revived from the diluted verdigris, was found by Dr. Lewis to be different from the metal before dissolution; but neither of these changes have yet been sufficiently examined.

Copper, in its metallic state, is very difficultly amalgamated with mercury; but unites with it more easily if divided by certain admixtures. If mercury and verdigris be triturated together with common salt, the amalgam is separated in the amalgamation, thus filled, are to be placed in a furnace sunk in the ground, the form of which is that of the frustum of a hollow cone. At the bottom of the furnace, or greater basins of the frustum, is a circular grate, or iron plate. This plate is covered with a coat of clay and horse-dung, to defend it from the action of the fire; and pierced with holes, through which the smoke and flame pass. The crucibles stand upon the circular plate, forming a circular row, with one in the middle. The fuel is placed between the crucibles, and is thrown into the furnace at the upper part of it, or the lesser basins of the frustum. To this upper part or mouth of the furnace is fitted a cover made of bricks or clay, kept together with bars of iron, and pierced with holes. This cover serves as a register. When the heat is to be increased, the cover must be partly or entirely taken off, and a free draught is permitted to the external air, which puffs along a vault under-ground to the air-hole, through which the air in the circular grate or plate, betwixt the crucibles, and through the upper mouth, along with the smoke and flame, into an area where the workmen stand, which is covered with a large dome or chimney, through which the smoke and air ascend. When the heat is to be diminished, the mouth of the furnace is closed with the lid; through the holes of which the air, smoke, and flame pass. The crucibles are to be kept red-hot during eight or ten hours; and in some places much longer, even several days, according to the nature of the calamine. During this time, the zinc rises in vapour from the calamine, unites with the copper, and renders that metal considerably more fusible than it is by itself. To render the metal very fluid, that it may flow into one uniform mass at the bottom, the fire is to be increased a little before the crucibles are taken out, for pouring off the fluid metal into moulds. From 60 pounds of good calamine, and 40 of copper, 60 pounds of brazes may be obtained, notwithstanding a considerable quantity of the zinc is dissipated in the operation. The quantity of brazes obtained has been considerably augmented since the introduction of the method now commonly practised, of granulating the copper; by which means a larger surface of this metal is exposed to the vapour of zinc, and consequently less of that vapour escapes. To make the finer and more malleable kinds of brazes, besides the choice of pure calamine and pure copper,
C H E M I S T R Y.

Iron.

Iron is a metal of a greyish colour; soon tarnishing in the air into a dusky blackish hue; and in a short time contracting a yellowish, or reddish rust. It is the hardest of all metals: the most elastic; and, excepting platinum, the most difficult to be fused.

Next to tenacity of gold, iron has the greatest tenacity of parts; an iron wire, the diameter of which is the tenth part of an inch, being capable of sustaining 450 pounds. Next to tin, it is the lightest of all the metals, losing between a seventh and eighth part of its weight when immersed in water. When very pure, it may be drawn into wire as fine as horse-hair; but is much less capable of being beaten into thin leaves than the other metals, excepting only lead.

Iron grows red-hot much sooner than any other metal; and this, not only from the application of actual fire, but likewise from strong hammering, friction, or other mechanical violence. It nevertheless melts the most difficulty of all metals except manganese and platinum; requiring, in its most fusible state, an intense, bright, white heat. When perfectly malleable, it is not fusible at all by the heat of furnaces, without the addition of the immediate contact of burning fuel; and, when melted, loose its malleability: all the common operations which communicate one of these qualities deprive it at the same time of the other, as its fusibility and malleability were in this metal incompatible. When exposed to the focus of a large burning mirror, however, it quickly fused, boiled, and emitted an ardent flame, the lower part of which was a true flame. At length it was changed into a blackish vitrified scoria.

From the great waste occasioned by exposing iron to a red but especially to a white heat, this metal appears to be a combustible substance. This combustion is maintained, like that of all other combustible substances, by contact of air. Dr. Hook, having heated a bar of iron to that degree called white heat, he placed it upon an anvil, and blew air upon it by means of bellows, by which it burnt brighter and hotter. Exposed to a white heat, it contracts a fémivitréous coat, which bursts at times, and flies off in sparkles. No other metallic body exhibits any such appearance. On continuing the fire, it changes by degrees into a dark red calx, which does not melt in the most vehement heat producable by furnaces, and, if brought into fusion by additions, yields an opaque black glass. When strongly heated, it appears covered on the surface with a soft vitreous matter like varnish. In this state, pieces of it cohere; and, on being
being hammered together, weld or unite, without discovering a juncture. As iron is the only metal which exhibits this appearance in the fire, so it is the only one capable of being welded. Those operations which prevent the superficial scoriification, deprive it likewise of this valuable property; which may be restored again, by suffering the iron to resume its vitreous aspect; and, in some measure, by the interposition of foreign vitreous matters, whilst none of the other metals will unite in the smallest degree, even with its own incrustation.

Iron expands the heat of all metals by heat. In the act of fusion, instead of continuing to expand, like the other metals, it shrinks; and thus becomes so much more dense, as to throw up such part as is unmeasured to the surface; whilst pieces of gold, silver, copper, lead, or tin, put into the respective metals in fusion, sink freely to the bottom. In its return to a consistent state, instead of shrinking like the other metals, it expands; sensibly rising in the vessel, and assuming a convex surface, while the others become concave. This property, first observed by Raumer, excellently fits it for receiving impregnations from moulds. By the increase of bulk which the metal receives in congelation, it is forced into the minutest cavities, so as to take the impregnation far more exactly than the other metals which shrink.

Iron is dissolved by all the metals made fluid, except lead and mercury. Though none of them act so powerfully upon it as gold; but, as Cramer observes, if the iron contains any portion of sulphur, it can scarcely be made to unite at all with gold.

Among the semimetallic bodies, it is averse to an union with mercury; no method of amalgamating these two having yet been discovered; though quicksilver, in certain circumstances, forms in some small degree to act upon it. A plate of tough iron, kept immersed in mercury for some days, becomes brittle; and mercury will often adhere to and coat the ends of iron petals used in triturating certain amalgams with saline lepidites. Mr. Jones has also discovered that by plunging iron, while heated to an intense white heat, into mercury, the latter will adhere to the surface of the iron, and completely filter it over.

Next to mercury, zinc is the most difficultly combined with iron; not from any natural indisposition to unite, but from the zinc being difficultly made to sublimate the heat requisite. The mixture is hard, somewhat malleable, of a white colour approaching to that of silver. Regulus of antimony, as soon as it melts, begins to act on iron, and dissolves a considerable quantity. If the regulus be fitted with a iron rod, it will melt off a part of it. Arsenic likewise easily mingles with iron, and has a strong attraction for it, foraking all the other metals to unite with this. It renders the iron white, very hard, and brittle.

This metal is the basis of the fine blue pigment, called, from the place where it was first discovered, Berlin or Prussian blue. This colour was accidentally discovered about the beginning of the present century, by a chemist of Berlin, who, having successfully thrown upon the ground several liquors from his laboratory, was much surprized to see it suddenly stained with a beautiful blue colour. Recollecting what liquors he had thrown out, and observing the same effects from a similar mixture, he prepared the blue for the use of painters; who found that it might be substituted to ultramarine, and accordingly have used it ever since.

Several chemists immediately endeavoured to discover the composition of this pigment; and in the year 1724 Dr. Woodward published the following process, in the Philosophical Transactions, for making it. Place together four ounces of nitre, and as much tartar as is directed for charcoal (no 779). Mix this alkaline well with four ounces of dried balloon blood; and put the whole in a crucible covered with a lid, in which there is a small hole. Calcine with a moderate heat, till the blood be reduced to a perfect coal; that is, till it emits no more smoke or flame capable of blackening any white bodies that are exposed to it. Increase the fire towards the end, so that the whole matter contained in the crucible shall be moderately, but sensibly, red.

"Throw into two pints of water the matter contained in the crucible, while yet red, and gave it half an hour's boiling: decant this first water; and pour more upon the black charry coal, till it becomes almost insipid. Mix together all these waters; and reduce them, by boiling, to about two pints.

"Dissolve also two ounces of martial vitriol, and eight ounces of alum, in two pints of boiling water. Mix this solution when hot with the preceding lixivium also hot. A great effervescence will then be made: the liquors will be rendered turbid; and will become of a green colour, more or less blue; and a precipitate will be formed of the same colour. Filtrate, in order to separate this precipitate; upon which pour the spirit of salt, and mix them well together; by which means the precipitate will become of a fine blue colour. It is necessary to add rather too much of the salt than too little, and till it no longer increases the beauty of the precipitate. The next day wash this blue, till the water comes off from it insipid; and then gently dry it."

Mr. Geoffroy was the first who gave any plausible theory of this procels, or any rational means of improving it. He observes, that the Prussian blue is no other than the iron of the vitriol rendered by the inflammable matter of the alkaline lixivium, and perhaps a little brightened by the earth of alum; that the green colour proceeds from a part of the yellow ferruginous clax, or ochre, unreceived, mixing with the blue; and that the spirit of salt dissolves this ochre more readily than the blue part; though it will dissolve that also by long standing, or if used in too large quantity. From these principles, he was led to increase the quantity of inflammable matter; that there might be enough to revive the whole of the ferruginous ochre, and produce a blue colour at once, without the use of the acid spirit. In this he perfectly succeeded; and found, at the same time, that the colour might be rendered of any degree of depth and lightness, at pleasure. If the alkali is calcined with twice its weight of dried blood, and the lixivium obtained from it poured into a solution of one part of vitriol to six of alum, the liquor acquires a very pale blue colour, and deposits as pale a precipitate. On adding more and more of a fresh solution of vitriol, the colour becomes deeper and deeper, almost to blackness.

He imagines, with great probability, that the blue pigment, thus prepared, will prove more durable in the air, mingle more perfectly with other colours, and be
CHURCH

An amusing phenomenon in the preparation.

Mr Macquer's theory.

By a more particular examination, he found, that the alkali might become perfectly saturated with the colouring matter; so that, when boiled on Prussian blue, it extracted none of its colour. When the salt was thus perfectly saturated, it seemed no longer to possess any alkaline qualities. If poured into a solution of iron in any acid, a fingle, homogeneous, and perfect precipitate, was formed; not green, as in Dr Woodward's processes, but a perfect Prussian blue; which needed no acid to brighten its colour. A pure acid added to the alkali was not in the least neutralized, nor in the least precipitated the colouring matter. From hence Mr Macquer concludes, that in the making of Prussian blue, vitriol is decomposed; because the iron has a strong attraction for the colouring matter, as well as the acid for the alkali; and the sum of the attraction of the acid to the alkali, joined to that of the iron for the colouring matter, is greater than the single attraction of the acid to the metal.

Another very important phenomenon is, that earths have not the same attraction for this colouring matter that metallic substances have. Hence, if an alkali saturated with this colouring matter be poured into a solution of alum, no decomposition is effected, nor any precipitate formed. The alum continues to form, and the alkali remains unchanged. From this experiment Mr Macquer concludes that alum does not directly contribute to the formation of the Prussian blue. The purpose he think it answers is as follows. Fixed alkaline salts can never be perfectly saturated with phlogistic matter by calculation; alkalis, therefore, though calcined with inflammable substances, so as to make a proper lixivium for Prussian blue, remain still alkaline. Hence, when mixed with a solution of green vitriol, they form, by their purely alkaline part, a yellow precipitate, so much more copious, as the alkali is less saturated with phlogiston. But nothing is more capable of spoiling the fine colour of the Prussian blue, than an admixture of this yellow precipitate; it is therefore necessary to add a quantity of alum, which will take up the greatest part of the purely alkaline salt, and of consequence the quantity of yellow feruginous precipitate is much diminished. But the earth of alum, being of a fine shining white, does not in the least alter the purity of the blue colour, but is rather necessary to dilute it. From all this it follows, that it is a matter of indifference whether the green precipitate is to be again dissolved by an acid, or the alkali part of the lixivium saturated with alum or with an acid, before the precipitate is formed. The latter indeed seems to be the most eligible method.

Most alkalies obtained from the ashes of vegetables, blue precipitate, being combined, by their combustion, with a portion durable of inflammable matter, are capable of furnishing a quantity of Prussian blue, proportional to the quantity of colouring matter they contain, even without the necessity of mixing them with a solution of iron; because they always contain a little of this metal dissolved, some of which may be found in almost all vegetables; therefore it is sufficient to saturate them with an acid. Hencel observed the precipitation of this blue in the faturation of the sullie alkali, and recommended to chemists to inquire into its nature.

The theories of Geoffroy, Macquer, &c. however, with respect to Prussian blue, have now given place to discoveries of Mr Scheele, who has examined the substance with the utmost care, and found the colouring matter to consist of an extremely volatile substance, capable of uniting with and neutralizing alkalies, but easily expelled from them by any other acid, even by that of fixed air. He begins his dissertation on this subject by observing, that the solution of alkali calcined with vitriol is deprived of all the green matter, which he calls lixivium fanguinis, by exposure to the air, loses its property of precipitating the iron of a blue colour; and that the precipitate thus obtained is entirely soluble in the acid. In order to determine whether the air had thus undergone any change, he put some newly prepared lixivium into a flas of vitriol well sealed with rosin; but after some time finding no change on the lixivium, or on the air contained in the vessel, he began to think that this might be occasioned by the absence of fixed air, which always abounds in the open atmosphere, though not in any confined portion of it, at least in an equal proportion. Having therefore filled a glass vessel with fixed air, he poured into it a little lixivium fanguinis; and next day found, that it threw down from green vitriol a precipitate entirely soluble in acids. With other acids he obtained no precipitate.

On inverting the experiment, and mixing some green vitriol with lixivium fanguinis, the mixture grew yellow; and he found this addition capable of fixing the colouring matter so that neither the acid of fixed air nor any other could expel it from the alkali. For having poured the mixture abovementioned into a solution of green vitriol, and afterwards super saturated the
the lixivium with acid, he obtained a considerable quantity of blue. To the same lixivium sanguinis, in which a small quantity of green vitriol was dissolved, he afterwards added of the other acids somewhat more than was necessary for its saturation; and though this was done, a considerable quantity of Prussian blue was afterwards obtained. Again, having precipitated a solution of green vitriol with alkali, and boiled the precipitate for some minutes in lixivium sanguinis, part of it was dissolved; the filtered lixivium underwent no change when exposed to the open air or to the aerial acid, and precipitated the solution of vitriol of a blue; and though the lixivium was supersaturated with acid, and some green vitriol added, a very beautiful Prussian blue was obtained. This, however, will not hold when a perfectly dephlogisticitated calx of iron is employed, of which none can be dissolved by the lixivium sanguinis; nor will any Prussian blue be obtained by precipitating with lixivium sanguinis a perfectly dephlogisticitated solution of iron in nitrous acid.

To determine what had become of the colouring matter in those experiments where it seemed to have been dissipated, some lixivium sanguinis was poured into a vessel filled with aerial acid. It was kept well corked during the night, and next day a piece of paper dipped in a solution of green vitriol was fixed to the cork, pencilling it over with two drops of a solution of alkali in water. The paper was thus soon covered with precipitated iron; and on being taken out two hours afterwards, and dipped in muriatic acid, became covered with most beautiful Prussian blue. The same thing happened when lixivium sanguinis supersaturated with vitriolic acid was employed; for in this case also the air was filled with the colouring matter capable of being in like manner absorbed by the calx of iron. But though from these experiments it is plain that acids expel this colouring substance from the lixivium, a given quantity of air is only capable of receiving a certain quantity of it; for the same mixture removed into another vessel imparts the colouring property to the air it contains according to its quantity. On putting perfectly dephlogisticitated calx of iron in water, no Prussian blue was formed; but the muriatic acid dissolved the calx in the water.

Our author having now assured himself that acids really attract the alkali more than the colouring matter, proceeded to try the effects of distillation. Having therefore supersaturated some lixivium sanguinis with vitriolic acid, he distilled the mixture in a glass retort with a gentle fire. When about one-third had passed over, he changed the receiver, and continued the operation till one-half was distilled. The first product had a peculiar taste and smell; the air in the receiver was filled with colouring matter, and the aqueous fluid was also strongly impregnated with it, as appeared by its forming a fine Prussian blue with phlogisticated calx of iron. Part of it being exposed to the open air for some hours, entirely lost its power, and the product of the second operation was no other than water mixed with a little vitriolic acid.

The next step was to procure, if possible, the colouring matter by itself; and this he attempted to obtain from the Prussian blue, rather than the lixivium sanguinis, as he would thus not only avoid the troublesome calculation of the alkali and blood, but obtain the colouring matter in much larger quantity than could be done from the lixivium. On examining several kinds of this pigment, he found in them evident marks of sulphur, volatile alkali, vitriolic acid, and volatile sulphureous acid; all of which substances are to be found in the lixivium sanguinis as well as in that of foot-leaves; and adhere to the precipitate in the preparation of Prussian blue. Finding, however, that he could not obtain his purpose by any kind of analysis of these by fire alone, he had recourse to a neutral salt used by chemists for discovering iron in mineral waters. This salt is formed by digesting caustic fixed alkali on Prussian blue, which effectually extracts the colour from it even in the cold, in a very short time, and being neutralized, may easily be reduced into a dry form. But it is not entirely to be depended upon for this purpose; for it always contains some iron which, indeed, is the medium of its connection with the alkali. The lixivium sanguinis is preferable, though even this contains some iron, as well as the lixivium of foot-leaves; our author’s experiments, however, were made with the neutral salt, for the reason already mentioned.

An ounce of the salt was dissolved in a glass retort in four ounces of water, afterwards adding three drachms of concentrated vitriolic acid; and the mixture was distilled with a gentle fire. The mass grew thicker as soon as it began to boil; from a great quantity of Prussian blue, a quantity of the colouring matter appeared by the smell to penetrate the lixivium; and part of it was absorbed by the air in the receiver, as in former experiments. The distillation was continued till about an ounce had passed into the receiver. The blue mass remaining in the retort was put into a filter, and a piece of green vitriol put into the liquid which passed through; but by this left no Prussian blue was produced. The blue which remained in the filter was again treated with lixivium tartar: the solution freed from its ochre by filtration, and the clear liquor committed a second time to distillation with vitriolic acid. Prussian blue was again separated, though in smaller quantity than before, and the colouring matter came over into the receiver. After one third of the matter had passed over, that which had been obtained in the first distillation with the salt was now added to it, the Prussian blue was separated from the lixivium in the retort, and extracted a third time. Some Prussian blue was formed again, though in much smaller quantity; whence it is apparent that Prussian blue may at last be totally decomposed by means of alkali. Lime, or terra pondersa, likewise extracts the blue colour, and shews the same phenomena as alkali.

With volatile alkali a compound, consisting of the colouring matter, iron, and colouring matter, is formed, which shows the same phenomena with that formed with fixed alkali. By distillation per se after it has been volatile alkali. By distillation per se after it has been volatile alkali. By distillation per se after it has been volatile alkali. By distillation per se after it has been volatile alkali. By distillation per se after it has been volatile alkali.
As in all the operations with vitriolic acid hitherto mentioned he made on metals, and which we are now about to describe, it was found necessary to deprive the colouring matter, of that vitriolic taint.

The precipitating liquor abovementioned, poured on metallic solutions, produces the following appearances by means of double elective attraction. 1. Gold precipitated by acerated alkali becomes white. 2. The fixed air is difengaged from a precipitate of silver with a flight effervescence. 3. Calx of mercury is dissolved, and yields crystals by gentle evaporation. 4. The calx of copper precipitated by acerated alkali effervesces, and assumes a faint citron colour. 5. Calx of iron precipitated from its solution in the vitriolic acid by the same alkali, effervesces, and assumes a dark blue colour. 6. Precipitated cobalt shows some signs of effervescence, and changes into a yellowish brown colour. The other calces are not acted upon.

The precipitating liquor abovementioned, poured on metallic solutions, produces the following appearances by means of double elective attraction. 1. Gold precipitated by a white colour, but by adding a superabundant quantity of the precipitating liquor the calx is redissolved. The second solution is colourless as water. 2. Silver is precipitated in form of a white substance of the consistence of cheese; by adding more of the liquor the precipitate is redissolved, and the solution is not decomposed either by sal-ammoniac or marine acid. 3. Corrosive sublimate apparently undergoes no change, though it is in reality decomposed; the calx being dissolved in the colouring matter. Mercury dissolved in the nitrous acid without heat, is precipitated in form of a black powder. 4. The solutions of tin and bismuth are precipitated, but the calx is not acted upon by the colouring matter. 5. The same effects are produced on the solution of butter of antimony, as well as on that of well digested calx of iron. 6. Blue vitriol is precipitated of a yellow citron colour; if more of the precipitating liquor be added, the precipitate is redissolved into a colourless liquid and a colourless solution of the same calx is likewise obtained by volatile alkali. On adding more of the solution of blue vitriol, the solution likewise disappears, and the liquor assumes a green colour. Acids dissolve a portion of this precipitate, and the remainder is white. The nitrate of mercury dissolves the precipitate completely, but lets it fall again on the addition of water. 7. The solution of white vitriol yields a white precipitate, which is not redissolved by addition of the precipitating liquor, but is soluble in acids. These solutions, like the colouring matter, which may be separated from them by distillation. 8. Green vitriol is precipitated first of a yellowish brown colour, which soon changes to green, and then becomes blue on the surface. Some hours afterwards the precipitate subides to the bottom of the vesicles, and then the whole mixture turns blue; but on adding any acid the precipitate becomes instantly blue. If a very small quantity of green vitriol be put into the precipitating liquor, the
Investigation of the constituent parts of the colouring matter itself; and in this he succeeded in such a manner as must do honour to his memory, at the same time that it promises to be a real and lasting improvement to science, by showing a method of preparing this valuable pigment without that nauseous and horrid ingredient, blood, which is now used in great quantities for that purpose. — His first hint concerning this matter seems to have been taken from an observation of the air in his receiver accidentally taking fire from the neighbourhood of a candle. It burned without any explosion, and he was able to inflame it several times successively. Wishing to know whether any fixed air was contained in the colouring matter, he filled a retort half full of the liquor containing the colouring matter, and applying a receiver immediately after, gave the retort a brisk heat. As soon as the receiver was filled with thick vapours of the colouring matter, he disjoined it, and, inflaming the vapour by a little burning sulphur introduced into the cavity, found that the air which remained threw down a precipitate from lime-water. Hence (says he) it may be concluded, that the aerial acid and phlogiston exist in this colouring matter."

It has been ascertained by several chemists, that Prussian blue by distillation always yields volatile alkali. To determine this, Mr. Scheele prepared some exceeding pure from the precipitating liquor abovementioned and green vitriol; distilling it afterwards in a flask retort, to which he adapted a receiver containing a little distilled water. The operation was continued till the retort became red-hot. In the receiver was found the colouring matter and volatile alkali, but no oil; the air in the receiver was impregnated with aerial acid, and the same colouring matter; the residuum was very black, and obeyed the magnet. On sublimating, instead of the Prussian blue, the precipitates of other metallic substances precipitated by the Prussian alkali, the results were:

1. The yellowish brown precipitate of cobalt yielded the same products with Prussian blue itself; the residuum in the retort was black.

2. The yellow precipitate of copper took fire, and emitted, from time to time, sparks during the distillation. It produced little colouring matter, but a greater quantity of aerial acid and volatile alkali than had been obtained by the former precipitates. A sublimate arose in the neck of the retort, but in too small a quantity to make any experiment; the residuum was reduced copper.

3. The precipitate of zinc yielded the same with Prussian blue.

4. That of silver yielded likewise volatile alkali and fixed air, but chiefly colouring matter; a sublimate containing some silver arose into the neck of the retort; the residuum was reduced silver.

5. Calx of mercury crystallized by means of the colouring matter, yielded some of that matter, but scarce any mark of volatile alkali. Some mercury, with a portion of the original compound, arose in the neck of the retort.

From these experiments Mr. Scheele concluded, that the colouring matter of Prussian blue was composed of volatile alkali and an oily matter. He was confirmed in his conjecture, by obtaining Prussian blue from green vitriol and spirit of hartshorn recently distilled on the addition of muriatic acid. The same product was obtained by means of the volatile spirit drawn from ox's blood; so that nothing now remained, but to imitate these natural processes by artificially combining the two ingredients together. For Unsuccessful this purpose he distilled a mixture of volatile fat alkali and unctuous oil; a mixture of the same alkali with animal fat, and with oil of turpentine; a mixture of quick-lime, sal ammoniac, and a mixture with others of a similar kind; but in vain. He began therefore to conclude, that as long as the volatile alkali contained any water, it could not enter into an union sufficiently intimate with the other principles to form the colouring matter; and finding also that the coal of blood, mixed with salt of tartar, yielded very good lixivium sanguinis, he concluded that no oily matter was necessary for the success of the experiment. Thus was our author led to make the following decisive trials, which on accomplishing his design and purpose, and showed the truth of the principles he had formed it assumed. Three table-spoonfuls of charcoal powder were mixed with an equal quantity of salt of tartar, and the mixture put into a crucible. A similar mixture was put into another crucible, and both put into a fire, and kept red-hot for about a quarter of an hour. One of them was then taken out, and the contents thrown, while perfectly red-hot, into eight ounces of water. At the same time he put into the other quantity an ounce of sal ammoniac in small pieces, agitating the whole briskly together, and taking care at the same time to push the sal ammoniac down towards the bottom of the crucible, which he replaced in the fire. Observing in two minutes afterwards, that no ammoniacal vapours arose, the whole mass was thrown, when red-hot, into eight ounces of water. The former lixivium, into which no sal ammoniac had been put, yielded no Prussian blue; but the latter showed the same phenomena with the best lixivium sanguinis, and produced a great quantity of blue. By mixing plumbago with the alkali instead of charcoal, a tolerable lixivium was obtained.

"From these experiments (says Mr. Scheele), it appears, that the volatile alkali is capable of uniting with the carbonaceous matter, after it has been converted into the strongest heat; that it thus acquires the remarkable property of combining so firmly with salt of tartar as to be able to sustain the most violent degree of heat; and when this lixivium is dissolved in water, there is obtained lixivium sanguinis, as it is called. It is now easy to explain what happens in the distillation."

(A) This reasoning seems not to be sufficiently conclusive; for late experiments have shown that inflammation is generally attended with the production of fixed air, which could not be proved to have an existence either in the materials or common atmosphere before.
Iron: 1203
Appearance.
In the diffilution of Prussian blue, for instance, the calx of iron attracts a portion of phlogiston from the colouring matter. The aerial acid being thus difengaged, must go over into the receiver with the volatile alkali, which is not free at the flame, but as the calx of iron in the heat of this diffilution cannot unite with more phlogiston, a portion of the colouring matter, not decomposed, must likewise arise. If the calx of iron could combine with the whole of the phlogiston, there would come nothing over into the receiver but aerial acid and volatile alkali. In order to prove this, I distilled a mixture of six parts of manganese finely powdered, and one part of pulverized Prussian blue, and obtained nothing but aerated volatile alkali, without the least mark of colouring matter.

Coloured matter kept from rising by manganese. The colouring matter may probably be obtained in an aerial form, though he had not been able to do so. It is also worth notice, that, excepting the solutions of silver and mercury in nitrous acid, the colouring matter of Prussian blue is not able to decompose any other by a single elective attraction. Now, as we know that Prussian blue is not soluble in acids, it naturally follows, that the colouring matter has a greater affinity with iron than acids have; notwithstanding there is no precipitation perceived when this matter is mixed with the solution of vitriol of iron. "It may not be easy (says Mr Scheele) to give a satisfactory explanation of this phenomenon."

Nitric acid.
Iron dephlogitizes with nitric acid, and renders the salt alkaline and caustic. A part of the iron is thus rendered soluble, along with the alkalized salt. A mixture of equal parts of iron fillings and nitric acid, injected into a strongly heated crucible, and, after the detonation, thrown into water, tinges the liquor of a violet or purplish blue colour. This solution, however, is not permanent. Though the liquor at first pales through a filter, without any separation of the iron; yet, on standing for a few hours, the metal falls to the bottom, in form of a brick-coloured powder. Volatile alkalies instantly precipitate the iron from this fixed alkaline solution.

Iron filings and sulphur take fire spontaneously.
Iron readily unites with sulphur; and when combined with it, proves much easier of fusion than by itself. A mixture of iron filings and sulphur, moistened with water, and pressed down close, in a few hours swells and grows hot; and, if the quantity is large, bursts into flame.

By cementation with inflammable matters, iron imbibles a larger quantity of phlogiston; and becomes much harder, less malleable, and more fusible. It is then called lead. See Metallurgy, and Steel.

§ 5. Lead.

Lead is a pale or livid-white metal, soon losing its brightness in the air, and contrasting a blackish or greyish ash-colour. It is the softest and most flexible of all metallic bodies; but not ductile to any great degree, either in the form of wire or leaf; coming far short, in this respect, of all other metals. It has also the least tenacity of all metallic bodies; a leaden wire of \( \frac{y}{4} \) of an inch diameter being capable of supporting only 29\( \frac{1}{4} \) pounds. Lead has, however, a considerable specific gravity; losing, when immersed in water, between \( \sqrt{3} \) and \( \sqrt{5} \) of its weight. It is of all metals the most fusible, excepting only tin and bismuth. The sheen lead. plumbers cast thin sheets of lead upon a table or mould, covered with a woollen, and above this with a linen cloth, without burning or scorching the cloths. The melted lead is received in a wooden cauld without a bottom; which being drawn down the sloping table by a man on each side, leaves a sheet of its own width, and more or less thin according to the greater or less celerity of its defect. For thick plates, the table is covered over with moistened sand, and the liquid metal conducted evenly over it, by a wooden strike, which bears on a ledge at each side.

Some have preferred, for mechanic ufe, the milled Advanta-lead, or flatted sheets, to the cauld; as being more equal, eqs of milled lead smooth, and solid. But whatever advantage of this kind the milled form may appear to have at first, they are not found to be very durable. When the lead is stretched between the rollers, its cavities must necessarily be enlarged. The particles of metal that may be squeezeed into them can have no union or adhesion with the contiguous particles; and of consequence, must be liable, from bending, blows, jars, &c. to start out again, and leave the mafs spongy and porous.

Lead yields the dulcet and weakb least found of all mætallic bodies. Reaumer observes, that it is rendered fo-sonorous by casting a small quantity into a spherical or elliptical segment, as in the bottom of an iron-ladle; from hence he conjectures, that the sound of the fonorous metals might be improved for the bells of clocks, &c. by giving them a familiar form.

Though this metal very soon lofes its lucre, and tarnishes in the air, it refists much longer than iron or copper the combined action of air and water, before it is decomposed or destroyed; and hence it is exceedingly useful for many purposes to which these metals can by no means be applied. When jult become fluid, Calcined. lead looks bright like quicksilver; but immediately contracts a variously coloured pellicle on the surface. If this is taken off, and the fire continued, a fresh pellicle will always be formed, till the metal is by degrees changed into a dusty powder or calx. The injection of a little fat, charcoal-powder, or other inflammable matter, prevents this change, and readily revives the calx into lead again. It is said, that lead, recovered from its cakcs, proves somewhat harder and whiter than at first, as well as less subject to tarnish in the air.

The blackish calx or ashes of lead become of a very Minium. different appearance if the calcination is continued with a fire to moderate as not to melt them, and particularly if exposed to flame. By this treatment it is said that they become fift yellow; then they are called mafficot or yellow lead. This colour becomes gradually more and more intense, till at last the calx is of a deep red; and then is called minium or red lead; but it is certain, that by proper management this calx never becomes yellow, assuming a reddish colour from the beginning. Too great a heat makes it irrecoverably yellow. It can be more easily prepared without exposure
Practice.

Lead. Exposure to the flame. The degree of heat necessary for converting it into unison is between 600 and 700 of Fahrenheit.

Litharge. If instead of keeping this calx in a continued moderate heat, it be suddenly put in the matter then takes on a solid appearance, changing to a dull kind of brick-colour when powdered, and is then called litharge. Most of this substance is produced by refining silver with lead (see Refining); and is of two kinds, white and red. These two are distinguished by the names of litharge of gold, and litharge of silver. The most perfect is that called litharge of gold: the pale fort contains a considerable proportion of lead in its metallic state; and even the highest coloured litharge is seldom free from a little metallic lead, discoverable and separable by melting the mass in a crucible; when the lead subsides to the bottom.

Lead mingles in fusion with all the metals except iron, with which it refuses any degree of union as long as the lead preserves its metallic form. On continuing the fire, the lead, scorifying or calcining, absorbs the phlogistic principle of the iron, and consequently promotes the calcination of that metal; both being at length reduced to calces. The fusible calx of lead easily unites with the calx of iron, and both melt together into an opaque brown or blackish glass. Copper does not unite with melted lead till the fire is raised so high as to make the lead smoke and boil, and of a bright red heat. Pieces of copper, now thrown in, soon dissolve and disappear in the lead: the mixture, when cold, is brittle, and of a granulated texture. The union of these two metals is remarkably slight. If a mixture of copper and lead and is exposed to a fire no greater than that in which lead melts, the lead almost entirely runs off by itself; a separation of which no other example is known. What little lead is retained in the pores of the copper, may be scorified, and melted out, by a fire considerableness less than is sufficient to fuse copper. If any of the copper is carried off by the lead, it swins unmelted on the surface.

Gold and silver are both dissolved by lead in a flight red heat. They are both rendered extremely brittle by the minutest quantity of this metal; though lead is rendered more ductile by a small quantity of either of them. In copellation, a portion of lead is retained by gold, but silver parts with it all. On the other hand, in its elusion from copper, if the copper contains any of the precious metals, the silver will totally melt out with the lead, but the gold will not. The attraction of lead to copper, however slight, is greater than that of copper to iron: a mixture of copper and iron being boiled in melted lead, the copper is imbibed by the lead, and the iron thrown up to the top. Silver is in like manner imbibed from iron by lead; whilst tin, on the contrary, is imbibed from lead by iron. If two mixtures, one of lead and tin, and another of iron and silver, are melted together, the result will be two new combinations, one of the tin with the iron at the top, the other with the lead and silver at the bottom: how carefully forever the matter be stirred and mixed in fusion, the two compounds, when grown cold, are found distinct, so as to be parted with a blow. This metal is soluble in alkaline liquor and expref-

CHEMISTRY.

Tin. Soluble in alkalies and oils.

§ 6. Tin.

The colour of this metal resembles silver, but is somewhat darker. It is fusible, less elastic, and sonorous, than any other metal except lead. When bent backwards and forwards, it occasions a crackling sound, as if torn asunder. It is the lightest of all the malleable metals, being lighter than very few times specifically heavier than water. The tenacity of its parts also is not very considerable; a tin wire of of an inch diameter being able to support only 142 pounds.

Tin is commonly reckoned the least ductile of all metals except lead; and certainly is so, in regard to ductility into wire, but not in regard to extensibility into leaves. These two properties seem not to be so much connected with one another as is generally imagined. Iron and steel may be drawn into very fine wire, but cannot be beat into leaves. Tin, on the other hand, may be beat into very thin leaves, but cannot be drawn into wire: gold and silver possess both properties in a very eminent degree; whilst lead, notwithstanding its flexibility and softness, can not be drawn into fine wire, or beat into thin leaves. It melts the most easily of all the metals; about the 430th degree of Fahrenheit's thermometer. Heated till almost ready to melt, it becomes so brittle that large blocks may be easily beat to pieces by a blow. The purer fort, from its facility of breaking into long shapen pieces, is called grain-tin. Melted, and plainly agitated at the infant of its beginning to congeal, it is reduced into small grains or powder.

With the heat necessary for fusion, it may also be calcined; or at least so far deprived of its phlogiston as to appear in the form of a grey calx, which may be entirely reduced to tin by the addition of inflammable matter. The calcination of tin, like that of lead, begins by the melted metal losing its brightness, and contracting a peculiar tinge on its surface. If the fire is raised to a cherry-red, the pellicle swells and bursts, discharging a small bright flame of an arscenic smell. By longer continuance in the fire, the metal is converted first into a greyish, and then into a perfectly white calx, called putty, which is used for polishing glasses and other hard bodies.

The calx of tin is the most refractory of all others. Even in the focus of a large burning mirror, it only softens a little, and forms crystalline filaments. With

Clads

Eds
CHEMISTRY.

Practice.

Tin. - glafs of bismuth, and the simple and arsenificated glafs of lead, it forms opaque milky compounds. "By this property it is fitted for making the basis of the imperfect glafs called enamels; (see glass and enameled)." The author of the Chemical Dictionary relates, "that having exposed very pure tin, finely to a fire as strong as that of a glafs-house furnace, during two hours, under a muffle, in an uncovered teft, and having then examined it, the metal was found covered with an exceedingly white calx, which appeared to have formed a vegetation; under this matter was a reddish calx, and a hyacinthin glafs; and laftly, at the bottom was a piece of tin unaltered. The experiment was several times repeated with the fame success.

Henckel discovered a method of separating tin, which may possibly arise from its arsenic, by slowly dissolving the tin in eight times its quantity of an aqua-regia made with quicksilver and tin, and forming the solution to evaporate in a gentle warmth: the arsenic begins to crystallize while the liquor continues hot, and more plentifully on its growing cold, into white crystals. M. Margraaf, in the Berlin Memoirs for 1746, has given a more particular account of this process. He observes, that the white sediment which at first separates during the distillation is chiefly arsentic; that Malacca tin, which is accounted one of the purest sorts, yielded less than 7th its weight of arsentic crystals; that some sorts yielded more; but that tin extricated from a particular kind of ore, which contained no arsenic, afforded none. That the crystals were truly arsentic, and appeared from their being totally volatile; from their subliming (a kind of ore, which contained no arsenic, afforded none. That the crystals were truly arsentic, and appeared from their being totally volatile; from their subliming (a kind of ore, which contained no arsenic, afforded none.)

Nitre dissagrates with tin, and hastens the calcination of this as well as of other imperfect metals. The vapours which rise from tin, by whatever method it is calcined, have generally an arsentic smell. Tin melted with arsentic falls in great part into a white calx: the part which remains uncalsced proves very brittle, appears of a white colour, and a sparkling plated texture, greatly resembling zinc. The arsentic is strongly retained by the tin, so as scarcely to be separable by any degree of fire; the tin always discoveries, by its augmentation in weight, that it holds a portion of arsentic, though a very intense fire has been used. Hence, as the tin ores abound in arsentic, the common tin, is found also to participate of that mineral.

Hence, an easy method of purifying silver from tin.

Tin notwithstanding it is, like lead, soon deprived of its lustre by exposure to the air, is nevertheless much less liable to rust than either iron, copper, or lead; and hence is advantageously used for covering over the insides of other metallic vessels. The amalgam of mercury and tin is employed to cover one of the surfaces of looking-glaes; by which they are rendered capable of reflecting the rays of light. The amalgam also, mixed with sulphur and sal ammoniac, and fitted to sublimate, yields a sparkling gold-coloured substance called aurum molaeicum; which is sometimes used as a pigment. This preparation is commonly made from quicksilver and tin, of each two parts, amalgamated together; and then thoroughly mixed with sulphur and sal ammoniac, of one each part and a half. The mercury and sulphur unite into a cinnabar, which sublimes along with the sal ammoniac; and, after sublimation, the aurum molaeicum remains at the bottom.

§ 7. Mercury or quicksilver.

Mercury is a fluid metallic substance, of a bright silver colour, resembling lead or tin when melted; entirely void of taste and smell; extremely divisible; and congealable only in a degree of cold very difficultly produced, in this country, by art (see cold and congealation). It is the most ponderous of all fluids, its density being to that of water nearly as 14 to 1. It is found to be specifically heavier in winter than in summer by 25 grains in 11 ounces.

Neither air nor water, nor the united action of these two, seem to make any impression upon mercury: nor is it more susceptible of rulf than the perfect metals. Its surface, nevertheless, is more quickly tarnished than gold or silver; because the dust which floats in the air, quickly seizes on its surface. The watery vapours also, which float in the air, seem to be attracted by mercury.

From these extraneous matters, which only slightly adhere to it, mercury may be easily cleansed by purifying it through a clean new cloth, and afterwards heating it: but if mixed with any other metals, no separation can be effected without distillation. In this process, a small portion of some of the metals generally arises along with the mercury. Thus, quicksilver
Practice.

Mercury or quicksilver.

Ver distilled from lead, bismuth, or tin, appears less bright than before; stains paper black; sometimes exhibits a film upon the surface; and does not run freely, or into round globules. Mr Boyle relates, that he has observed the weight of mercury sensibly increased by distillation from lead, and this when even a very moderate fire was made use of. By amalgamation with Telluric regula of antimony, and then digested after a few hours digestion, mercury is said to become, by a few repetitions of the process, more ponderous, and more active. The animated, or philosophic mercury of some of the alchemists, are supposed to have been mercury thus prepared. By the same, or similar processes, seem to have been obtained the curious mercury which Boyle declared he was possessed of, and made himself; which were "considerably heavier in specie than common quicksilver, dissolved gold more readily,—grew hot with gold, so as to be offensive to the hand, and elevated gold in distillation." When quicksilver is to be distilled, it is proper to mingle it with a quantity of iron-flings; which have the property of making it much brighter than it can be otherwise obtained, probably by furnishing phlogiston.

By digestion in a strong heat for several months, mercury undergoes a considerable alteration, changing into a powder, at first ash-coloured, afterwards yellow, at length of a bright red colour, and an acrid tafte; and is then called mercurius precipitatus per fe. In this last state it proves similar to the red precipitate, formed in a solution of mercury in nitrous acid. This calx proves less volatile in the fire than the mercury in its fluid state. It supports for some time even a degree of red heat. In the focus of a burning mirror, it is said to melt into glass when laid upon a piece of charcoal, and to revive into running mercury before it exaltes. Evaporated by common fire, it leaves a small portion of a light brown powder; which, Boerhaave relates, bore a blast-heat; swelled into a spongy mass; formed with borax a vitreous friable substance; but vanished in cupellation. By a long continued digestion in a gentle heat, mercury suffers little change. Boerhaave digested it in low degrees of heat, both in open and close vessels, for 15 years together, without obtaining any other reward for his labour than a small quantity of black powder; which, by triturating, was quickly revived into running mercury. Conflant triturum, or agitation, produces a change similar to this in a short time. Both the black and red powders, by bare exposure to a fire sufficient to elevate them, return into fluid mercury. The red powder has been revived by simply grinding it in a glass mortar.

In like manner, quicksilver remains unchanged by distillation. Boerhaave had the patience to distil 18 ounces of mercury upwards of 500 times over, without observing any other change than that its fluidity and specific gravity were a little increased, and that some grains of a fixed matter remained. The vapours of mercury, like those of all other volatile bodies, cause violent explosions if confined. Mr Hellest gives an account of his being present at an experiment of this kind: a person pretending to fix mercury, had enclosed it in an iron box closely walled. When the mercury was heated, it burst the box, and dissipated mercury invisibly into the air.

Mercury dissolves or unites with all metallic bodies, except three, viz. iron, arsenic, and nickel: in some cases it will absorb metals, particularly gold and silver, amalgamated with their solutions in acids or alkalies; but does not act upon any metal when combined with sulphur, nor precipitates made by alkalis, nor on calces by fire. Whatever metal it is united with, it constantly preserves its own white colour. It unites with any proportion of those metallic substances with which it is capable of being combined; forming, with different quantities, amalgams of different degrees of consti'cutence. From the fluid ones, greatest part of the quicksilver may be separated by colature. Bismuth is so far attenuated by mercury, as to pass through leather with it in considerable quantity. It also promotes the action of quicksilver upon lead to a great degree; so that mercury united with $\frac{1}{2}$, or $\frac{1}{6}$ of its weight of bismuth, dissolves many of lead in a gentle warmth, without the agitation, triturum, comminution, or melting heat necessary to unite pure mercury with lead. From these properties, this solution of bismuth in mercury becomes a proper solvent for pieces of lead lodged in the human body.

On triturating or digesting amalgams for a length of time, a blackish or dusky-coloured powder arises of the amalgamated metal. Some of the chemists have imagined, that the amalgamated metal was here reduced to its constituent parts; but pure mercury is by itself reducible to a powder of the same kind; and the metallic particles in this process, united with the mercury, are found to be no other than the metal in its entire substance. Some metals separate more difficulty than others; and gold and silver the most so. Boerhaave relates, that if the powder which separates from an amalgam of lead be committed to distillation with vinegar in a tall vessel, the mercury will glide before the vinegar boils, that, by a like artifice, quicksilver may be made to distil in a lesser degree of heat than that of the human body: but Dr Lewis, though he made many trials, was never able to succeed.

By amalgamation with gold, mercury may become exceedingly fixed; so as not to be distillable by the greatest heat. Concerning this, Dr Brandt relates the following curious experiment: "Having amalgamated fine gold with a large proportion of quicksilver, and strained off the superfluous mercury, he digested the amalgam in a close-stopped vessel for two months with such a degree of heat, that a part of the quicksilver sublimed into the neck of the glass. The matter being then ground with twice its weight of sulphur, and urged with a gradual fire in a crucible, a spongy calx remained; which being melted with borax, and afterwards kept in fusion by itself for half an hour, in a very violent fire, still retained so much of the quicksilver as to become brittle under the hammer, and appear internally of a leaden colour. The metal being again amalgamated with fresh mercury, the amalgam again ground with sulphur, and exposed to an intense fire, a spongy calx remained as before. This calx, being digested in two or three fresh parcels of aqua-regia, a small portion of whitish matter remained:}
Mercury or quicksilver. The paper which covered the cylindrical glass wherein the digestion was performed, contrived from the vapours, a deep-green circular spot in the middle, with a smaller one at the side; whereas the aqua-regia digested in the same manner by itself, or with gold, or with mercury, gave no stain. The first solution, on the addition of oil of tartar per deliquitum, grew red as blood; and standing, it deposited, first, a little yellow wax, like aurum fulminans; afterwards, a bright matter like fine gold; and at last, a paler precipitate, inclining to green; its own deep red colour and transparency remaining unchanged. Being now committed to distillation, a colourless liquor arose; and the residuum, perfectly exiccated, yielded, on adulcration, a yellow calx of gold; which the alkaline liquor had been unable to precipitate. The deliquitur, was calcined with twice its weight of sulphur, and afterwards, a bright matter like ground with a pestle, till the amalgam is completed. The mercury was let fall by little and little, through an aperture made in the gun-barrel, with a most intense degree of heat, without obtaining any water; but it being inspected by a by-fander, that the mercury in this experiment came over before it had been sufficiently acted upon by the fire, by reason of the lowness of the neck of the distilling instrument, the experiment was varied in the following manner. Sixteen ounces of mercury were heated in a crucible, in order to evaporate any moisture that might have been accidentally mixed with it; and an iron gun-barrel of four feet in length, being placed perpendicularly in a good furnace, and a gun-head and recipient fitted to its upper part, the mercury was let fall by little and little into the barrel, and the fire urged with bellows. After each injection, the mercury made a considerable noise and ebullition, and arose into the head; where it soon condensed and trickled down, in the common form of running mercury, into the recipient, without the least perceptible appearance of any aqueous humidity.

Mercury is difficultly amalgamated with regulus of antimony and copper; for which some particular manoeuvres are required. Two of Dr Lewis's receipts for uniting quicksilver with copper, we have already given (n 1153); with regulus of antimony, mercury, he says, may be perfectly united, by pouring a small stream of melted regulus into a considerable portion of mercury, made almost boiling hot. Another method directed by Henckel, is to put mercury into an iron mortar along with some water, and let the whole over the fire. When the water boils, a third or fourth part of melted regulus is to be poured in, and the mass ground with a pestle, till the amalgam is completed. The use of the water, as Dr Lewis observes, is to hinder the mercury from flying off by the heat of the regulus; but as the two are by this means not put together in so hot a flame, the union is more difficult, and less perfect. The loss of the mercury, in the first process, may be prevented by using a large vessel, and covering it with a perforated iron-plate, through the hole in which the regulus is to be poured. This method is likewise applicable to the amalgamation of copper.

With sulphur, mercury unites very readily, forming by trituration, or simple fusion, a black powder or mists, called sulphur mineral; which, by careful sublimation, becomes the beautiful red pigment called vermilion. (See Sulphur, sect. iv.)

Preparatory to the employment of one of these metals in medicine, the chemist has rendered it an object to chemists to find out some more simple and more certain method of preparing it with less expence and trouble, and more certainty of its effects, than it can be by the methods hitherto mentioned. This is now accomplished.
the least brittle of any of the semimetals; and when
amply supplied with phlogiston, which may be done
by treating it in close vessels with inflammable
matters, it poises a femiductility, by which it may be
flattened into thin plates. When broken, it appears formed
of many flat shining plates or facets, which are larger
when slowly than when hastily cooled. When heated,
it is very brittle; and cracks like tin, only louder,
when bent. Exposed to the air, it contracts in
length of time a yellowish ruf. Its specific gravity,
Dehagraphe
according to Dr Lewis, is to that of water as 7 1/, to 1. t-ion.
It begins to melt as soon as red-hot; but does not
flow thin till the fire is raised to a white heat. Then
the zinc immediately begins to burn with an
exceedingly bright and beautiful flame. Kept just in
fusion, it calcinates slowly; not only on the upper surface,
but likewise round the sides, and at the bottom of
the crucible. If several pieces are just melted togeth-er,
the mass, when grown cold, may be broken into the
same number; their union being prevented by a yellowish clax,
with which each piece is covered over. M. Malonini relates,
in the French Memoirs for 1742, that a quantity of zinc being melted six
times, and the fusion continued fifteen hours each
time, it proved, on every repetition, harder, more
brittle, less fusible, and less calcinable; that after the
two first fusions, its colour was grey; after the third,
brown; and after the fourth, black; that the fifth
rendered it of a slate-blue; and the sixth of a
clear violet.

So violent is the defagration of zinc, that the whole
flowers of
of its calx was sublimed by it, in the form of light flocks
of wood; which, however, are easily reduced to a
fine powder. These are used in medicine, and reckoned
an excellent remedy in epileptic cafes. When once sublimed, they are by no means capable of
being elevated again by the most violent heat. In a
heat far greater than that in which they frizz arose,
they suffer no alteration; in a very vehement one,
they melt, according to Henckel, into a semiform
green glass. Vitriified with borex, they give a grey,
or brown, or brownish, glass. From the brightness of the flame
of burning zinc, and the garlic smell which it is said
to emit, some have concluded that zinc contained the
phosphorine acid; which, from some other circumstances,
is not altogether improbable.

The flowers of zinc have been thought very difficultly,
or not at all, reducible to their metallic form by an addition of phlogiston. But Dr Lewis observes,
that this difficulty proceeds not from their unfitness to
be restored into the form of zinc, but from the volatility
of the semimetal, which occases its being disseipated
in fumes, if the common methods are made ufe of. All
causes, tofe of iron excepted, require a greater heat
for their fusion than that in which the metal itself
melts; and as a full melting heat is the greatest that
zinc can sustain, it burns and calcines the indium or
its revival, if the air is admitted; and in close vessels
esecrpes, in part at least, through their pores. On
mixing flowers of zinc with powdered charcoal, and
urging them with a strong fire in a crucible, a defagration
and fresh sublimation ensue: sufficient marks
that the zinc has been reduced to its metallic form;
for as long as it remains in the state of calx, neither
of these effects can happen. If the vessel is so con-
trived
Zinc. — trived to exclude the air, and at the same time to allow the reviving semimetal to run off from the vessel in which it is contained. In this way, the zinc will be found to be preserved in its metallic state. It is still more effectually detained by certain metallic bodies, as copper, or iron; with which the zinc, when thus applied, unites more readily and perfectly than if it were allowed to escape. Hence it can be made to do by any other means.

Homberg pretended to obtain an oil from the flowers of zinc, by distilling them in distilled vinegar, and then distilling the solution in a glass retort. At first a quantity of phlegm arose; then the superfluous acid; and at last an empyreumatic oil. This lat, which Homberg imagined to proceed from the flowers of zinc, Newmann very justly attributes to the distilled vinegar.

Another by Mr. Hellot. — An oil of another kind was obtained by Mr. Hellot from the above solution, by distilling the ash-coloured residuum, which remained after the distillation, with the acidulous phlegm which came over, for eight or ten days; distilling the tincture to dryness; and repeating the extraction with the distilled liquor, till the quantity of dry extract thus obtained was very considerable. This resin-like matter, distilled in a retort with a stronger fire, yielded a yellowish liquor, and a white sublimate. The liquor discovered no mark of oil; but, upon being passed upon the sublimate, immediately dissolved it, and then exhibited on the surface several drops of a reddish oil. Some of this oil was taken up on the point of a pencil, and applied to gold and silver-leaf. In twenty-four hours the parts touched appeared, in both, equally dissolved.

Zinc does not unite in fusion with bismuth, or the semimetal called nickel. It unites differently with iron; less so with copper; easier with the other metals. It renders iron or copper more easily fusible; and, like itself, brittle when hot, though considerably malleable when cold. It brightens the colour of iron almost into a silverhue, and changes that of copper into a yellow or gold colour. It greatly debases the colour of gold; and renders it less fusible. It renders arsenic, and other metals; that most volatile metal brittle and untractable. A mixture of equal parts of each is very hard, white, and bears a fine polish; hence it is proposed by Mr. Hellot for making specula. It is not subject to rust or tarnish in the air, like those metals whose basis is copper. It improves the colour and lustre of lead and tin, renders them firmer, and consequently fitter for several mechanic uses. Tin, with a small proportion of zinc, forms a kind of pewter. Lead will bear an equal weight, without losing too much of its malleability. Mauldin observes, that arsenic, which whitens all other metals, renders zinc black and friable; that when the mixture is performed in close vessels, an agreeable aromatic odour is perceived on opening them, that zinc amalgamated with mercury, and afterwards recovered, proves whiter, harder and more brittle than before, and no longer crackles on being bent.

Mixtures of zinc with other metals, exposed to a strong fire, boil and deflagrate more violently than zinc by itself. Some globules of the mixture are usually thrown off during the ebullition, and some part of the metal calcined and volatilized by the burning zinc; hence this substance has been called metallic nitre. Bismuth.

Gold itself does not entirely resist its action. It very difficultly volatilizes copper; and hence the sublimates obtained in the furnaces where brass is made, or mixtures of copper and zinc melted, are rarely found to participate of that metal. On melting copper and zinc separately, and then pouring them together, it cannot be violent detonation immediately ensues, and above united with half the mixture is thrown about in globules.

Zinc does not unite in the least with sulphur, or with crude antimony, which secrete all other substances except gold and platina; nor with compositions of sulphur and fixed alkaline salts, which dissolve gold itself. With nitre it deflagrates violently. Its flowers do not sufficiently deflagrate; yet alkalize double their weight of the salt more readily than the zinc itself. The alkaiine mafs appears externally greenish, nitre alkaline internally of a purple colour. It communicates a fine line by purple water, and a red to vinegar. The accersous tincture infiltrated, leaves a tenacious substance which soon runs in the air into a dark red caufic liquor, the alkahef of some of the pretended adepts.

§ 9. BISMUTH.

This semimetal, called, also tin-glafl, and by some naturalists marcasita officinarum, is somewhat similar to the regulus of antimony. It appears to be composed of cubes formed by the application of plates upon each other. Its colour is less white than that of regulus of antimony; and has a reddish tinge, particularly when it is exposed to the air. In specific gravity it approaches to silver; being nearly ten times heavier than water. It has no degree of malleability; breaking under the hammer, and being reducible by triturating to fine powder. It melts a little later than tin, and seems to flow the thinnest of all metallic substanstes. Bismuth is semifvolatile, like all other semimetals. When exposed to the fire, flowers are evolved from it; it is calcined; and converted into a litharge of nearly as great a proprity as antimony. It may be employed, like that metal, in the purification of gold and silver by cupellation. (See Refining.) When in fusion, it occupies less volume than in its solid state: a property peculiar to iron among the metals, and bismuth among the semimetals. It emits fumes in the fire as long as it participates of that metallic form; when calcined or vitrified, it proves perfectly fixed.

Bismuth mingles in fusion with all the metallic substances, except regulus of cobalt and zinc. The adobe explosion of nickel or regulus of antimony, renders it incapable of the malleable, malleable, and fusible metals; renders it useless in the refinement of the gold of the most of the metals with which it unites. It whitens copper and gold, and improves the colour of some of the white metals; mixed in considerable quantity, it renders them all brittle, and of a flaky structure like its own. If mixed with gold or silver, a heat that is but just sufficient to melt the mixture, will presently vitrify a part of the bismuth; which, having then no action on those perfect metals, separates, and glazes the crucible all round.

§ 10.

Practice.
Regulus of antimony.

This semi-metal, when pure, and well fused, is of a white shining colour, and coniuits of laminae applied to each other. When it has been well melted, and not too hastily cooled, and its surface is not touched by any hard body during the cooling, it exhibits the perfect figure of a star, consisting of many radial issuing from a centre. This proceeds from the disposition that the parts of this semi-metal have to arrange themselves in a regular manner, and is similar to the crystallization of salts.

Regulus of antimony is moderately hard; but, like other semi-metals, it has no ductility, and breaks in small pieces under a hammer. It loses half of its weight in water. The action of air and water destroys its lustre, but does not rust it so effectually as iron or copper. It is fusible with a heat sufficient to make it red hot; but when heated to a certain degree, it fumes continuously, and is diffipated in vapours. These fumes form what are called the argentina flowers of regulus of antimony, and are nothing but the earth of this semi-metal deprived of part of its inflammable principle, and capable of being reduced to its reguline state by an union with this principle.

There are different methods of preparing the regulus of antimony; but all of them consist merely in separating the sulphur which this mineral contains, and which is united with the regulus. It is plain, therefore, that regulus of antimony may be made by an addition of any sulphur to crude antimony in fusion, which has a greater attraction for sulphur than the regulus itself has. For this purpose, alkaline salts have been employed, either previously prepared, or ex tremoraneously produced in the process, by a destillation of tartar and nitre. By this means, the sulphur was indeed absorbed; but the hepar sulphuris, formed by the union of the sulphur and alkali, immediately dissolved the regulus, so that very little, sometimes none at all, was to be obtained distinct from the scoria. Metals are found to answer better than alkaline salts, but the regulus is seldom or never free from a mixture of the metal employed. The way of obtaining a very pure regulus, and in great quantity, is to calcine the antimony in order to dilate its sulphur; then to mix the calc with inflammable matters, such as oil, soft soap, &c. which are capable of reforming the principle of inflammability to it. This method was invented by Kunckel. Another, but more expensive way of procuring a large yield of very pure regulus, is, by digesting antimony in aqua-regis, which dissolved the reguline part, leaving the sulphur untouched, precipitating the solution, and afterwards reviving the precipitate by melting it with inflammable matters.

There are considerable differences observed in the regulus of antimony, according to the different substances made use of to absorb the sulphur. When prepared by the common methods, it is found to be very difficulty amalgamated with mercury; but Mr. Pott has discovered, that a regulus prepared with two or five parts of iron, four of antimony, and one of chalk, readily unites with mercury into an hard amalgam, by bare triturating with water. Marble and quicklime fuse equally well with chalk; but clay, gypsum, or regulus of other earths, have no effect.

One earthy substance, found in lead-mines, and commonly called cawk, has a very remarkable effect upon antimony. This is found in whitish, moderately com rocacious roact and ponderous masses; it is commonly tipped off with a spar; but differs from bodies of this kind, in not be ing acted upon by acids, (see n^1 1668). If a lump of cawk, of an ounce or two, be thrown red hot into 16 ounces of melted antimony, the fusion continued for two minutes, and the fluid matter poured off. "you will have 13 ounces like polished steel, and as the most refined quicksilver." Phil. Trans. n° 110. Dr. Lewis mentions his having repeated this experiment several times with success: but having once varied it by mixing the cawk and antimony together at the first, a part of the antimony was converted into a very dark black vitreous matter, and part seemed to have suffered little change; on the surface of the mass some yellow flowers appeared.

Regulus of antimony enters into the compositions for metallic speculations for telecopies, and for printing-presses. It is also the basis of a number of medicinal preparations; but many of them, which were formerly much esteemed, are found to be either inert, uncertain, or dangerous in their operations. When taken in substances, it is emetic and purgative, but uncertain in its operation; because it only acts in proportion to the quantity of solvent matter it meets with in the stomach; and if it meets with nothing capable of acting upon it there, the regulus will be quite inactive. For these reasons, the only two preparations of antimony now retained, at least by skilful practitioners, are the infusion of gla s of antimony in wine and emetic tar.

For making the glasses of antimony we have the following process. "Take a pound of antimony; reduce it to fine powder, and set it over a gentle fire; calcine it in an unglazed earthen pan, till it comes to be of an ash-colour, and ceases to fume: you must keep it continually flirring; and if it should run into lumps, you must powder them again, and then proceed to finish the calcination. When that is done, put the calcined antimony into a crucible; set it upon a tile in a wind-furnace; put a thin tile on the top; and cover it all over with coals. When it is brought into fusion, keep it so in a strong fire for an hour; then put into it an iron rod; and when the melted antimony, which adheres to it, is transparent, pour it upon a smooth, hot, marble; and when it is cold, put it up for use. This is vitrum antimonii, or fibrium."

This preparation is more violent in its effects than the pure regulus itself; because it contains less phlogiston, consequently is similar to a regulus partially calcined, and so more soluble. Hence it is the most proper for infusion in wine, or for making the tartar emetic. It is obviously, however, liable to great uncertainties in point of strength; for as the antimony is more or less strongly calcined, the glass will turn out stronger or weaker in its operation, and consequently all the preparations of it must be liable to much uncertainty. This uncertainty is very apparent in the difference of strength of different parcels of emetic tartar; accord ingly Mr. Geoffroy found by examination of different parcels of emetic tartars, that an ounce of the weakest contain
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From 30 to 90 grains of regulus; an ounce of moderate strength contained about 108 grains; and an ounce of the strongest kind contained 154 grains. For these reasons, the author of the Chemical Dictionary recommends the pulvis algaroth as the most proper material for making emetic tartar; being perfectly soluble, and always of an equal degree of strength. Emetic tartar, as he judiciously observes, ought to be a metallic salt composed of cream of tartar saturated with the regulus of antimony; and M. Bauné has shown such a saturation to be possible, and that the neutral salt crystallizes in the form of pyramids. They are transparent while moist; but by exposure to the dry air, they lose the water of their crystallization and become opaque. The preparation of this salt, according to M. Bauné, consists in mixing together equal parts of cream of tartar, and levigated glafs of antimony: these are to be thrown gradually into boiling water; and the boiling continued till there is no longer any effervescence, and the acid is entirely saturated. The liquor is to be filtered; and upon the filter is observed a certain quantity of fulphureous matter along with some undissolved parts of the glafs of antimony. When the filtered liquor is cooled, fine crystals will be formed in it, which are a soluble tartar perfectly satured with glafs of antimony. He observes, that the diffolution is soon over if the glafs is well levigated, but requires a long time if it is only grossly pounded.

The trouble of levigating glafs of antimony, as well as the uncertainty of diffolving it, would render pulvis algaroth much preferable, were it not on account of its price; which would be a temptation to those in use to prepare medicines, to sublimate a cheaper antimonial preparation in its place. This objection, however, is now in a great measure removed by Mr Scheele; who demonstrated that the pulvis algaroth is no other than regulus of antimony half calcined by the dephlogisticated marine acid in the corrodive sublimations made use of for preparing the antimonial caustic. If therefore we can fall upon any other method of dephlogisticating the regulus, we shall then be able to combine the marine acid with it; and by separating them afterwards, may have the powder of algaroth as good as from the butter of antimony itself. One of the methods of dephlogisticating the regulus is by nitre. Our author therefore gives the following receipt for the powder in question.

"Take of powdered crude antimony one pound, powdered nitre, one pound and a half; which, after being well dried and mixed, are to be detonated in an iron mortar. The hepar obtained in this manner is to be powdered, and a pound of it to be put into a glafs vessel, on which first a mixture of three pounds of water and 15 ounces of vitriolic acid is to be poured, and afterwards 15 ounces of powdered common salt are to be added; the glafs vessel is then to be put in a fand-bath, and kept in digestion for 12 hours, during which period the mafs is to be contantly stirred. The solution, when cool, is to be strained through linen. On the residuum one third of the above menstruum is to be added, and the mixture digested and strained. From this solution, when it is diluted with boiling water, the pulvis algaroth precipitates, which is to be well edulcorated and dried."

As regulus of antimony, like other metallic sub-

flances, is soluble in liver of sulphur, it happens, that, on boiling antimony in an alkaline ley, the salt, uniting with the sulphur contained in that mineral, forms an heparr sulphur, which dissolves some of the reguline part. If the liquor is filtered, and saturated with an acid, and the regulus and sulphur will fall together in form of a kermes mineral. If the ley is suffered to cool, a like precipitation of a red powder happens. This last is called kermes mineral.

Nitre deffagrates violently with antimony, confumine not only its sulphureous part, but also the phlogifon of the regulus; and thus reduces the whole to an inert fly.

**§ II. ARSENIC.**

Arsenic. Found naturally in a metallic form.

Reguline arsenic, whether found naturally or prepared by art, very readily parts with as much of its phlogifon as is sufficient to make it fly off in a white smoke; but this still retains a very considerible quantity of phlogistic matter, as evident from its producing nitrous air by the affusion of nitrous acid, and from the experiments already related of the preparation of the acid of arsenic. This caulis indeed is the form in which arsenic is most commonly met with. It is less volatile than the regulus; and by sublimation in a glafs vessel assumes an opaque crystaline appearance from becoming white on the surface; but that which crystalizes in the bowels of the earth does not appear to be subject to any such change.

White arsenic, though a true metallic caulis, may be white ar-

mixed in fusion with the same metals which will unite with the regulus. This seems contrary to the general rule of other calces, which cannot be united with any metal.
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Arsenic.

Metal in its metallic state; but it must be remembered, that by this operation the arsine calx is reduced to a regulus by the phlogiston of the metal: whence, in all fusions of this kind, some fome rise to the top, consisting of the calcined metal and part of the white arsenie. The parts of distilled water diffuse, by means of moderate heat, one part of calcined arsenie, and by boiling may be made to take up 1.5. The solution changes syrup of violet green, but the tincture of turfuole red. It is not changed by neutral salts, but slowly precipitates the solutons of metals, the arsenie united to the metallic calx falling to the bottom.——

"It may be asked (says Mr Bergman), whether the whole of the arsenie, or only the arsine acid, unites with the metallic calx, yielding the phlogiston to the menstruum of the other metal?" Certainly such a mutual commutation of principles does not appear improbable, if we consider only those cafes in which the menstruum is vitriolic or nitrous acid: but as iron, for example, united with malac acid (while does not attract the phlogiston of white arsenic), as well as when it is joined to the nitrous acid, is precipitated, it would appear that the whole of the arsenic is united, at least in certain cafes, to the metallic calxes.

One part of arsenic is dissolved by 70 or 80 of boiling spirit of wine.

Arsenic dissolves partially in concentratd vitriolic acid, but concentrates in the form of crystalline grains on cooling. These dissolve in water with much greater difficulty than the arsenic itself. On the blow-pipe they emit a white smoke, but form into a globule by fublimation, which at first bubbles, but soon grows quiet, and is but slowly consumed even in a white heat. This fixity is occasioned by the acid carrying off the phlogiston of the arsenic, and thus leaving a greater proportion of its peculiar acid than what it naturally contains; and therefore the more frequently the operation is repeated, the more fixed the arsenic becomes, though it is scarce possible to dissipate the arsinephlogiston as perfectly with this acid as with the nitrous; the effects of which have been already particularly mentioned.

The marine acid, which naturally contains phlogiston, dissolves about one-third of its weight of arsenic, a great part of which separates spontaneously on cooling in a state of saturation with the acid. This falt, which may be had in a crystalline form, is much more volatile than the former, readily subliming in a clofe vessel with a moderate heat; but is soluble with difficulty in boiling water. It is of a fine yellow colour, and yearly differs from butter of arsenic, except in its degree of concentration. The nature of marine acid prevents it from disengaging the arsine acid from the phlogiston of the femimetal, as will easily appear from what has been said concerning that acid. The arsine acid, however, is easily made to appear by the addition of that of nitre, as will be understood from the directions given by Mr Scheele for the preparation of the acid of arsenic.

Arsenic is not precipitated from its solution in vitriolic and nitrous acids by the phlogisticated alkali, which yet very readily precipitates all other metals.

From the marine acid, however, it is precipitated by its means of a white colour; but unless the solution be very acid, the addition of more water will throw down a precipitate of the same colour.

Dephlogisticated marine acid deprives arsenic of its inflammable principle; so that in the distilled vessel we find water, acid of arsenic, and marine acid, rege nerated.

Arsenic is dissolved by its own acid, and forms crystalline grains with it as well as with that of flour and borax. Salaccharine acid dissolves it likewise, and unites with other acids.

Solution of fixed alkali dissolve arsenic; and, when loaded with it, form a brown tenazulic mass, called liver of arsenic. The arsenic is partly precipitated by mineral acids, though part of it gradually loses its phlogiston, and adheres more tenaciously. Solution made with volatile alkali seems to effect this decomposition more readily, as no precipitation is made by acids. Limpid solution of saline hepatic, dropped into a solution of white arsenic, floats upon the surface in form of a grey stratum, which at length disturbs the whole liquor.

By the sufficience of heat solutions of arsenic attack effusions on some of the metals, particularly copper, iron, and zinc metals...and the solutions of the two last yielding crystals by evaporation. No alteration is made on these compounds by alkaline salts or by acids: volatile alkali does not discover the copper by changing the colour of the solution blue, nor does the phlogisticated alkali throw down any blue precipitate from the solution of iron. The reason of this is the superabundance of phlogiston in the solutions; for the arsine acid takes up all metals: when united with copper, it shows a blue colour with volatile alkali; and when united with iron, it lets fall a Prouiana blue in the usual way; but the quantity of phlogiston which converts the acid into white arsenic, prevents the appearance of these phenomena when the latter is made use of.

Arsenic, either in its calcined or regular state, may be united with sulphur; in which case it appears golden with either of a red or yellow colour, according to the sulphur. Quantity of sulphur with which it is united. These compounds are spontaneously produced by nature; both of them sometimes pellicid and crystalline; with this difference, however, that the yellow seems to affect a lamellated, and the red a crystalline, form. These are called red and yellow orpiment, or realgar and orpiment; the specific gravity of realgar being about 3.225; of orpiment, 5.315. Both of these sublimes totally with a moderate heat, unless when they happen to be mixed with other substances. They readily unite with those metals which form an union with the arsenic and sulphur of which they are composed. Silver mineralized by fublimation with orpiment, forms a substance similar to that which is called the red ore of that metal. Iron, in conjunction with orpiment, assumes a white, polished, and metallic appearance, similar to that of the white or arsine pyrites; and by various combinations of these substances with metals of different kinds, many of the natural metallic ores may be produced.

Nitre, when treated with mineralized arsenic, decomposes it, and combines with it to form nitrates of arsenic.
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Arfenic. tonates partly with the sulphur, and partly with the phlogiston of the arfenic; the alkaline basis of the salt either forming fat polychreft with the acid of the sulphur, or uniting with the alkali, and forming the neutral arfencial salt. By the addition of fixed alkali in proper quantity, either to orpiment or realgar, and then exposing the mixture to a subliming heat, nitre retains the sulphur, but lets go the greatest part of the arfenic; the hepatic mafs, however, retains a small quantity of the latter; and if there is much alkali, scarce any of the arfenic arises.

On distilling orpiment with twice or thrice its quantity of corrosive sublimate, two liquids arife which refuse to unite; and at length, on augmenting the heat, a cinnabar arfices. A butter of arfenic is found at the bottom of the receiver, of a ferruginous brown colour, but pellucid: in the open air it first emits a copious fume of a white colour, and then gradually attracts the moisture of the atmosphere, by which it is precipitated. It is remarkable that it unites so slowly with marine acid, that they form a repelant mixture; nor can they be made to unite beyond a certain degree. By the effusion of distilled water, a white powder will be precipitated, which, though ever so well washed, retains some acidity; for a portion of butter of antimony is produced by distillation, as is likewise true of the pulvis algaroth. The smoke has a peculiar penetrating smell, somewhat similar to that of phlogilized vitriolic acid, and lets fall white flowers.

The liquor which flows above, and which, by chemical authors, has been compared to oil, is yellowish and pellucid, separating a white arfencial powder by the addition of water and spirit of wine. It is not affected by the stronger acids; but effervesces, and lets fall a precipitate, with alkalies. On keeping it with a cucumber with a long neck unfiptopped, white flowers gradually concrete round the orifice, which are lax, and sometimes approaching to a crystalline form. And lastly, by spontaneous evaporation, pellucid crystals appear at the bottom of the liquor, which are soluble in water with great difficulty; but when disolved, precipitate silver from nitrous acid, and let fall some arfenic on the addition of an alkali. When put into lime-water, a cloudy flow surrounds them; on being exposed to the fire, they totally sublimate without any arfencial smell, without decrepitation, or losing their transparency; but if ignited, phlogilic matter comes in contact with them, the arfencial smell faintly appears. No traces of mercury are to be found in this liquor by treating it either with alkali or copper; not the slightest precipitation is made by it on being dropped into a solution of terra pondersota in the marine acid; from all which it appears, that this liquor is only a very dilute butter of arfenic, containing less of the mercury on account of the quantity of water it has. The butter contains the acs in its most concentrated state, and is therefore loaded with a larger quantity of arfenic: the former liquor will therefore be obtained in much larger quantity, by setting the mixture of corrosive sublimate and arfenic to stand a night in a cellar, or moistened with water, before it is subjected to distillation. As the common marine acid can dissolve only a determined quantity of the butter, it naturally follows, that what remains after complete saturation should totally refuse to mix. The acida, however, when too much diluted, precipitates the butter; but in proportion to its strength it dissolves a greater quantity.

Arfenic mineralized by sulphur is not dissolvd by Arfenic mifwater, but is affected by the different acids, according nerIALIZED to the particular circumstances of each. Nitrous acid and aqua-regia act most powerfully; the former soon destroys the red colour of the realgar, and converts it into yellow orpiment; its primary action being to calcine the arfenic, without affecting the yellowness of the sulphur. It makes no change on the colour of orpiment. Aqua-regia, by long digestion, takes up the arfenic, and leaves the sulphur at the bottom; and hence we may find out the proportions of the two ingredients. Some dexterity, however, is necessary in performing this operation with accuracy; for if, on the one hand, the menstrum be too weak, part of the arfenic will remain undissolved; and if, on the other, it be too strong, part of the sulphur will be decomposed; for strong nitrous acid is capable of decomposing sulphur by long digestion, having a greater attraction for phlogiston than the vitriolic acid itself. The colour of the residuum ought to be grey; for as long as any yellow particles remain, it is a sign that some of the arfenic also remains. If any iron be present in the compound, it is all dissolvd, by reason of the superior attraction of the acid for it, before any of the arfenic is taken up, unlefs it shall have been calcined either by the access of air and heat employed in the operation, or by the too great power of the menstrum.

The pure regulus of arfenic may be obtained artificially from white arfenic, either by sublimation with mercury, black flux, or other phlogilic materials; or by melting it with double its weight of soap and potash; or lastly, by precipitation by means of some other metal, from orpiment or sandarack melted with sulphur and fixed alkali. By the first of these methods it is obtained in a crystalline form, ochohedral, pyramidal, or even prismatic. Mr Bergman mentions a natural regulus of arfenic, named mispickel, which along with mispickel, some sulphur contains a large quantity of iron united with the regulus into a metallic compound; but the iron sometimes amounts to ½ or even ⅓ of the whole, it neverthelcss remains untouched by the magnet. When ignited, it sends forth an arfencial smell, and soon becomes obedient to the magnet, even though the operation be performed on a tile without any additional phlogiston; it melts easily in an open fire, and in close vessels the greater part of the regulus sublimes, leaving the iron at the bottom.

The pure regulus of arfenic is vastly more volatile than any other metal, and therefore cannot be melted, uthility of this it begins to send forth a visible fmoke in 180° of the Swedish thermometer, and is capable of inflammation; but in order to inflame it, it must be thrown into a vesel previously heated to a sufficient degree, otherwise it will be sublimed. The flame is of an obscure whitish blue, diffusing a white smoke and garlic smell. In close vessels it retains its metallic form, and may be sublimed of any figure we please.

Regulus of arfenic unites with many of the metals, but destroys the malleability of those with which it enters into fusion. It renders those more easy of fusion on which are melted with difficulty by themselves; but tin, the most easily fusible of all the metals, becomes
Regulus of arfelic,

This metal acquires a permanent and shining whiteness by its union with regulus of arfelic, and is able to retain half its own weight of the arfentical metal. The other white metals become grey by fusion with this femimental, platina only excepted. Gold fusfed in a clofe vefsel with regulus of arfelic, scarcely takes up $\frac{1}{2}$ of its weight; silver $\frac{1}{2}$ lead $\frac{1}{2}$ copper $\frac{1}{2}$ and iron more than its own weight. The magnetic property of this latent metal is destroyed by a large quantity of regulus, though the exact proportion which destroys it can scarcely be determined, as some of the iron is always taken up by the fcoria; but according to Mr Bergman, less than an equal quantity is certainly sufficient. Bifmutn retains $\frac{1}{2}$ of its weight; zinc $\frac{1}{2}$ regulus of antimony $\frac{1}{2}$; and manganese an equal quantity. Nickel and regulus of cobalt take up a large quantity; but how much cannot be determined, as it is next to impossible to procure any of those metals in a flare of perfect purity. In a fufficient degree of heat, and by a triotte of feveral hours, regulus of arfelic takes up about $\frac{1}{2}$ of its own weight of mercury, forming an amalgam of a grey colour.

Regulus of arfelic, by reafon of its volatility, may be expelled from all the metals with which it is united; but, in flying off, it generally carries along with it some of the metals with which it is united, gold and silver not excepted, if the degree of heat be great and very suddenly applied. Platina, however, perfectly refists the volatilization; and by reafon of its refractory nature, even retains a portion of the arfenic. This femimental cannot be united by fusion with alkaline falls until the phlogifon is confiderably diminished, and the regulus approaches to the nature of pure arfenical metal. By adding regulus therefore to nitre in fusion, a detonation enfues, the phlogifon of the former is totally destroyed, and the acid uniting with the alkali of the nitre forms a neutral arfenical salt, similar to that made with white arfenic and nitre. By difillation with dry acid of arfenic, the regulus fublinges before it can be acted upon by the acid; but when thrown into the acid in folution, foon takes fire, and fends forth a white fmoke; for the acid, being in this infuance deprived of its phlogifon, feparates that principle from the regulus, and fublimes it with it in fuch quantity as to regenerate white arfenic; while on the other hand, the regulus, by this operation, is fo far deprived of its phlogifon as to appear in the form of a cafl. By difillation with corrosive fublimare, a fmoaking butter, and fmall quantity of mercurius dulfis and running mercury, are procured; which happens in confequencc of a dolfble elcclive attraction; the regulus of arfenic yielding its phlogifon to the base of the corrosive fublimare, which being thus really calcined, reduces the former to perfect mercury, while the marine acid takes up the cafl of arfenic. The regulus of arfenic readily unites with sulphur, and forms the fame red and yellow compounds that have already been mentioned when fpeaking of white arfenic; it is difoluble in hepaf sulphuris, but may be precipitated by every other metal which can unite with the hepaf.

Regulus of arfenic is not affected by the vitriolic acid, unless when concenfrated and affifted by heat. The inflammable part of the regulus which phlogifonizes cooks the acid flies off, fo that the remainder affumes the nature of white arfenic, and exhibits the fame propertics with menilina as any other metallic cafl: the fame holds good with nitrous acid, except that it attaracts the phlogifon more vehemently. Marine acid has little or no effect except when boiling.

Regulus of arfenic precipitates certain metals diffolved in acids, fuch as gold and platina, difolved in aqua regulis on metallic solution.

§ 12. Cobalt.

Regulus of cobalt, or more properly pure cobalt itself (what we have under the name of cobalt being only a cafl of the regulus), is a femimental of a redhifh white colour, clofe-grained, fo as to be easily reducible to powder, about 7.7 of specific gravitiy, and forming itself into mafles of a needle-like texture, placed upon one another. It is feldom or never found native, but always calculated and united with arfenic, the arfenical acid, sulphur, iron, &c. The zaffire used in commerce is an impure and grey cafl of cobalt. When mixed with three times its weight of pulverized flints, and exposed to a ftrong fire, it melts into glafs of a dark blue colour, called fmalts, used in tinging other glafes, and in painting. With three times its weight of black flux, a small quantity of tallow and marine falt, it affords the femimetal known by the improper name of regulus of cobalt; but the reduction is very difficult. For this purpose a large quantity of flux must be made of, and the crucible kept a confiderable length of time in a white-red heat, that the matter may become quite difolved. So- Regulus of cobalt, when cooled, becomes covered with a dull pellicle, and undergoes a spontaneouf calcification; but it may easily be calcined in the air.
Cobalt. in any quantity by exposing it in powder in a shallow vessel, under the muffle of a cupelling furnace, and fritting it now and then to expose fresh surfaces to the air. After being kept red hot for some time, this powder loses its splendor, increases in weight, and becomes black, the calx being convertible, by a most violent heat, into a blue glass. By fusion it combines with vitriofulceur earths, forming with them a beautiful blue glass extremely fixed in the fire; whence it is of the greatest use in enamelpainting, porcelain-painting, &c. The action of terra ponderosa, magnesia, and lime, on cobalt, is not known. Alkalies manifestly alter it; but in what respect is not known.

Cobalt dissolves in concentrated vitriolic acid, when its calx forms a beautiful blue glass. Its calx, with vitriofulceur earths, entirely dissolves in the vitriolic acid. Phenomena with vitriofulceur earths, when the vitriolic acid is boiled with the heat, the acid evaporating almost entirely in the form of sulphurous gas. The residue is then to be washed; a portion of it dissolves in the water, and communicates a greenish colour to it when warm, which changes to a rosy colour when cold. M. Beauné affirms, that by sufficiently evaporating the vitriolic solution of cobalt, two sorts of crystals are obtained; one white, small, and cubical; the other greenish, quadrangular, fissiles in length, and four in breadth. These last he only considers as the true vitriol of cobalt; the former being produced by certain foreign matters united to it. The crystals most commonly obtained have the form of small needles, and may be decomposed by fire, leaving a calx of cobalt not reducible by itself. They may likewise be decomposed by all the alkalies, by terra ponderosa, magnesia, and lime. According to Fourcroy, 100 grains of cobalt, dissolved in the vitriolic acid, afford, by precipitation with pure mineral alkali, 140 grains of precipitate; by the same alkali aerated, 160 grains. Diluted vitriolic acid acts on zaffre, and dissolves a part, with which it forms the salt already described.

Nitrous acid acts upon the femimetal with that violence which is its general characteristic; and the solution, when nearly faturated, appears either of a rosy brown or bright green colour. By strong evaporation it yields a salt in small needles joined together; which is very deliquescent, boils upon hot coals without denotation, and leaves a calx of a deep red colour. It is decomposed by the same substances as the former, and by excess of alkali the precipitate disappears.

Muriatic acid, affixed by heat, dissolves cobalt in part, but has no effect upon it in the cold. It acts more strongly on zaffre, forming a solution of a reddish brown, which becomes green by being heated. By evaporation it yields a very deliquescent salt in small needles, which becomes green when heated, and is soon after decomposed. Aqua-regia dissolves the metal more easily than the marine acid, but less so than the nitrous. The solution has been long known as a sympathetic ink.

Cobalt is not dissolved directly by the acid of borax; but when a solution of this salt is mixed with a solution of cobalt in any of the mineral acids, a double decomposition takes place; the alkaline basis of the borax uniting with the acid which held the cobalt in solution; and the calx, combining with the sedative salt, falls to the bottom in form of an insoluble precipitate.

This femimetal is calcined by being heated to ignition with nitre. One part of cobalt, and two or three of dry nitre, well powdered and mixed, when thrown into a red-hot crucible; produce small incandescences; a portion of the cobalt being converted into a calx of a red colour, more or less deep, and sometimes of a green. Sal ammoniac is not decomposed, by reason of the slight attraction there is between the metal and muriatic ammoniac acid. M. Busquet, who made the experiment with great care, could not obtain a particle of volatile alkali. Sulphur does not unite with it but very difficultly, and the combination is promoted by liver of sulphur. Thus a kind of artificial one may be produced, the grain of which will be finer or closer, and its colour whiter or yellower, in proportion to the quantity of sulphur in the mixture. M. Beauné observes, that this compound cannot be decomposed by acids, and that fire cannot destroy all the sulphur.


This was first discovered to be a femimetal of a peculiar kind by Cronstedt, in the years 1751 and 1754, by Mr. Voss, who procured it in the form of regulus from its ore, but Cronstedt, without being able to reduce it to a sufficient degree of purity; which indeed has not yet been done by any chemist. M. Bergman has laboured most in this way, though even he has not reduced it to the purity of other metallic substances. His experiments were made with some regulus made by M. Cronstedt, and whose specific gravity was to that of water exactly as 7.421 to 1. His attempts to purify it were made.

I. By Calcination and Scorification.

Nine ounces of powdered nickel were exposed for 3000 hours, in several portions, to a most violent heat, under the dome of an assaying furnace. Thus the arsenic was first diffipated with a fetid smell, after which the odour of sulphur became perceptible; after this a white smoke arose without any smell of garlic, and which, according to our author, arose probably from the muriatic substances. His experiments were made with some regulus made by M. Cronstedt, and whose specific gravity was to that of water exactly as 7.421 to 1. His attempts to purify it were made.
Nickel.

green colour. Nearly the same phenomenon appeared after reduction in a fourth operation.

On performing the reduction with lime and borax, the regulus, when full melted, lost much of its ferruginous nature, which adhered to the black incorius; it soon acquired an hyacinthine colour, without any remarkable mixture of cobalt, was little obedient to the magnet, and its specific gravity was somewhat diminished, being now only 7.0828.

By a fifth calculation, gradually adding a quantity of powdered charcoal while the matter continued red hot, a prodigious quantity of arsenic, imperceptible before, flew off in the form of vapour; the arfenical acid being thus furnished with as much phlogiston as was necessary to make it rise in fume. The regulus was treated in this manner until no more arfenical smoke could be perceived; it was now of a lamella ted and tenacious texture when reduced, but still diffused the arfenical odour on being removed from the fire. The roasting was therefore repeated a sixth time, and continued for ten hours; the addition of powdered charcoal continued to diffuse the arsenic in invisible vapours which yet were perceptible by the smell; the colour of the metallic calx was obscurely ferruginous, with a mixture of green scarcely visible. On reducing the regulus with equal parts of white flux, lime and borax, a semiducile regulus was obtained, highly magnetic, and soluble in nitrous acid, to which it communicates a deep green colour; a blackish mass remained, which afterwards became white, and when laid on a burning coal, flies off without any remarkable arfenical smell. The regulus being then six times fused with lime and borax, the scorius resembled the hyacinth in colour, and the metallic part was surrounded with a green calx. The regulus, as before, was magnetic and semiducile. Lastly, it was exposed for four hours to a very strong heat; when the powdered charcoal was added by degrees without any dilution of arsenic or loss of weight; the colour of the roasted powder was ferruginous, with a very slight tinge of green. On reduction, a very small globe, still magnetic, was found among the scorius.

II. By Sulphur.

Eight hundred parts of Crofts's regulus of nickel, fused with sulphur and a small quantity of borax, yielded a mineralized mass of a reddish yellow, whole weight amounted to 1700. On exposing one half of this to the fire, it began to grow black; on which the heat was augmented until vegetations appeared; the remaining calx weighed 652. Melting this part with borax, and the other which had not been exposed to the fire, a sulphurated regulus of a whitish yellow colour was obtained, weighing 1102. The same regulus, calcined for four hours, was still covered with vegetations, and then, on the addition of powdered charcoal, diffused an arfenical odour; the metallic calx was green, and weighed 1058. A whitish yellow regulus was obtained semiducile, highly magnetic, and extremely refractory, weighing 504. By fusion with sulphur a second time, it weighed 816; one half of which roasted to greenness, united by means of fire to the other half still sulphurated, weighed 509, and was almost deprived of its magnetic quality. A calcination of four hours, during which phlogiston was ad-

ded, diffused a considerable quantity of arsenic; the powder put on an ashen-colour, somewhat greenish, in weight 569; and by reduction yielded a regulus whose surface was red, and when breaking, appeared of a white ashen-colour, very friable, and weighing 432; the specific gravity 7.173.

On mineralizing the regulus a third time with sulphur, adding charcoal as long as any vestige of arsenic remained, which required a violent calcination of 12 hours, the remaining powder was of an ashen-colour, and weighed 364; but the regulus obtained by means of a reduction effected by the most violent heat in a forge for three quarters of an hour, was so refractory that it only adhered imperfectly to the scorius, which were of a distinct hyacinthine colour; nor could it be reduced to a globule by means of borax, though urged by the flame vehement of fire. The absolute gravity of this regulus was 180; its specific gravity 8.666. Its magnetic virtue was very remarkable; for it not only adhered strongly to the magnet, but to any other piece of iron; and the small pieces of it attracted one another. It had a considerable ductility, was of a whitish colour, mixed with a kind of glittering red; dissolved in volatile alkali, yielding a blue solution, and a green one in nitrous acid.

An hundred parts of the same regulus, beaten out into thin plates, were covered by a calcination of four hours, with a crust apparently martial, having under it a green powder, and within it a nucleus consisting of reguline particles still unchanged; the weight maintained unchanged by 5. The frangible mass, reduced to powder, put on a brownish-green colour; and after a calcination of four hours more, concreted at the bottom in form of a friable black crust, strongly magnetic, and weighing 100: No vestiges of arsenic were discovered by a succeeding operation, in which charcoal was added; nor was the magnetic powder destroyed, but the weight was increased to 105, and the colour somewhat changed. By fusing for an hour with lime and borax, this powder yielded a regulus of an angular structure, red, semiducile, and altogether magnetic, the specific gravity being 8.975. The same globule dissolved in aqua regia, was precipitated by green vitriol, as if it had been bathed with gold; but the precipitate was readily soluble in nitrous acid. Most of the reguli showed no signs of precipitation with green vitriol.

III. With Hepar Sulphuris.

Fifty-eight parts of regulus of nickel, which had been sulphurated before, being fused with 1200 parts of salinum hepar sulphuris, then dissolved in warm water, filtered through paper, and precipitated by an acid, yielded a powder, which, by calcination till the sulphur was driven off, appeared of an ashen-colour, and weighed 35. The infoluble residuum, deprived of its sulphur by means of fire, was likewise of an ashen-colour, and weighed 334. On reducing this regulus by means of the black flux, a friable regulus was obtained, which had a very weak magnetic property; but, on fusion with borax, this quality was augmented. On mixing and melting together equal parts of calx of nickel, gypsum, colophony, and white flux, a powdery, fictitious, and reguline mass was produced; which, by fusion with borax, afforded a regulus possessing the properties...
C H E M I S T R Y.

Nickel.

Properties of nickel, but not entirely definite of cobalt, which obeyed the magnet, and did not part with its iron even after two solutions in the nitrous acid, and various reductions by fusion with borax; the sulphur was also retained with great obstinacy.

On dissolving regulus of nickel by fusion, in hepatic sulphur made with fixed alkali, adding a quantity of nitre sufficient only to destroy a small part of the hepatic sulphur, the regular which had been fuperseded by it was separated, and fell to the bottom. On examining this regulus, it appeared more pure, and generally deprived of cobalt, but still containing iron. In like manner nickel is always very distinctly precipitated by regulus of cobalt, as this latter is attracted more powerfully by the hepatic sulphur. When dissolving by fusion with hepatic sulphur, this femimetal may be precipitated by adding iron, copper, tin, or lead, and even by cobalt: the regulus obtained is indeed scarcely ever attracted by the magnet; but we are not from thence to conclude that it does not contain any iron; for when the heterogeneous matters, which impede its action, are properly removed, it then acknowledges the power of the magnet very plainly.

IV. By Nitre.

One part of Cronstedt's regulus was added to twelve of nitre ignited in a crucible, and kept red-hot for about an hour. Some weak families appeared first; then a large quantity of arsenic was emitted; and, lastly, the sides were covered with a blue crust occasioned by the cobalt, a green matter remaining at bottom. This fused again for an hour, with twelve parts of nitre, tinged the internal sides of the vessel of a green colour; and, lastly, a brownish green mass, much less in quantity than in the former operation, was left at the bottom. This green matter, treated in the same way for two hours a third time, left a grey foetia at the bottom, which yielded no regulus with black flux.

Another portion of the same regulus, treated in the same way with nitre, was dissolved, and became green; yet, on being freed by abrasion from the alkaline salt, it yielded no regulus with black flux, but only foetia of a hyacinthine colour mixed with blue, tinged nitrous acid of a green colour, crucinating, and on evaporation leaving a greenish calx behind.

Another portion of Cronstedt's regulus was kept some hours in the crucible with 16 parts of nitre, by which means all the arsenic was first separated; then the phlogisticated nitrous acid; and, lastly, the sides of the vessel were penetrated by a kind of green efflorescences. The mass, after being washed with water, was of a dilute green colour, and tinged borax of a greenish brown. A green powder was still yielded, after treating this in the same manner with 12 parts of nitre; and on reducing it with one-half black flux, one-eighth borax, and as much lime, a yellowish white regulus, both magnetic and malleable, was obtained, possessing all the properties of nickel. Its specific gravity was 9.039; the phlogistic ingredient was used in small quantity, that the iron might, if possible, enter the foetia.

It having appeared from this and some other experiments, that nitre was capable of discovering the smallest quantity of cobalt contained in nickel the products of the former operations were now subjected to its action. The regulus produced by repeated foecification thus became a little blue; that dissolved in volatile alkali (to be afterwards particularly mentioned) discovered a considerable quantity of cobalt; nor was there any one which did not thus discover more or less of that ingredient by this trial.

V. By Sal Ammoniac.

A calx of nickel, so much freed from cobalt that it Effects of did not tinge borax in the leash, mixed with twice its weight of sal ammoniac, yielded by sublimation with a strong red heat, two kinds of flowers; one, which rose higher than the other, was of an ash colour; the other white. The bottom of the glass was stained of a deep hyacinthine colour; the residuum was divided into two strata; the upper one yellow, scaly, and shining like mosaical gold. With borax it afforded an hyacinthine glass, but not regulus; and in a few days liquefied in the air, acquiring a green colour and the confidence of butter. The residuum showed the same properties with calx of nickel; and the green solution flowed no veigles of iron with galls, but became blue with volatile alkali; which was also the case with the flowers. The lower stratum contained a calx, blackish on the upper part, but of a ferruginous brown in the under, with a friable and scarcely magnetic regulus, of a reddish white. The blackish calx yielded an hyacinthine glass with borax. Part of this stratum sublimed with twice its quantity of sal ammoniac; and with the same degree of heat as before, yielded flowers of a very fine white, with a residuum of ferruginous brown, greenish on the upper part towards the sides of the vessel, the bottom being stained of an hyacinthine colour as before. Twenty parts of sal ammoniac being added to a part of the interior stratum reduced, the whole was sublimed in a retort; a blackish powder remained, which became green by calcination, and of an hyacinthine colour by foecification, as did also the bottom of the containing vessel. The sublimation being twice repeated, using a double quantity of sal ammoniac each time, the calx became at length very green, dissolving with the same colour in the nitrous acid, and yielding by reduction a white, brittle, and very little magnetic regulus. In all the sublimations, it was observed, that the volatile alkali rofe first; then sal ammoniac; and lastly, a part of the marine acid was forced over by the violence of the heat.

VI. With Nitrous acid.

Having obtained a salt by crystallization from nickel Effects of of dissolving in nitrous acid, part of this was calcined with antimony charcoal doft in a proper vessel, and during the operation a large quantity of arsenic was dissipated; a grey, femidulcite, and magnetic regulus being obtained after reduction. A brittle regulus was obtained after a second solution, precipitation, and reduction; but by a third operation it became again femidulcite and magnetic. By repeating this process a fourth and fifth time, the quantity became to much diminished that it could no longer be tried. In all these solutions a blackish residuum appeared; which, when suffered to remain in the acid, grew white by degrees; but when edulcorated and laid on a burning coal, exhaled a sulphurous smoke, and left a black powder soluble in the nitrous acid.

VII. By

Nitre capable of separating all the cobalt from nickel.
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CHEMISTRY.

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Volatile alkali.

Four hundred and eighty-seven parts of a calx of nickel, produced by diffusing Crofiedt's regulus in nitrous acid, and precipitating the solution by a fixed alkali, being immerfed for 24 hours in a quantity of volatile alkali, yielded a residuum of fifty, having a blackish green colour. The solution, which was blue, by filtration and infpiration yielded a powder of a light blue, weighing 282; which, reduced with black flux, produced a white, feminidite, and highly magnetic regulus, weighing 35, whose specific gravity was 7.000. The icoria were of a light red; but when mixed with borax, put on a hyacinthine colour, and yielded a regular weighing 30. The two regulns united together proved very refractory; so that the mafs could not be melted by the blow-pipe, even with the addition of borax. It lent forth neither an arfencical nor sulphureous smell on the addition of charcoal dust; but, on a succeeding reduction, yielded by hyacinthine icor; and the remaining fuccelli, diffolved in nitrous acid, affording a very green solution, which, on the addition of volatile alkali, yielded a powder of the fame colour.

From 50 parts of the blackish-green residuum, 13 of a clear white, brittle, squamous, and little magnetic regulus, were obtained, the specific gravity of which was 9.333. At the bottom of the vessel was found a fcoria of an obscurely blue colour, with the upper part hyacinthine. It was easily fufed; and tinged borax, first blue, then of a hyacinth colour, upon which it became more strongly magnetic. By the addition of heat it diffolved in nitrous acid, forming a solution of a beautiful blue colour. A black powder at first floatd in the liquor, but became white, and fell to the bottom. After eduction it was for the most part diffipated, with a sulphureous smell, on being exposed to the fire; a little brown-coloured mafs, soluble in volatile alkali, remaining at bottom. This solution was precipitated by phlogificated alkali, and a powder thrown down of the colour of calx of nickel, which soon grew blue with volatile alkali.

From all these experiments it appears, that nickel cannot be obtained in a state of purity by any means hitherto known. From every other substance, indeed, it may be separated, except iron; but this refisits all the operations hitherto defcribed, and cannot be diminished beyond certain limits. The magnet not only readily discovers its preence, but some portions of the regulus itself becomes magnetic; but the tenacity and difficulty of fution, which increafes the more in proportion to the number of operations, plainly show that there is no hope of separating the whole quantity, unless we fuppose the regulus of nickel itself to be attracted by the magnet; and there is certainly a pofibility that one other substance besides iron may be attracted by the magnet. The great difficulty, or rather impoffibility, of obtaining it in a state of purity, naturally rafes a fupicion of its not being a diftinct semimetal, but a mixture of others blended together; and on this fubjeét our author agrees in opinion with those who fuppose it to be a compound of other metals. Indeed, Mr BERGMAN is of opinion, that "nickel, cobalt, and manganese, are perhaps no other than modifications of iron." And in order to aecertain this, he made the following experiments.

1. Equal parts of copper, of the gravity of 9.324, and iron of 8.5676, united by fusinon with black flux, yielded a red mafs, whose specific gravity was 8.5441; compose and which tinged nitrous acid first blue, then green, nickel artificially.

2. Two parts of copper and one of iron had a specific gravity of 8.4634; the mixture yielding first a blue, and then a green solution. 3. Equal parts of copper and iron, of the specific gravities already mentioned, with another part of cobalt whose gravity was 8.1500, yielded a metal of the gravity of 8.0300, imparting a brown colour to the solution. 4. Two parts of arsene of 4.000, added to one of copper and another of iron, gave a brittle metal of 8.0468, which formed a blue solution. 5. One part of copper, one of iron, two of cobalt, and two of white arfene, gave a brittle regulus of 8.4186; the solution of which was brownish, and separated in part spontaneously. 6. One part of copper, one of iron, four of cobalt, and two of white arfene, formed a mafs of 8.7174. The solution was somewhat more red than the former; and a similar effect took place on repeating the experiment, only that the specific gravity of the metal was now 8.2941. 8. One part of iron and four of white arfene formed a metal which diffolved with a yellow colour; and, on the addition of Pruffian alkali, immediately let fall a blue sediment. 9. One part of copper, eight of iron, sixteen of white arfene, and four of sulphur, united by fire, on the addition of black flux, yielded a mafs which, though frequently calcined and reduced, produced nothing but brown or ferruginous calces. It acquired a greenish with nitrous acid; but on the addition of phlogifticated alkali deposited a Pruffian blue. 10. One part of iron was diffolved in fix of the nitrous acid, and likewise separated by one part of copper and one of the calcined ore of cobalt, in the fame quantity of the fame acid. The whole of the solution of iron was then mixed with five parts of the solution of copper, whence a green and faturated nickel colour was produced; which, however, on the addition of three parts of the folution of cobalt, became evidently occluded. The alkaline lixivium dropped into this, which formed a ferruginous brown sediment, the folution still remaining green: afterwards all the blue was precipitated; by which at first all colour was deftroyed, but afterwards a red appeared, occasioned by the cobalt diffolved in the alkaline falt. The fediment, when reduced, yielded a regulus similar to copper, and at the fame time duc­tile, which tinged both glafs and nitrous acid of a blue colour. If a faturated folution of nickel be mixed with half its quantity of folution of cobalt, the green colour is much occluded; but four parts of the former, on the addition of three of the latter, put off all appearances of nickel. See the article Nickel.

§ 14. OF PLATINA.

The properties of this metal have not as yet been The hear­thoroughly investigated by chemists, and there is there­viat of all fore some disagreement concerning them. Formerly metals, it was fupposed to be inferior in specific gravity to 4 A gold;
Platina.

Gold; but now is generally allowed to be superior in that respect by little less than a fourth part; being to water in the proportion of 23 to 1 when perfectly freed from all heterogeneous matters. Mr. Bergman says that its colour is that of the purest silver. They are not affected by the magnet in the least, nor can they be dissolved in any simple menstruum excepting dephlogisticated marine acid. As it is commonly met with, however, platina has the form of small grains, its plates of a bluish black, whose colour is intermediate between those of gold and silver. These grains are mixed with many foreign substances, as particles of gold, mercury, and blackish ferruginous, sandy grains, which by the magnifier appear coriaceous. The grains themselves, when examined by a magnifying glass, appear sometimes regular, sometimes round and flat, like a kind of button. When beat on the anvil, most of them are flattened and appear dull; some break in pieces, and on being narrowly examined appear to be hollow, and particles of iron and a white powder have been found within them; and to these we must attribute the attraction of platina by the magnet; since, as we have already observed, pure platina is not attracted by it.

Mr. Bergman, who carefully examined this metal, dissolved it first in aqua-regia composed of the nitrous and marine acid. The solution at first exhibits a yellow colour, but on approaching to saturation became red, and the reddness increases as the liquor becomes more loaded with metal. Crystals are produced by evaporation of a deep red colour, generally in small angular and irregular grains, whose true shape cannot be discovered. Their appearance is sometimes opaque and sometimes pellucid. After these are once formed, they are extremely difficult of solution, requiring much more water than even gypsum itself for this purpose. — The solution is not precipitated by vegetable fixed alkali, nor does the latter affect the crystals, except very faintly by digestion with them in a caustic frit. Acetated mineral alkali takes them up and grows yellow, but without depositing anything, though it decomposes them at last by evaporating to dryness.

On the addition of a small quantity of vegetable fixed alkali, either mild or caustic, small red crystals soluble in water, and sometimes of an octahedral figure, are deposited. They are decomposed with difficulty by the mineral alkali, but not at all by the vegetable. If a larger quantity of falt is added at first, an infusible spongy matter of a yellow colour is precipitated. Crystalline particles of the same kind are thrown down by an alkali faturated either with the vitriolic, nitrous, marine, or acceous acids, though all the platina cannot thus be separated from the menstruum.

Aqua-regia, composed of nitrous acid and common salt, dissolved the metal with equal facility as the former; only the solution was more dilute, and a yellow powder floated on the surface, a larger quantity being found at the bottom. On adding vegetable fixed alkali to the clear solution, a copious yellow powder, soluble in a large quantity of water, was deposited. A powder, of a similar kind, was precipitated, tho' more slowly, and more of a crystalline nature; but mineral alkali, though used in much larger quantity, did not make any alteration. The collected powder was yellow, and agreed in property with that separated independently in a former experiment.

On repeating the experiment with nitre and depurate spirit of salt, instead of nitrous acid and sea-falt, the platina was dissolved into gold-coloured liquor, a green-coloured granulated matter falling to the bottom, and the finer part of the same rising to the top. After faturating the superaerious acid, a metallic calx, insoluble in water, was thrown down by the vegetable alkali. The green powder is soluble in water, and is of the same nature with the precipitate thrown down by the vegetable alkali.

Platina precipitated from aqua-regia by a sufficient quantity of mineral alkali, the precipitate washed and precipitated by vegetable alkali immediately lets fall a crystalline powder, as it does also with nitre and other salts, having the vegetable alkali at the same time dilutes them with dilute solutions of platina, dissolved in vitriolic acid. Nitrous acid also dissolves the calx in marine acid; — The above phenomena are likewise produced by the precipitate thrown down by the vegetable alkali after the saline powder has been deposited.
The volatile alkali first throws down this metal in a saline form; the grains sometimes distinctly octahedral. Their color is red when that of the solution is so, but yellow when the solution is more dilute. After faturating the superabundant acid, the same alkali precipitates the platina truly calcined. This precipitate is dissolved in water, though with difficulty, and may be reduced to more regular crystallites by evaporation. These are dissolved by the mineral alkali; but hardly any signs of decomposition are to be observed, unless the yellow solution, evaporated to dryness, be again dissolved in water; for then the metallic calx reverts at the bottom, and the solution is deprived of its yellow color. The vegetable alkali has scarce any effect in this way; for, after repeated exsolution, the solution remains clear and yellow: but here probably the fixed alkali takes the place of the volatile; for in larger quantities, and especially when the caustic vegetable alkali is made use of, the mixture filments of volatile alkali.

The volatile alkali, faturated with any acid, precipitates the platina in the same manner as the vegetable alkali in combination with acids: but these neutral salts precipitate only a determined quantity of platina; for after their effect has ceased, the liquor lets fall a pure calx of platina on the addition of vegetable or volatile alkali.

Platina, partly precipitated by neutral salts.

The caust of platina precipitated by mineral alkali, and then dissolved in any simple acid, shows nearly the same phenomena with volatile alkali as with the vegetable alkali. "Whence (says Mr Bergman) we may conclude, that platina dissolved in acids forms at first, both with the volatile and fixed vegetable alkali, a triple salt, difficult of solution, and which therefore almost always falls to the bottom unless the quantity of water be very large." Calcareaeous earth, whether aerated or caustic, produces the same phenomena as the vegetable alkali, without any crystalline appearance.

Platina has been remarkable ever since its first discovery for being the most insubfluent substance in the world. Meissr Macquer and Beaumé kept it in the most violent heat of a glafs-house furnace for several days without perceiving any other alteration than that its grains adhered slightly to each other; but the adhesion was so slight that they separated even by touching. In these experiments the color of the platina became brilliant by a white heat, but acquired a dull grey colour after it had been heated for a long time. They observed also, that its weight was constantly increased; which undoubtedly arose from the calculation of the iron it contained. Dr. Lewis, after various attempts to fuse platina, found himself unable to succeed even in a fire which vitrified bits of glafs-house pots and Heffian crucibles. Meissr Macquer and Beaumé first melted this refractory metal with a large burning-gla$s, 22 inches diameter and 28 inches focus. The power of this speculum was almost incredible, and far exceeded what is related of the lens of Téhirnhausen or the mirror of Villette. Its general effects are related under the article BURNING-CrEss.

And as platina refilts this intense heat more than six times as long as the most insubfluent substances formerly known, it appears to require a fire as many times stronger to melt it. It has been found, however, capable not only of fussion but of vitrification by the electric fire; and that it may also be melted by fire excited by defphlogistificated air: but M. de Lisle was the first who was able to melt it with the heat of a common forge when exposed to the blast of a double belows in a double crucible. Thus its real specific gravity must be observed in a common forge. Its precipitate is fusible, in a common forge.

Platina, most insubfluent substance in the world.

Though Dr Lewis could not accomplish the fusion alloyed by platina by the methods he attempted, he was not able to alloy it with other metals. Equal with other parts of gold and platina may be melted together by metals, a violent fire, and the mixed metal forms, however, an ingot by pouring it into a mould. It is whifht, hard, and may be broken by a violent blow; but when carefully annealed, is capable of considerable extension under the hammer. Four parts of gold with one of platina form a compound much more fusible than the former, and likewise more malleable; so that it may be extended into very thin plates without being broken or even split at the edges. Dr Lewis remarks also, that though in this case it is alloyed with such a quantity of white metal, it neverthele$s appears no paler than guinea usually are, which contain only one-twelfth of silver.

Equal parts of silver and platina melted together with gold, with a violent fire, form a much harder and darker metal, colored mafs than silver, which has also a large grain, though it preserves some ductility. Seven parts of silver with one of platina form a compound much more resembling silver than the other; but still coarser-grained and less white. From the experiments made on silver, however, it appears that no perfect union is formed.
formed between the two; for after the mixture has been kept in fusion for a considerable time, most of the platina separates and falls to the bottom. Lewis observed that silver melted with platina was thrown up with an explosion against the sides of the crucible.

Silver did not appear to be in any degree meliorated by its union with this metal, excepting by the superior hardness communicated to it; but copper seemed to be considerably improved. A large proportion of platina, indeed, as two-thirds or equal parts, produced an hard, brittle, and coarse-grained compound; but when a smaller quantity of platina is added, as from 1 to 9, or even less, a golden-coloured copper is produced, very malleable, harder, susceptible of a finer polish, smoother-grained, and much less subject to calcination and rust than pure copper.

Of all metallic matters, however, zinc most readily unites with platina, and is most effectually dissolved by fusion. When the proportion of platina is considerable, the metal is of a bluish colour, the grain clover, without tarnishing or changing colour in the air, and they have not even the malleability of the femi-metal.

Platina unites readily with the compound metals, braifs formed of copper and zinc, and bronze made of copper and tin. In the latter it was remarkable, that the compound metal took up more platina than both its ingredients separately can do. This compound was hard and capable of receiving a fine polish, but is subject to tarnish.

Equal parts of braifs and platina formed a compound very hard, brittle, capable of receiving a fine polish, and not subject to tarnish. It is possible therefore that it might be used to advantage as a material for speculums; all materials for which, hitherto discovered, have the great inconvenience of tarnishing in the air, and that very quickly.

Platina amalgamates with mercury, but with much greater difficulty than gold, which will also separate the quicksilver after it has been united with the platina. The amalgamation of platina does not succeed but by very long trituration of the metals with water, as for instance a week; but if the trituration be performed with a mixed metal composed of gold and platina, the mercury feizes the gold, and leaves the platina untouched. Dr Lewis proposes this as a method of separating gold from platina; and it is that used in Peru, where gold and platina are sometimes naturally mixed in the ore; but we do not know whether this separation be quite complete.

Mr Morveau succeeded in uniting iron with platina, though Dr Lewis could not accomplish this. The latter succeeded, however, in uniting it with cast iron. The compound was much harder and less subject to rust than pure iron. It was also susceptible of a much finer polish.

Platina may be alloyed with tin, lead, or bismuth, but without any advantage. To lead and tin it gives the property of affaining blue, violet, or purple colours, by being exposed to the atmosphere.

‘Dr Lewis could not succeed in uniting platina with arfenic; but M. Scheffer affirms, that if only one twentieth of arfenic be added to platina when red hot in a crucible, the two substances will be perfectly fused and united into a brittle grey mass. This experiment did not succeed with Mr Margraf, for he, having exposed to a violent fire during an hour a mixture of an ounce of platina with a fusible glass, composed of eight ounces of minium, two ounces of plints, and one ounce of white arfenic, obtained a regulus of platina well united and fused, weighing an ounce and 32 grains; the surface of which was smooth, white, and shining, and the internal parts grey; but which nevertheless appeared sufficiently white when filed. The experiment succeeded imperfectly also in the hands of Dr Lewis; but M. Fourcroy informs us, that ‘it has since been repeated, and that platina is in fact very fusible with arfenic, but that it remains brittle. In proportion as the arfenic is driven off by the continuance of the heat, the metal becomes more fusible; and by this process it is that M. Acharut and M. de Morveau succeeded in making crucibles of platina by melting it a second time in moulds.’

M. Fourcroy seems to deny that platina can be united with mercury, contrary to what is mentioned above. ‘Platina (says he) does not unite with mercury, though triturated for several hours with that metallic fluid. It is likewise known, that platina refits the mercury used in America to separate the gold. Many intermediums, such as water, used by Lewis and Beaumé, and aqua-regia by Scheffer, have not been found to facilitate the union of these two metals. In this respect platina seems to resemble iron, to whose colour and hardness it likewise in some measure approaches.’

This last sentence, however, seems very little to agree with what he himself had before told us of M. Macquer’s experiment of melting platina. ‘The melted portions (says he) were of a white brilliant colour, in the form of a button; they could be cut to pieces with a knife.’ This surely was a very small approach to the hardness of iron; and gives us an idea rather of the consistence of tin or lead. ‘One of these masses was flattened on the anvil, and converted into a thin plate without cracking or breaking, but it became hard under the hammer.’ In another experiment indeed the button of platina was brittle, and sufficiently hard to make deep traces in gold, copper, and even iron; but this was obtained from precipitated platina urged for 33 minutes by a strong blast furnace. In an experiment of this kind M. Beaumé even succeeded in melting the precipitate along with certain fluxes, into a vitrifrom substance by two different processes. The precipitate of platina, mixed with calcined borax, and a very fusible white glass, was exposed, for 36 hours, in the hottest part of a potter’s furnace; and afforded a greenish glass, inclining to yellow, without globules of reduced metal. This glass, treated a second time with cream of tartar, gypsium, and vegetable alkali, was completely melted, and exhibited globules of platina dispersed through its substance. M. Beaumé separated them by washing, and found them fusible. The same chemist afterwards, together

(a) For a particular account of this process see before no 587.
Platina.

Platina, together with M. Macquer, exposed precipitate of platina to the same burning mirror with which they had fused the metal: the precipitate exhaled a very thick and luminous fume, with a strong smell of aqua-regia: it lost its red color, returned that of platina, and melted into a perfect brilliant button, which was found to be an opaque vitreous substance, of an hyacinthine colour at its surface, and blackish within; and may be considered as a true glass of platina. It may however be observed, that the saline matters with which it was impregnated contributed doubts to its vitrification.

"The orange-coloured precipitate obtained by pouring a solution of sal ammoniac into a solution of platina, appears to be a saline substance entirely soluble in water. This precipitate has a valuable property, discovered by M. de l'Ile, viz. that it is fusible without addition in a good furnace or common forge-heat. The platina melted by this process is a brilliant, dense, and close-grained button; but it is not fusible unless it has been exposed to a very strong heat. Macquer thinks that this fusion, like that of the grains of platina alone, exposed to the action of a violent fire, confines only in the agglutination of the softened particles; which being exceedingly more divided and minute than the grains of platina, adhere to and touch each other in a greater number of points than the grains; and in that manner render the texture of the metal much more dense, though no true fusion may have taken place. It seems, however, that if platina in grains be capable of fusion by the burning glafs, and of becoming considerably ductile, the precipitate of this metal, formed by sal ammoniac may likewise be fused on account of its extreme division; and that its not being as ductile as the button of platina fused by the solar heat, may perhaps depend on its retaining a part of the matter it carried down with it in precipitation, of which it may be possible to deprive it by fire."

Attempts to purify platina by cupellation

It being so extremely difficult to bring platina itself into fusion, one of the first attempts to purify it was by cupellation with lead. Thus the better metals would be purified, and, running through the crucible along with the lead, leave the platina in as great purity as though it had been melted by itself. This operation, however, was found almost equally difficult with the fusion of the metal by itself. Lewis failed in the experiment, though he applied the most violent heat of the ordinary cupelling furnaces. The vitrification and absorption of the lead indeed took place as usual; but in a short time the platinum became fixed, and could not by any means be reduced fluid. Melfrs Macquer and Beaumé succeeded by exposing an ounce of platina with two ounces of lead in the hottest part of a porcelain furnace, where the fire is continued for 50 hours without interruption. At the end of the operation the platina was flattened in the cupel; its upper surface was dull and rough, and easily separated; but its under surface was brilliant, and it was found easily to extend under the hammer; and on every chemical trial was found to be perfectly pure, without any mixture of lead. M. de Moreau likewise succeeded in cupelling a mixture of one drachm of platina and two drachms of lead in M. Macquer's wind-furnace. The operation lasted eleven or twelve hours, and a button of platina was obtained which did not adhere to the cupel, was uniform, though rather rough, and of a colour resembling tin. It weighed exactly one drachm, and was not at all acted upon by the magnet. Thus it appears that platina may be obtained in plates or laminae, which may be forged, and consequently may be employed in making very valuable utensils; and this the more especially as Mr. Beaumé has observed that different pieces of it may be welded and forged like iron. After having heated two pieces of pure cupelled platina to whitlness, he placed them one upon the other, and striking them briskly with a hammer, found that they united together as quickly and firmly as two pieces of iron would have done.

The great specific gravity of platina has rendered it a very desirable matter for such as would adulterate the precious metal, and can procure the platina easily, adulterating gold with platina. This, however, can only be done in South America, where platina is met with in plenty. In Europe the scarcity of platina renders it a more valuable object than even the gold itself. Fears of this fraud, however, have undoubtedly given occasion to the prohibition of exporting it. There are great differences among chemists concerning the quantity of platina that can be mixed with gold without destroying the colour of the latter. Dr. Lewis, as has already been observed, informs us, that four parts of platina may be mixed with one of gold, and yet the mixture be no paler than that for guineas; while Fourcroy afferts, that "it greatly alters the colour of the metal, unless its quantity be very small: thus, for example, a 47th part of platina, and all the proportions below that, do not greatly affect the colour of the gold." But whether this be the case or not, chemistry has afforded various ways of separating even the smallest proportion of platina from gold so that there is now no reason to prohibit the importation of it to Europe, more than that of any other metal with which gold can be alloyed. The following are the methods by which the platina may be most readily discovered: 1. By amalgamating the suspected metal with mercury, this fraud and grinding the mixture for a considerable time with it should water; by which the platina will be left, and the gold be pradically amalgamated. 2. By dissolving a little of it in aqua-regia, and precipitating with alkaline salt; the remaining liquor, in case the metal has been adulterated with platina, will be so yellow, that it is supposed a mixture of one thousandth part would thus be found out. 3. By precipitation with sal ammoniac, which throws down the platina but not the gold. If mineral alkali be used, the gold will be precipitated, but not the platina, unless the precipitant is in very large quantity. 4. By precipitation with green vitriol, which throws down the gold, and leaves the platina united with the crucible.

Platina.

All these methods, however, are not only attended with a considerable deal of trouble, but in some cases, for instance in suspected coin, it might not be eligible to use them. The hydraulic balance, alone affords a certain method of discovering mixtures of metals without hurting the texture of their parts. The great specific gravity of platina would very easily discover it if mixed with gold in any moderate quantity; and even in the smallest, the gravity of the mass could never be less than that of the pure gold: which circumstance
Manganese

compliance, as gold is never worked without alloy, would be sufficient to create a just suspicion; after which some of the methods already mentioned might be tried. It is possible, however, that the hardness and ductility of platinum might render it more proper for alloying gold than even copper or silver, usually made use of for this purpose.

§ 15. Of Manganese.

This substance is now discovered to afford a semi-metal different from all others, and likewise to posses some other properties of a very singular kind. Mr Scheele has investigated its nature with the utmost care; and the results of his inquiries are as follows:

1. Two drachms of levigated manganese, digested for several days in a diluted vitriolic acid, did not appear to be dissolved or diminished in quantity; nevertheless a yellowish white precipitate was procured by saturating the acid with fixed alkali. The remaining manganese was not acted upon by more of the same acid, but the addition of another half ounce nearly destroyed the acidity of the menstruum when boiled upon it.

2. With concentrated vitriolic acid an ounce of manganese was reduced to a mass like honey, and then exposed to the fire in a retort till it became red-hot. Some vitriolic acid came over into the receiver; and after breaking the retort, a mass was found in it weighing 12; drachms, hard and white in the inside, but red on the outside. A great part of it dissolved in distilled water, on the effusion of which at first it became very hot. The residuum after evaporation weighed a drachm and an half, and was of a grey colour. Being calcined in a crucible with concentrated vitriolic acid till no more vapours arose, it was all dissolved by water excepting one drachm; which being again calcined with the same acid, an insoluble residuum of a white colour, and weighing only half a drachm, remained. This white residuum effervesced with borax, and melted into a transparent brown glass; it likewise effervesced with fixed alkali, changing into a brown mass, which yielded an hepatic smell with acids, and became at the same time gelsinous. The solution obtained by calcination was evaporated and set to crystallize. A few small crystals of felenite were first deposited, and afterwards some very fine large crystals of an oblique paralleloiped form, whose number increased as long as there was any liquid left. They tafted like Epson salt, and Mr Weffield supposes them to be alum; but according to Mr Scheele, they have no other resemblance to alum than that they contain the vitriolic acid.

3. By phlogificated vitriolic acid the manganese was entirely dissolved. To procure this acid in purity, Mr Scheele dipped some rags in a solution of alkali of tartar, and after saturating them with the fomes of burning brimstone, put them into a retort, pouring on them some dissolved acid of tartar, luting on a receiver which contained levigated manganese and water. After a warm digestion of only one day, the liquid of the receiver had become as clear as water, and a little fine powder, confluting principally of siliceous earth, fell to the bottom.

4. Two drachms of levigated manganese, digested for several days with an ounce of pure colourless acid of nitre, did not appear to have deprived the menstruum of its acidity, or to have been affected by it in any degree. The liquor being distilled off, and the product of the distillation poured back on the residuum, a small quantity of it was dissolved. By a third distillation, and pouring back the liquor on the residuum, a complete solution was effected; and this quantity of acid appeared capable of dissolving nine drachms of the powder.

5. The solution of manganese thus saturated, was precipitated and divided into two equal portions. Into one and crystals obtained of these some drops of vitriolic acid were poured, by which a fine white powder was thrown down, which however, did not settle to the bottom for some hours. It was soluble neither in boiling water nor in acids. The limpid solution, by evaporation, yielded some small crystals of felenite or gypsum.

6. From the other half of this solution, after evaporation by a gentle heat, about ten grains of small shining crystals of a bitter taste were obtained. By pouring some drops of vitriolic acid into the solution impregnated by gentle heat, no precipitation, excepting of a little felenite, ensued; but as soon as it was impregnated to the consistence of honey, some fine acicular crystals, verging towards the fame centre, began to form, but grew foit, and deliquesced in a few days after.

7. Phlogificated nitrous acid dissolves manganese as readily as the phlogificated vitriolic. A little lead was dissolved by phlogificated vitriolic nitrous acid.

8. An ounce of purified muriatic acid was poured upon half an ounce of levigated manganese; which, it on spirit after standing about an hour, assumed a dark brown of salt colour. A portion of it was digested with heat in an open glass vessel, and smelled like warm aqua regia. In a quarter of an hour the f mell was gone, and the solution became clear and colourless. The reft of the brown solution being digested, to see whether the muriatic acid would be saturated with manganese, an effervescence ensued, with a strong f mell of aqua regia, which lasted till next day, when the solution was found to be saturated. Another ounce of acid was poured upon the residuum, which was followed by the same dissolving phenomenon, and the manganese was entirely dissolved, by this a small quantity of siliceous earth only remaining.

The solution, which was yellow, being now divided into two portions, some drops of vitriolic acid were poured into the one, by which it instantly became white, and a fine powder, insoluble in water, was precipitated. Some small crystals of felenite were formed by evaporation, and the residuum exhibited the fame phenomenon with those abovementioned with nitrous acid.
The following experiments Mr. Scheele concludes, that manganiferous acid has a strong elecive attraction for all phlogistic substances; and that this attraction becomes stronger, if there be present a menstruum which can unite with the phlogificated manganiferous acid. Thus it attracts phlogiston more powerfully than even the nitrous acid itself in the moist state. By saturation with phlogiston, manganiferous acid has the property of losing its black colour, and assuming a white one, which is unusual, the phlogiston generally communicating a black or dark colour to the substances with which it was united.

That manganiferous acid naturally contains some phlogiston, though in small quantity, appears from evaporating a solution of it in vitriolic acid to dryness, and then distilling the mala in a glass retort in an open fire. When the retort begins to melt, the acid parts fly off from the manganiferous acid, forming a black colour. By distilling the mala remaining after evaporation of the nitrous folution, a green vitriolic acid remains, and the black calx of manganiferous acid remains as before. A solution of this mineral in vitriolic or nitrous acid, precipitated by fixed alkali, retains its colour; but when calcined in the open fire, again becomes black.

By loosing its phlogiston, manganiferous acid becomes insoluble in pure acids; and therefore the residue of the above-mentioned folution cannot be dissolved by adding more of the vitriolic or nitrous acids: but if that which has come over into the receiver be poured back into the retort, a folution will again take place by reason of the manganiferous acid remaining in the acid.

On this principle our author explains the reason of Partial Solution of this mineral abovementioned. Part of it is dissolved, for instance, in the vitriolic acid, while the remainder is found insoluble. This happens (says he), "because the undissolved portion has parted with the little phlogiston it naturally possesses, to that portion of manganiferous acid which is taken up by the vitriolic acid during the firit dissolution; for without that principle it is insoluble."

Manganiferous acid attracts phlogiston more strongly when combined with some acid than by itself, as appears from the following experiments. 1. Levigated manganiferous acid, digested or boiled with a strong solution of sugar, honey, gum arabic, harthorn jelly, &c. remains unchanged, but on mixing the pounded manganiferous acid with vitriolic acid during the decomposition of the mineral, the whole is dissolved, the black colour vanishes by degrees, and the solution becomes as limpid as water. So strongly is the attraction of manganiferous acid for phlogiston in these circumstances, that metals, the noble ones excepted, render it soluble in these acids in a limpid form.

"It would be difficult to conceive how the concentrated acid of manganiferous acid might dissolve metals without affecting the phlogiston. Quicksilver and silver, when dissolved in the pure vitriolic acid, really lose their phlogiston, which is a constituent part of these metals. This appears from the red vapours in which the acid arises, and the dissolved metallic earth cannot be again reduced to its metallic form, till it has acquired the loth phlogiston, which is effected either by precipitation with complete metals or by heat alone. Thus manganiferous acid attracts phlogiston in a limpid form, and it is not probable that the concentrated acid undergoes a dissolution of this degree of fire; for if you saturate half an ounce of this acid with alkali of calx, and afterwards calcine a retort, with a receiver applied, an ounce and a half of powdered manganiferous acid, with an equal quantity of the same vitriolic acid, then dissolve the calcined mass in distilled water, and likewise wash well the receiver, which contains some drops of vitriolic acid, which are also to be added to the solution, and lastly, add the same quantity of alkali, there will be no mark of superabundant acid or alkali. Thence it may be concluded, that the phlogiston in the vitriolic acid, if there really exists any in it, contributes nothing to the solution. But the manganiferous acid precipitated by alkali, contains a considerable quantity of it; in consequence of which it is afterwards entirely soluble in acids without any addition."

The effects of volatile sulphureous acid on manganiferous acid, clearly prove what has been asserted. The manganiferous acid attracts the phlogiston contained in this acid, phlegmatically, which is the cause of its great volatility, and which renders it.

"Volatile acid dif-"
Manganese renders the former soluble in the new pure vitriolic acid. If this solution be mixed with concentrated vitriolic acid and distilled, no volatile sulphureous acid is obtained; and if it be precipitated by means of fixed vegetable alkali, vitriolated tartar is obtained; which proves that manganese has a stronger attraction than vitriolic acid for phlogiston in the most way.

"The effects of nitrous acid on this substance are similar to those of vitriolic acid. Could spirit of nitre sustain as great a degree of heat as the concentrated vitriolic acid, it would also entirely disfolve the manganese by means of the phlogiston attracted by heat; but as this is not the case, it is necessary to add phlogiston in the manner abovementioned. The manganese decomposes phlogificated nitrous acid, for the same reason that it does the volatile sulphureous acid; and that the phlogiston of this acid really combines with manganese, is manifest from this, that the effusion of vegetable acid destroys no smell of aquafortis by displacing the phlogificated acid of nitre. By distillation with pure vitriolic acid also, the nitrous acid is expelled, not in a smoking state, and of a yellow colour, but pure and colourless.

"In the solution of manganese by means of gum arabic or fugar, a very considerable effervescence takes place, owing to the extrication, or probably rather the production, of fixed air from the mixture; but with phlogificated acid of nitre no such phenomenon takes place, because the manganese is combined with pure phlogiston; and if this should be again separated, there is no cause for the production of fixed air. This mineral is also distilled without effervescence, by uniting it with nitrous acid and metals, arsenic or oil of turpentine."

As muriatic acid disfolves manganese without addition, Mr. Scheele is of opinion that this proves the existence of phlogiston in that acid, as has already been taken notice of. The manganese digested in the cold with spirit of salt assumes a dark brown colour; for it is a property of this substance that it cannot be dissolved into a colourless liquor without phlogiston, but has always a red or blue colour; but with spirit of salt the solution is more brown than red, on account of the fine particles of the manganese floating in the liquid. Here the mineral adheres but loyally to the acid, so that it may be precipitated by water.

The effects of acid of tartar and acid of lemons upon manganese are likewise explained on the principle already laid down, viz. the extreme attraction this substance has for phlogiston. Thus it attracts part of that naturally contained in these acids, decomposing one part of them, and being dissolved by the other. This destruction of the acid is similar to that of the sugar, gum arabic, &c. which render it soluble in nitrous acid; for if a proper quantity of these are added, the manganese will be dissolved, without a possibility of recovering the smallest particle of the vegetable substance employed; and if the solution be slowly evaporated and calcined, there will not remain the smallest mark of burned sugar or gum. During this decomposition, a pungent vapour arises, which, being collected, appears to be true vinegar. It is obtained in its purest state from diluted vitriolic acid, sugar, and manganese.

Flour acid disfolves but very little manganese, owing to its precipitating salt which envelopes the particles of manganese, and prevents the further action of the manganese. In all precipitations of manganese, however, by means of mild fixed alkalis, the full quantity is not procured; because the fixed air, detached from the mineral, disfolves part of it.

Though manganese contains nitre, yet this effects of does not happen till the mixture becomes red hot. If manganese phlogificated manganese be mixed with an equal quantity of nitre, and distilled in a glass retort, the mixture begins to grow black before the retort becomes red-hot, but no nitrous acid goes over. By lixiviation, no mark of uncombined alkali is met with; but phlogificated nitrous acid is extricated by the application of tamarinds, or any vegetable acid. Three parts of phlogificated manganese, mixed with one part of finely pounded nitre, yields no nitrous acid, though the nitre is alkalized as soon as the mixture becomes black in the retort.

Mr. Scheele proceeds now to another set of experiments upon manganese united with phlogiston. In order to procure it in this state, the best method is to disfolve in distilled water, and crystallize the salt obtained by solution of manganese in vitriolic acid, and then precipitate it with vegetable fixed alkali. In this state it is white like chalk; but by calculation in an open fire, the superfusious phlogiston flies off, and the calx regains its usual black colour. This change of colour likewise happens when the precipitation is made with caustic alkalis, whether fixed or volatile. The precipitate, indeed, in this case, is white when kept close from the air, but assumes a brown colour when exposed to it for any time; but when the precipitation is made by mild alkali, the white colour is preserved by the fixed air, which in this case it also contains. By diluting the solution with a considerable quantity of water, and precipitating with caustic alkali, the precipitate is brown from the very beginning, owing to the air in the liquid attracting the phlogiston from the manganese. The precipitate formed by lime-water is also brown; but on adding more of a strong solution of manganese, and afterwards precipitating with caustic alkali, the powder falls of a white colour; because the air, being already saturated with phlogiston, cannot take up any more. The results of Mr. Scheele's experiments on this phlogificated manganese are:

1. An ounce of this substance distilled by itself in a glass retort, with a strong fire, yielded a great quantity of fixed air with some drops of water. The residuum poured warm out of the retort grew red-hot, and set the paper on fire.

2. On repeating the experiment with only a drachm of phlogificated manganese, and tying a bladder to the neck of a retort, three ounce-measures of air came over: the residuum was of a light grey colour; dissolved in acids without addition of any more phlogiston; and took fire in that degree of heat in which sulphur smokes, but does not burn. From these experiments, says Mr. Scheele, it is evident, that phlogiston does not separate from manganese if the access of air be prevented.

3. One part of finely powdered manganese boiled in Beid with four of oil-olive, effervesced violently, and dissolved oil olive, into a kind of saline.

4. On distilling a mixture of finely powdered manganese and charcoal, with an empty bladder tied to the mouth of the retort, a quantity of fixed air was extricated.
Manganese.

5. On distilling half an ounce of powdered manganese with two drachms of sulphur, the latter partly rose into the neck of the retort, and some volatile acid vapours penetrated through the lute. The distillation was continued till the retort began to melt; and, on cooling, the residuum was found to weigh 3 drachms. It was of a yellowish-grey colour; and distilled in spirit of vitriol with effervescence, yielded an hepatic smell, some sulphur being also precipitated at the same time. By calcination in the open air, the sulphur was dissolved; but great part of the mass was rendered soluble on account of its having been penetrated by the acid vapour, and shot into crystals as though it had been formally dissolved in volatile sulphurous acid; and by repeating the calculation with more sulphur, the whole became at last entirely soluble, and was reduced to crystals.

7. By the addition of finely powdered manganese, triturated with nitre and strongly calcined in a crucible, unites with the alkali of the nitre, while the acid is dissipated in the air. The mass formed by the union of the manganese and alkali is of a dark green colour, and soluble in water, communicating also a green colour to the liquid; but in a short time a fine yellow powder (an ochre of iron) falls to the bottom, leaving the liquor of a blue colour. By the addition of water, this solution first assumes a violet colour, grows afterwards red, and a precipitation of the manganese takes place, which refumes its natural colour as soon as it has fallen. The same precipitation takes place on the addition of a few drops of acid, or by exposure for some days to the open air. As for the dark red colour affirmed by the solution when the precipitate is about to fall, Mr. Scheele conjectures that the particles of manganese may naturally have a red colour, which becomes visible when the substance is dispersed through a menstruum without being perfectly dissolved.

8. Half an ounce of phlogisticated manganese, distilled in a retort with an equal quantity of powdered sal ammoniac, yielded first a concrete volatile salt, after which some sal ammoniac undecomposed arose in the neck of the retort. Half an ounce of pure dephlogisticated manganese, mixed with two drachms of powdered sal ammoniac, yielded alkali in its caustic state. Both residua were soluble in water; which shows that manganese attracts phlogiston from the volatile alkali.

9. On digesting finely powdered manganese for some weeks with pure nitrous acid and some volatile alkali, a great number of air-bubbles rise to the top, and the volatile alkali is entirely decomposed: for though the mixture be afterwards distilled in a retort with the addition of quicklime, not the least urinous smell can be perceived. This decomposition is effected by the manganese attracting the phlogiston of the volatile alkali; for that the nitrous acid has no share in this, is proved by the following experiment.

10. An ounce of well triturated manganese was distilled with half an ounce of sal ammoniac; and a liquid alkali, such as that obtained from sal ammoniac and quicklime, was procured. On repeating this experiment, with the variation only of a bladder instead of a receiver, the same kind of air was obtained as that which rises to the top of the nitrous mixture. Though the emission of this air indicated a destruction of the volatile alkali, our author explains the reason of its being still obtained in a caustic state by the phlogiston taken from the alkali being more than sufficient to render the alkali soluble in natrium acid; in consequence of which, the superfluous quantity combines with the manganese, and enables it to decompose the sal ammoniac in the ordinary way. It must be owned, however, that his reasoning on this subject is not entirely satisfactory, nor does the account he gives of his experiments seem entirely consistent with itself. See Scheele's Chem. Essays, Essay V. xxxix.

11. Powdered manganese, distilled with an equal quantity of white arsenic, underwent no change, with the addition of arsenic flying off in its proper form; but with an equal quantity of yellow orpiment, some volatile sulphurous acid came over first, then a yellow sublimate, and at last a little red sublimate arose. On augmenting the fire by degrees, the orpiment remained obstinately attached to it. Similar effects ensued on treating manganese with an equal quantity of antimony; which likewise yielded a pungent sulphurous acid, but no sublimate. By calculation in the open air these compounds are decomposed; and the manganese, united with vitriolic acid, becomes soluble in water.

12. On distilling manganese with an equal quantity of finely pounded cinnabar, a volatile sulphurous acid came over first, then a little cinnabar was sublimed into the neck of the retort; and at last the quicksilver, which had been the basis of the cinnabar, began to distil: the residuum, being a combination of manganese and sulphur, was similar to the compounds already described.

13. With an equal quantity of corrosive sublimate, manganese underwent no change; but when sublimed with an equal quantity of mercurius dulcis, a corrosive sublimate, and then mercurius dulcis, arose into the neck of the retort. The reason of this is, that the mercurius dulcis contains a portion of phlogiston; by being deprived of which it ceases to be mercurius dulcis, and becomes corrosive sublimate: but by reason of the strong attraction of manganese for phlogiston, the mercurius dulcis parts with that portion which is necessary to keep it in its mild state, and thus is converted into corrosive mercury.

Sect. IV. Inflammable Substances.

These may be divided into the following classes: General


4. Resins. 5. Bitumens; and, 6. Charcoal.

Vol. IV.
CHEMISTRY.

§ 1. SULPHURE.

1. Common sulphur. For the extraction of this substance from its ores, see Sulphur. The artificial composition of it we have already related, n° 715; and have now only to take notice of a few of its properties, which come more properly under this section.

Sulphur, as commonly used in commerce and the arts, is of a pale yellow colour, of a disagreeable and peculiar smell, which is rendered more sensible when it is heated or rubbed. By rubbing, it receives very curious electrical qualities; (See ELEcTRIcITY.) Its specific gravity is considerably greater than that of water, though less than earth or stones. In clofe vessels, sulphur is incapable of receiving any alteration.

It melts with a very gentle heat; and then is sublimed, adhering to the capital in small, very fine, needle-like crystals, called flowers of sulphur. It may thus be sublimed many times without alteration. If sulphur is exposed to a heat barely sufficient to melt it, and very slowly cooled, it crystallizes in form of many needles crossing one another. Some of these pointed crystals may also be observed in the interior parts of the lumps of sulphur which have been melted, and cast into cylindrical moulds, as they are commonly sold; because the centre of these cylindrical rolls is more slowly cooled than the surface. Sulphur also gives this needle-like form to cinnabar, antimony, and many other minerals containing it. Sulphur may be decomposed in several ways. The most simple is by burning; which we have already taken notice of, n° 623. It may also be very effectually decomposed by mixing it with iron filings and water. In this case the phosphigen is disublimated, and the acid uniting with the iron forms a green vitriol.

It is very remarkable, that though sulphur is composed of vitriolic acid and phosphigen, yet the addition of more inflammable matter, so far from making the union stronger, weakens it to a great degree: and hence we have another method of decomposing this substance; namely, by combining it with a large quantity of oil, and distilling the compound. Sulphur is capable of being easily dissolved in expressed oils, but very difficult in effential ones. These compositions are called balsams of sulphur; and are sometimes employed in medicine, but are found to be of a very heating nature. They are much used by farriers. According to Mr Beaumé, sulphur cannot be disublimed in oil, without a heat sufficient to melt it. A larger quantity is kept disublimed when the mixture is hot, than when cold; and consequently the sulphur, especially if it has been disublimed in a thin effential oil, crytallizes on cooling the mixture. The sulphur, thus separated from the oil, is found not to be altered in any respect from what it formerly was; but if the mixture is exposed to a degree of heat capable of entirely decomposing the oil, the sulphur is decomposed along with it, and the same products are obtained by distilling this mixture to dryness, as if a mixture of pure oil of vitriol and oil were distilled. These products are, first a portion of oil, when an effential oil was made use of in the composition of the balsam; then some volatile sulphureous acid, which is at first watery, and afterwards becomes stronger; along with this acid more oil arises, which becomes more and more thick towards the end of the distillation; and lastly, when the resort has been made red hot, nothing remains but a fixed coal.

In this process we find, that both the sulphur and oil are decomposed. The acid of the sulphur seems to attack the watery principle of the oil, while its phlogiston remains confounded with that of the oil, or is disublimed in vapours. Hence, though the vitriolic acid in sulphur is concentrated to the utmost degree, and perfectly free from water, what rifes in this distillation is very aqueous, by reason of the water which it attracts from the oil.

Spirit of wine does not sensibly act upon sulphur in its liquid state; but if both the spirit of wine and sulphur meet in the state of vapour, they will then unite, and a perfect solution will take place. By methods of this kind, many combinations might be effected, which have been hitherto thought impossible.

Pure sulphur unites easily with all metals; gold, its union platina, and zinc, excepted. The compounds, except with metals that with mercury, poofs a metallic lustre without any dulness. The sulphur may be separated by expelling the mixture into a strong fire. (See MetalurGy,) or by dissolving the metallic part in acids. The sulphur, however, defends several of the metals from the action of acids; so that this dissolution succeeds but imperfectly. The reguline part of antimony is more easily separated from sulphur by means of acids than by any other metallic substance. Alkali salts will separate the sulphur from all metals in fusio, but they unite with it themselves, and form a compound equally capable of dissolving the metal.

Sulphur united with quicksilver forms the beautiful pigment called cinnabar, or vermilion; which is so much used in painting, that the making of it is become a distinct trade. Neumann relates, that in the making of cinnabar by the Dutch method, six or eight parts of quicksilver are made use of to one of sulphur. The sulphur is first melted, and then the quicksilver is filtered into it; upon which they unite into a black mass. In this part of the process the mixture is very apt to take fire; of which it gives notice by swelling up to a great degree. The vessel must then be immediately covered. The mass being beaten to powder, is afterwards to be sublimed in large earthen jars almost of an equal width from end to end; these are hung in a furnace by a strong rim of iron. When the matter is put in, the mouth of the vessel is covered, the fire increased by degrees, and continued for several hours, till all the cinnabar has sublimed; care being taken to introduce at times an iron rod to keep the middle clear; other wise the cinnabar concreting there, andMopping up the passageway would infallibly burst the vessels.

The quantity of sulphur directed in the common receipts for making cinnabar is greatly larger than the above; being no less than one-third of the quantity of quicksilver employed: accordingly it has been found, that the sublimate, with such a large quantity of sulphur, turned out of a blackish colour, and required to be several times sublimed before it became perfectly red; but we cannot help thinking, that by one gentle sublimation
divides the matter among six retorts, so that if any accident happens to one, the whole matter is not lost. The retorts ought to be well luted to a receiver of a moderate size, pierced with a small hole, and half full of water; and a small wall of bricks must be raised between the furnace and receiver, in order to guard this vessel against heat as much as possible. The retorts are to be heated by slow degrees for an hour and an half; then the heat is to be increased till the vesels are red hot, when the phosphorus ascends in luminous vapours. When the retort is heated till between a red and white, the phosphorus falls in drops, which fall and congeal in the water at the bottom of the receiver. This degree of heat is to be continued till no more comes over. When a retort contains eight-pints or more, this operation continues about five hours.

In the first distillation, phosphorus never passes pure, Redistillation is always of a blackish colour, by reason of its carrying along with it some part of the coal. From this, phosphorus however, it may be purified by redistillation in a small glass-retort, to which is luted a receiver half full of water. A very gentle heat is sufficient; because phosphorus, once formed, is very volatile; and as the fuliginous matter was raised probably by the fixed air emitted by the charcoal in the instanteous union with the phosphoric acid, none of it can arise in a second distillation.

The phosphorus is then to be divided into small cylindrical rolls, which is done by putting it in glass-tubes immersed in warm water; so the phosphorus is almost as fusible as fus. It takes the form of the glass-tubes; from which it may be taken out, when it is cold and hardened. All this must be done under water, lest the phosphorus should take fire.

This concrete continually appears luminous in a dark place; and by a very slight heat takes fire, and burns sometimes far more vehemently than any other known substance. Hence it is necessary to be very cautious in the distillation of it; for if the receiver should happen to break while the phosphorus is distilling, and a little flaming phosphorus fall upon the operator's legs or hands, it would burn its way to the bone in less than three minutes. In this case, according to Mr Heliot, nothing but urine will stop its progress.

Though phosphorus takes fire very readily by itself, it does not inflame at all when grinding with other inflammable bodies, as camphor, gun-powder, or essential oils. In grinding it with nitre, some luminous flashes are observed; but the mixture never burns unless the quantity of phosphorus be large in proportion to the nitre: rubbed pretty hard on a piece of paper or linen, it sets them on fire if they are rough, but not if they are smooth. It fires written paper more readily than such as is white, probably from the former having more aperities. On grinding with iron-slings, it presently takes fire.

Oils ground with phosphorus appear, like itself; Liquid luminous in a temperately warm place; and thus become phosphoric oil, which may be rubbed on the hands, &c. without danger. Phosphorus is commonly prepared by grinding a little of the solid phosphorus with oil of cloves, or rubbing it first with camphor, and this mixture with the oil. A luminous amalgam, as it is called, may be obtained, by digesting...
CHEMISTRY.

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SULPHUR.

Experiments on phosphorus with spirit of wine.

Rectified spirit of wine, digested on phosphorus, extracts a part of it, as to emit luminous flames on being dropped into water. It is computed that one part of phosphorus will communicate this property to 60,000 parts of spirit. The liquor is never observed to become luminous of itself, nor in any other circumstance except that above-mentioned. By digestion for some months, the undissolved phosphorus is reduced to a transparent oil, which neither emits light nor concretes in the cold. By washing with water, it is in some measure revived; acquiring a thicker consistence, and becoming again luminous, though in a less degree than at first. During this digestion, the glass is very apt to burst.

Phosphorus is partially dissolved by express'd oils; and totally, or almost so, in essential oils and ether. When essential oils are satu rated with it by heat, a part of the phosphorus separates, on standing in the cold, in a crystalline form. Concentrated spirit of salt has no action on it. In distillation, the spirit rises first, and the phosphorus after it unchanged. Spirit of nitre dissolves it, and the distillation is attended with great heat and copious red fumes; so that great part of the spirit distills without the application of any external heat, and the phosphorus at last takes fire, explodes, and bursts the vessel. Oil of vitriol likewise dissolves phosphorus, but not without a heat sufficient to make the acid diftil. The distilled liquor is white, thick, and turbid; the residuum is a whitish tenacious mass, which deliquesces, but not totally, in the air. Phosphorus itself is resolved into an acid liquor on being exposed two or three weeks to the air, its inflammable principle seeming by degrees to be diffipated.

Phosphorus has been reported to produce extraordinary effects in the resolution of metallic bodies: but from the experiments that have been made with this view, it does not appear to have any remarkable action on them; at least on the precious ones, gold and silver, for the resolution or subtilization of which it has been chiefly recommended. The following experiments were made by Mr Margraff.

1. A scruple of filings of gold were digested with a drachm of phosphorus for a month, and then committed to distillation. Part of the phosphorus arose, and part remained above the gold, in appearance resembling glafs: this grew moist on the admission of air, and dissolved in water, leaving the gold unaltered. Half a drachm of fine silver, precipitated by copper, being digested with a drachm of phosphorus for three hours, and the fire then increased to distillation, a great part of the phosphorus arose pure, and the silver remained unchanged. Copper filings being treated in the same manner, and with the same quantity of phosphorus, the phosphorus sublimed as before; but the remaining copper was found to have lost its metallic brightness, and to take fire on the contact of flame. Iron filings suffered no change. Tin filings run into granules, which appeared to be perfect tin. Filings of lead did the same.

2. Sulphur, precipitated per fo, treated in the same manner, was totally converted into running quicksilver.

3. Rectified spirit of wine, digested on phosphorus, extracts a part of it, as to emit luminous flames on being dropped into water. It is computed that one part of phosphorus will communicate this property to 60,000 parts of spirit. The liquor is never observed to become luminous of itself, nor in any other circumstance except that above-mentioned. By digestion for some months, the undissolved phosphorus is reduced to a transparent oil, which neither emits light nor concretes in the cold. By washing with water, it is in some measure revived; acquiring a thicker consistence, and becoming again luminous, though in a less degree than at first. During this digestion, the glass is very apt to burst.

4. Phosphorus of Homberg. This substance, which in Homberg's experiments with metals.

1. Mr. Canton's phospheus. This is a composition of quicklime and common sulphur. The receipt for ton's phosphorus is as follows: 'Calcine some common oyster shells, by keeping them in a good coal fire for half an hour; let the purest part of the calx be pulverized and sifted. Mix with three parts of this powder one part of flowers of sulphur. Let this mixture be rammed into a crucible of about an inch and a half in depth till it be almost full; and let it be placed in the middle of the fire, where it must be kept red hot for an hour at least, and then set by to cool: when cold, turn it out of the crucible; and breaking or breaking it to pieces, scrape off, upon trial, the brightest parts; which, if good phosphorus, will be a white powder. This kind of phosphorus shines on being exposed to the light of the sun, or on receiving an electrical stroke.

2. Phosphorus of Homberg. This substance, which in Homberg's experiments with metals.
Practice.

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be bruised into powder; and then it must be put into a glafs matraf, the mouth of which is rather strait than wide, and seven or eight inches long. This matraf is to be placed in a crucible, or other earthen vefsel, large enough to contain the belly of the matraf, with about a space equal to that of a finger all round the vefsel. This space is to be filled with sand, so that the matraf shall not touch the earthen vefsel. The apparatus is then to be put into a furnace, and the whole to be made red hot. The fire must be applied gradually, that any oily or fuliginous matter may be expelled; after which, when the matraf is made red hot, fulphurous vapours exhale; this degree of heat is to be continued till a truly fulphurous flame, which appears at the end of the operation, has been seen nearly a quarter of an hour: the fire is then to be extinguished, and the materias left to cool, without taking it out of the crucible; when it ceases to be red hot, it must be stopped with a cork. Before the materias is perfectly cold, it must be taken out of the crucible, and the powder it contains poured as quickly as possible into a very dry glass phial, with a glass stopper. If you would preserve this phosphorus a long time, the bottle containing it must be sealed as feldom as possible. Sometimes it kindles while it is pouring into the glass phial; but it may be then extinguished by closing the phial expeditiously. A small quantity of this pyrophorus laid on paper, and exposed to the air, immediately takes fire, becomes red like burning coals, and emits a strong fulphurous vapour greatly resembling that which arises on decomposing liver of sulphur.

It has been generally alleged, that the common black phosphorus is impaired by being exposed to the light; but Mr Cavallo has discovered the fallacy of this supposition by the following experiment. Some portions of the same pyrophorus were inclosed in three glass tubes, and immediately sealed up hermetically. On the 22th of May 1779, two of them were suspended from a nail out of a window, and the third was wrapped up in paper and inclosed in a box, where not the least glimmering of light could enter. In this situation they were left for more than a year; after which one of those that had been kept out of the window was broke, along with that which had been kept in the dark, in the presence of Mr Kirwan; when the pyrophorus seemed to be equally good in each tube, taking fire in about half a minute after it was taken out of the tubes, and exposed to the air on a piece of paper.

There are many different kinds of pyrophor; some of the most remarkable of which are described under the article PYROPHORUS. Many theories have been invented to solve the phenomenon of their accension on the contact of air. This has been thought owing to the conversion of the earth of alum into lime, or to a remainder of the vitriolic acid attracting moisture from the atmosphere; but the formation of pyrophorus, without either alum or vitriolic acid, shows that neither of these opinions can be just. It is more probable, therefore, that the heat is occasioned by the total distillation of that aqueous part which is essential, to the constitution of terrestrial substances. In consequence of this, the water contained in the atmosphere is not only attracted with avidity, but decomposed by the matter reduced to such a state of extreme dryness. By these operations it gives out the latent heat contained in it, and this produces the accension in question.

§ 2. ARDENT SPIRITS.

See Fermentation and Distillation.

§ 3. OILS.

1. Essential Oils. Those oils are called essential which have evidently the smell of the vegetable from which oils, they are drawn. For the method of procuring them, see Distillation. They are distinguished from all others by their superior volatility, which is so great as to cause them rise with the heat of boiling water. All these have a strong aromatic smell, and an acid, caustic tafe; in which respect also they differ from other oils. This tafe is thought to proceed from a copious and disengaged acid, with which they are all penetrated. The presence of this disengaged acid in essential oils, appears from the impression they make upon the corks of bottles in which they are kept. These corks are always stained of a yellow colour, and a little corroded, nearly as they are by nitrous acid. The vapour of these oils also reddens blue paper, and converts alkalies into neutral salts.

This acid is likewise supposed to be the cause of their solubility in spirit of wine. They are not all equally soluble in this menstruum, because they do not all contain an equal quantity of acid. As this acid is much more volatile than the other volatile concrete, they lose a great deal of it by repeated distillations, and therefore they become less and less soluble on being frequently distilled. By evaporation they lose their volatile and thin part, in which the specific smell of the vegetable from which they are extracted resides; by which losses they become thicker, and acquire the smell and consistence of turpentine, and even of resins. In this state they are no longer volatile with the heat of boiling water; and, if distilled with a stronger fire, they give over an oil which has neither smell nor tafe of the vegetable whence they were extracted, but is entirely empyreumatic, and similar to those oils procured by distilling vegetable or animal substances with a strong fire. See Distillation.

To the class of essential oils, the volatile concrete called camphor seems most properly to belong. With them it agrees in its properties of inflammability, solubility in spirit of wine, and a strong aromatic flavour. The only differences between them are, that camphor is always in a solid state, and is incapable of decomposition by any number of sublimations. It has, however, been found possible to decompose it by distillation with certain additions. By distilling it several times along with bole, we obtain a fluid having the properties of an essential oil, soluble in water, and separating again on the addition of spirit of wine. On distilling it eight times with decomposed nitrous acid, we obtain a salt having the form of a paralipoped, of an acid and bitter tafe, and changing the juice of violets and turnsole red. This has the properties of a true acid; combines with fixed and volatile alkalies into neutral salts capable of being crystallized; diffuses copper, iron, bismuth, arsenic and cobalt.
Oils.

With magnesia it forms regular crystals, in some measure resembling balsap. It is distinguished from the acid of sugar by not precipitating lime from its solution in marine acid, and by forming with magnesia a white powder soluble in water.

According to Neumann, all the camphor made use of is the produce of two species of trees; the one growing in Sumatra and Borneo, the other in Japan. Of the Japanese kind is the only one brought into Europe. The tree is about the size of a large lime, the flowers white, and the fruit a small red berry. All parts of the tree are impregnated with camphor; but the resinous part, and therefore are chiefly made use of for the preparation of this commodity: though, in want of them, the wood and leaves are sometimes mixed.

The camphor is extracted by distillation with water in large iron pots filled with earthen heads stuffed with straw; greatest part of the camphor concretes among the straw, but passes down into the receiver among the water. In this state it is found in small bits like grey salt-petre, or common bay-leaf; and requires to be purified either by a second sublimation, or by distillation in spirit of wine, filtration, and expression. If the first method is followed, there will be some difficulty in giving it the form of a perfect transparent cake. A difficulty of this kind indeed always occurs in sublimations; and the only way is to keep the upper part of the glass to such a degree of heat as may keep the sublimate in a half-melted state. Dr Lewis recommends the repetition of camphor by spirit of wine, and then melting it into a cake in the bottom of a glass.

Camphor possesses considerable antiseptic virtues; and is a good diaphoretic, without heating the constitution; with which intention it is often used in medicine. It is likewise employed in fire-works and several other arts, particularly in making varnishes. See Varnish.

This substance dissolves easily and plentifully in various spirits and in oils; four ounces of spirit of wine will dissolve three of camphor. On distilled the mixture, the spirit rife first, very little camphor coming over with it. This shows that camphor, however volatile it may seem by its smell, is very far from having the volatility of ether, and consequently is improperly clasped with substances of that kind.

2. Empyreumatic Oils. Under this name are comprehended all those oils, from whatever substance obtained, which require a greater heat for their distillation than that of boiling water. These are partially soluble in spirit of wine, and becomes more and more fo by repeated distillations. The empyreumatic oils obtained from animal substances are at first more fetid than those procured from vegetables but by repeated distillations, they become exceedingly attenuated and volatile, becoming almost as white, thin, and volatile, as ether. They then acquire a property of taking upon the brain and nervous system, and of allaying its irregular movements, which is common to them with all other inflammable matters when highly attenuated and very volatile; but this kind of oil is particularly recommended in epileptic and convulsive affections. It is given from 4 to 10 or 11 drops: but, though prepared with the utmost care, it is very susceptible of losing its whiteness, and even its thinness, by a short exposure to air; which proceeds from the almost instantaneous evaporation of its more thin and volatile parts, and from the property which the less volatile remains has of acquiring colour. To avoid this inconvenience, it must be put, as soon as it is made, into very clean glass bottles with glass stoppers, and exposed to the air as little as possible.

The most important observations concerning the method of making the pure animal oils are, first to change the vessel at each distillation, or at least to make them perfectly clean; for a very small quantity of the thicker and less volatile part is sufficient to spoil a large quantity of that which is more rectified. In the second place the Br. Beauné has observed, that this operation may be greatly abridged, by taking care to receive none but the most volatile part in each distillation, and to leave a large residuum, which is to be neglected, and only the more volatile part to be further rectified. By this method a considerable quantity of fine oil may be obtained at three or four distillations, which could not otherwise be obtained at fifty or sixty.

Animal Fats. Though these differ considerably from one another in their external appearance, and probably in their medicinal qualities, they afford, on a chemical analysis, products similar in quality, and differing but inconsiderably in quantity. They all yield a larger portion of oil, and no volatile part; in which respect they differ from all other animal substances. Two ounces of hog's lard yielded, according to Neumann, two drachms of an empyreumatic liquor, and one ounce five drachms and 50 grains of a clear brown-coloured oil of a volatile smell, somewhat like horse-radish. The caput mortuum was of a shining black colour, and weighed ro grains.

Tallow being distilled in the same manner, two Tallow drachms of empyreumatic liquor were obtained from two ounces of it; of a clear brown oil, smelling like horse-radish, one ounce six drachms and 12 grains. The remaining coal was of a shining black colour, and weighed 18 grains. A particular kind of acid is now found to be contained in it.

The marrow of bones differs a little from fats, Marrow. when chemically examined. Four ounces of fresh marrow, distilled in the usual manner, gave over three drachms and a scruple of a liquor which smelled like tallow; two scruples and an half of liquor which had more of an empyreumatic and a fourth smell; two ounces and an half of a yellowish-brown, butyryceous oil, which smelled like horse-radish; and six drachms and an half of a blackish-brown oil of the same smell. The caput mortuum weighed four scruples.

All animal fats, when perfectly pure, burn totally away without leaving any ashes, and have no particular smell. In the state in which we commonly find them, however, they are exceedingly apt to turn rancid, and emit a most disagreeable and noxious smell; and to this they are peculiarly liable, when long kept in a gentle degree of heat. In this state, too, an inflammable vapour arises from them, which when on fire is capable of producing explosions. Hence, in those works where large bellows are used, they have been often suddenly burst by the inflammable vapours arising from the rancid oil employed for softening the leather.
**Chemistry.**

**Resins and Balsams.**

These are commonly reckoned to be composed of an essential oil thickened by an acid; as the essential oils themselves are found to be convertible into a similar substance, by the exhaustion of their more volatile parts. True resins are generally transparent in a considerable degree, soluble in spirit of wine, and possess of a considerate degree of flavour.

Resins are originally produced by infusing the natural juices which flow from incisions made in the stems of growing vegetables, and are in that state called balsams. The balsams may be considered as essential oils thickened by loosing some of their odoriferous principle, and of their finest and most volatile parts. There are several kinds of balsams, which, however, differ from each other only in the fineness and degree of consistence; and therefore all yield similar products on distillation. An analysis of turpentine therefore will be sufficient as an example of the analysis and natural properties of all the rest.

The true turpentine-tree is found in Spain and the southern parts of France, as well as in the island of Chio and in the Indies. It is a middling-sized evergreen-tree, with leaves like those of the bay, bearing purplish, imperfect flowers; and on separate pedicles hard unctuous berries like those of juniper. It is extremely resinous; and unless the resin is discharged, decays, produces fungous excrescences, swells, bursts, and dies; the prevention of which consists wholly in plentiful bleeding, both in the trunk and branches. The juice is the Chio or Cyprus turpentine of the shops. This fort is quite of a thick consistence, of a greenish white colour, clear and transparent, and of scarcely any taste or smell.

The kind now called Venice turpentine, is no other than a mixture of eight parts of common yellow or black rosin with five parts of oil of turpentine. What was originally Venice turpentine is now unknown. Neumann relates, that the Venice turpentine sold in his country was no other than that prepared from the larix tree, which grows plentifully in some parts of France, as also in Austria, Tyrol, Italy, Spain, &c. Of this there are two kinds: the young trees yielding a thin limpid juice, resembling balsam of copaiba; the older, a yellower and thicker one.

The Strasbourg turpentine is extracted from the silver fir. Dr. Lewis takes notice that some of the exotic firs afford balsams, or resins, superior to those obtained from the native European ones; as particularly that called balm of Gilead fir, which is now naturalized to our own climate. A large quantity of an elegant resinous juice may be collected from the cones of this tree: the leaves also, when rubbed, emit a fragrant smell; and yield, with rectified spirit, an agreeable resinous extract.

The common turpentine is prepared from different sorts of the pine, and is quite thick, white, and opaque. Even this is often counterfeited by mixtures of rosin and common essential oil.

All the turpentine yield a considerable proportion of essential oil. From sixteen ounces of Venice turpentine, Neumann obtained, by distillation with water, four ounces and three drachms of oil. The same quantity distilled, without addition, in the heat of a water-bath, gave but two ounces and an half; and from the residuum treated with water, only an ounce could be obtained. The water remaining in the still is found to have imbied nothing from the turpentine; on the contrary, the turpentine is found to imbibe part of the water; the residuum and the oil amounting to a full ounce on the pound more than the turpentine employed. When turpentine is distilled or boiled with water till it becomes solid, it appears yellowish; when the process is further continued, of a reddish brown colour: in the first state, it is called boiled turpentine; and in the latter, colophony, or rosin.

On distilling sixteen ounces of turpentine in a retort with an open fire, increased by degrees, we obtain first four ounces of a thick colourless oil; then two ounces and two drachms of a yellowish one; four ounces and three drachms of a thicker yellow oil; and two ounces and one drachm of a dark brownish red empyreumatic oil, of the consistence of balsam, and commonly called balsam of turpentine.

The limpid essential oil called spirit of turpentine, is exceedingly difficult of solution in spirit of wine; the turpentine itself dissolves with great ease. One part of the oil may indeed be dissolved in seven parts of rectified spirit; but on standing for some time, the greatest part of the oil sediments to the bottom, a much greater proportion of spirit being requisite to keep it dissolved.

2. Benzoin. This is a very brittle brownish resin, of an exceedingly fragrant smell. The tree which produces benzoin is a native of the East Indies; particularly of Siam and the island of Sumatra. It is never permitted to exceed the fifth year, being, after this time, unfit for producing the benzoin. It is then cut down, and its place supplied by a young tree raised commonly from the fruit. One tree does not yield above three pounds of benzoin.

A tree supposed to be the same with that which affords
Bitumen.  

Forbs benzoin in the East Indies, is plentiful also in Virginia and Carolina; from whence it has been brought into England, where it grows with vigour in the open ground. The bark and the leaves have the smell of benzoin; and yield with rectified spirit a resin of the same smell; but no resin has been observed to issue from it naturally in England, nor has any benzoin been collected from it in America.

Bitumen dissolves totally in spirit of wine, leaving only the impurities, which commonly amount to no more than a scruple on an ounce. To water, it gives out a portion of fulphur matter of a peculiar kind, volatile and sublimable in the fire. See 984 et seq.

The principal use of resins is in the making of lacquers, varnishes, &c. See VARNISH.

§ 5. BITUMENS.

These are inflammable mineral bodies, not sulphurous, or only casually impregnated with sulphur. They are of various degrees of consistence; and seem, in the mineral kingdom, to correspond with the oils and resins in the vegetable.

Concerning the origin of bitumens, chemists are not at all agreed. Some chemical writers, particularly Mr. Macquer, imagine bitumens to be no other than vegetable resins altered in a peculiar manner by the admixture of some of the mineral acids in the earth; but Dr. Lewis is of a contrary opinion, for the following reasons.

"Mineral bitumens are very different in their qualities from vegetable resins; and, in the mineral kingdom, we find a fluid oil very different from vegetable oils. The mineral oil is changed by mineral acids into a substance greatly resembling bitumens; and the vegetable oils are changed by the same acids into substances greatly resembling the natural resins.

"From bitumens we obtain, by distillation, the mineral oil, and from resins the vegetable oil, diitfined in their qualities as at first. Vegetable oils and resins have been treated with all the known mineral acids; but have never yielded anything similar to the mineral bitumens. It seems, therefore, as if the oily products of the two kingdoms were essentially and specifically different. The laws of chemical inquiries at least demand, that we do not look upon them any otherwise, till we are able to produce from one a substancc similar to the other. When this shall be done, and not before, the presumption that nature effects the same changes in the bowels of the earth, will be of some weight."

There is a perfectly fluid, thin bitumen, or mineral oil, called naphtha, clear and colourless as crystal; of a strong smell; extremely subtle; so light as to swim on all known liquors, other perhaps excepted: spreading to a vast surface on water, and exhibiting rainbow colours; highly inflammable: formerly made use of in the composition of the fopposed inextinguishable greek fire.

Next to this in consistence is the oleum petra, or petroleum; which is groffer and thicker than naphtha, of a yellowish, reddish, or brownish colour; but very light, so as to swim even on spirit of wine. By distillation, the petroleum becomes thinner and more subtle, a gros matter being left behind; it does not, however, easily arile, nor does it totally lose its colour by this process, without particular managements or additions.

Both naphtha and petroleum are found plentifully in some parts of Peria, trickling through rocks or swimming on the surface of waters. Kemper gives an account of two springs near Baku; one affording naphtha, which it receives in drops from subterraneous veins; the other, a blackish and more fetid petroleum, which comes from Mount Caucasus. The naphtha is collected for making varnishes; the petroleum is collected in pits, and sent to different places for lamps and torches.

Native petrola are likewise found in many different places, but are not to be had in the shops; what is sold there for petroleum, being generally oil of turpentine coloured with alkanet root. The true naphtha is recommended against disorders of the nerves, pains, cramps, and contractions of the limbs, &c.; but genuine naphtha is rarely or never brought to this country.

There are some bitumens, such as amber, amber-gris, pit-coal, and jet, perfectly solid; others, such as Barbadoes tar, of a middle consistence between fluid and solid. Tarf and pest are likewise thought to belong to this class.

1. Amber. This substance melts, and burns in the fire, emitting a strong peculiar smell. Distilled in a strong heat, it yields a phlegm, an oil, and a particular species of acid salt. The distillation is performed in earthen or glass retorts, frequently with the addition of sand, sea-salt, coals, &c. which may break the phlegm, and light oil, which absores a part of the oil: and changing the paste, ther depuration as well as the nature of this salt, see GRIS. 1447

The most advantageous method of distilling amber, Moft ad- vantageously, is without any addition; and this is the method used in Prussia, where the greatest quantities of coal, and oil of amber are made. At first a phlegmatic liquor distils; then a fluid oil; afterwards one that is thick and more ponderous; and last of all, an oil still more ponderous along with the salt. In order to collect the salt more perfectly, the receiver is frequently changed; and the phlegm, and light oil, which arile at first, are kept by themselves. The salt is purified, by being kept some time on biblious paper, which absorbs a part of the oil: and changing the paper as long as it receives any oily salt. For the further depuration as well as the nature of this salt, see SUCCEINUM.

2. Ambergris. This concretc, which is only used as a perfume, yields, on distillation, products of a grissimilar nature to that of amber, excepting that the volatile salt is in much less quantity. See AMBERGRIS.

3. Pit-coal. See the articles Coal and Lithan. Thrax.
Practice.

**Bitumens.** This substance yields by distillation, according to the translator of the Chemical Dictionary, 1. 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 is inflammable with a violent fire; 5. an acid, concrete salt; 6. an inflammable earth (we suppose he means a piece of charred coal, or cinder) remains in the retort. The fluid oil obtained from coals is said to be exceedingly inflammable, so as to burn upon the surface of water like naphtha itself.

**Peat.** There are very considerable differences in this substance, proceeding probably from the admixture of different minerals: for the substance of peat is plainly of vegetable origin; whence it is found to answer for the filling of ores, and the reduction of metallic calces, nearly in the same manner as coals of wood. Some sorts yield, in burning, a very disagreeable smell, which extends to a great distance; whilst others are inoffensive. Some burn into grey or white, and others into red, ferruginous ashes. The ashes yield, on elixation, a small quantity of alkaline, and some neutral salts.

The smoke of peat does not preserve or strengthen like that of wood; and the foot into which it condenses is more apt to liquefy in moist weather. On distilling peat in close vessels, there arises a clear insipid phlegm; an acid liquor, which is succeeded by an alkaline one; and a dark-coloured oil. The oil has a very pungent taste, and an empyreumatic smell; less agreeable than that of mineral bitumens. It liquefies in the cold, into a pitchy mass, which liquefies in a small heat: it readily catches fire from a candle; but burns less vehemently than other oils, and immediately goes out upon removing the external flame. It dissolves almost entirely in rectified spirit of wine, into a dark, brownish-red liquor.

**Charcoal.** This is the form to which all inflammable matters are reducible, by being subjected to the most violent action of fire in close vessels; but though all the coals are nearly similar to one another in appearance, there is nevertheless a very considerable difference among them as to their qualities. Thus the charcoal of vegetable parts with its phlogiston very readily, and is easily reducible to white ashes: charcoal pitch, or, as it is commonly called, coak, much more difficultly; and the coals of burnt animal substances, far more difficulty than either of the two. Mr Macquer acquaints us, that the coal of bullock's blood parts with its phlogiston with the utmost difficulty. He kept it very red, in a shallow crucible surrounded with charcoal, for six hours and more, stirring it constantly that it might be all exposed to the air, without being able to reduce it to white, or even grey ashes. It still remained very black, and full of phlogiston. The coals of pure oils, or concrete oily substances, and foot, which is a kind of coal raised during the inflammation of oils, are as difficultly burnt as animal coals. These coals contain very little saline matter, and their ashes furnish no alkali. These coals, which are so difficultly burnt, are also less capable of inflaming with nitre than others more combustible; and some of them, in a great measure, resist even the action of nitre itself.

Charcoal is the most refractory substance in nature; no_instance having been known of its ever being melted, or showing the least disposition to fusion, either by itself, or with additions: hence, charcoal is found to be the most proper support for such bodies as are to be exposed to the focus of a large burning glafs. The only true solvent of charcoal is niter sulphur. By the violent heat of a burning glafs, however, it is found to be entirely dissipable into inflammable air, without having any residuum. See *Aerology*, n° 129, and CHARCOAL.

The different substances mixed with different coals, render some kinds of charcoal much less fit to be used in reviving metals from their calcines, or in smelting them originally from their ores. The coals of vegetable substances are found to answer best for this purpose. See *Metallurgy*.

**Sect. V. Vegetable and Animal Substances.**

The only substances afforded by vegetables or animals, which we have not yet examined, are the mucilaginous, or gummy; and the colouring parts obtained by infusion, or boiling in water; and the calculous concretions found in the bodies of animals, chiefly in the human bladder. The colouring matter is treated of under the article *Colour-Making*, to which we refer; and in this section shall only consider the nature of the others.

§ 1. Mucilage of Gum.

The mucilage of vegetables is a clear transparent mucilage substance, which has little or no taste or smell, the consistence of which is thick,ropy, and tenacious, when united with a certain quantity of superabundant water. It is entirely and intimately soluble in water, and contains no disengaged acid or alkali.

When mucilage is dissolved in a great quantity of water, it does not sensibly alter the consistence of the liquor; but, by evaporation, the water grows more and more thick; and, at last, the matter acquires the consistence of gum arabic, or glue; and this without losing its transparency, provided a heat not exceeding that of boiling water has been used.

Gums, and solid mucilages, when well dried and very hard, are not liquefied in the fire like refining, but swell, and emit many fumes; which are, at first, watery: then oily, fuliginous, and acid. Diftilled in close vessels, an aqueous acid liquor comes over along with an empyreumatic oil, as from other vegetable substances; a considerable quantity of coal remains, which burns to ashes with difficulty.

Mucilages and gums are not soluble either by oils, spirit of wine, alkalis, or acids, except in so far as they dissolve in theseliquors by means of the water in which the alkali or acid are dissolved. They are, however, the most effectual means of uniting oil with water. Three parts of mucilage, poured upon one part of oil, will incorporate with it by trituration or agitation; and the compound will be soluble in water. Vegetable gums are used in medicine, as well as the mechanic arts; but the particular uses to which each of them is applicable, will be mentioned under the name of each particular gum.

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§ 2. Of the Human Calculus.

This substance has been repeatedly examined by the most eminent chemists. Mr Scheele, as has been related, has been able to extract an acid from it. His account of it in other respects is to the following purpose.

1. All the calculus examined, whether flat and polished, or rough and angular, were of the same nature, and consisted of the same constituent parts.

2. The diluted vitriolic acid has no effect upon the calculus, but the concentrated acid dissolves it, and by abstraction from it is converted into the sulphureous kind, leaving a black coal behind.

3. Neither diluted nor concentrated spirit of salt had any effect upon it.

4. By means of nitrous acid, a new one was produced, and which is possessed of singular qualities, as already mentioned.

5. The solution of calculus in nitrous acid is not precipitated by ponderous earth, nor are metallic solutions sensibly altered by it.

6. It is not precipitated by alkalis, but grows somewhat yellower by a superabundance of the latter. In a strong digesting heat the liquor becomes red, and tinges the skin of the same colour. It precipitates green vitriol of a black colour; vitriol of copper, green; silver, grey; corrosive sublimate, zinc, and lead, white.

7. The solution is decomposed by lime-water, and lets fall a white precipitate, soluble in the muriatic acid without any effervescence: but though there be an excess of precipitate, the liquor still remains acid; which happens also with animal earth, and that of flour dissolved in the same acids. On evaporation to dryness, the matter will at last take fire; but when heated only to a dull red heat in a close crucible, it grows black, smells like burnt alum, and effervesces with acids; being convertible before the blow-pipe into quicklime.

8. Neither this solution, nor the alkaline mixture, is changed by the acid of sugar.

9. The calculus is not changed by acid of tartar, though it is dissolved even in the cold by alkali, when reduced to such a state of causticity as not to discover the least mark of serial acid. The solution is yellow and tastes sweetish; and is precipitated by all the acids, even by the aerial. It decomposes metallic solutions, but does not precipitate lime-water; and a smell of volatile alkali is produced by a little superabundance of alkali in the solution. Dry volatile alkali has no effect upon the calculus; but caustic volatile alkali dissolves it, though a pretty large quantity is required for this purpose.

10. Calculus is likewise dissolved by digesting in lime-water; and for this purpose four ounces of lime-water are required to twelve grains of the calculus; but the latter is partly precipitated by adding acids to the solution. By this union the lime-water loses its caustic taste.

11. Calculus is also dissolved entirely by pure water; but for this purpose a large quantity of fluid is required. Eight grains of calculus in fine powder will dissolve by boiling for a short time in five ounces of water. The solution reddens tincture of lacmus, but does not precipitate lime-water; and when it grows cold, the greatest part of the calculus separates in fine crystalls.

12. On distilling a drachm of calculus in a glass retort, a volatile liquor was obtained resembling horse-horn, but without any oil; and in the neck of the vessel was a brown sublimate. On heating the retort thoroughly red hot, and then leaving it to cool, a black coal was left, weighing 12 grains, which retained its black colour on a red hot iron in the open air. The sublimate, which had some marks of fusion, weighed 28 grains, and became white by a new sublimation. Its taste was somewhat fourth, but it had no smell; it was soluble both in water and in spirit of wine; but a larger quantity of spirit than of water was requisite for this purpose. It did not precipitate lime-water, and seemed in some respects to agree with the sal finisii.

From these experiments our author concludes, that the human calculus is neither calcareous nor gypseous; but consists of an oily, dry, volatile acid, united with some gelatinous matter. The calculus is an oily salt, in which the acid prevails a little, since it is soluble in pure water; and this solution reddens the tincture of lacmus. That it contains phlogiston, appears from its solution in caustic alkalis and lime-water, but especially from the effect of the nitrous acid, by which it acquires quite different properties than from solution in alkalis; nor can it be precipitated from this solution. The animal gelatinous substance appears on distillation, by which a liquor is obtained resembling spirit of horse-horn, and a fine coal is left behind.

13. Calculus is found dissolved in all urine, even in that of children. On evaporating four kannes of fresh urine to two ounces, a fine powder is deposited as it cools, and a part firmly adheres to the glases. The precipitated powder readily dissolves in a few drops of caustic fixed alkali; and in others respects all the properties of calculus. Of the same nature is the extraordinary sediment deposited by the urine of those who labour under an ague. Mr Scheele suspected at first, that there was in this urine some unknown menstrum which kept such a quantity of powder dissolved, and which might afterwards evaporate by exposure to the air; but altered his opinion on perceiving that the sediment was equally deposited in close vessels.

14. All urine contains some animal earth combined with phlogistic acid; by the superabundance of which acid,
Acid, the earth is kept dissolved; and by reason of this supernumerous acid fresh urine communicates a red colour to lacmus. By saturation with caustic volatile alkali a white powder is precipitated; of which three drachms and an half are obtained from four kanles of urine. In the superabundance of this urine, a white precipitate is formed. On evaporating the superabundance, another remains, which precipitated lime-water; and when mixed with lamp-black, afforded phosphorus by distillation; whence it is evident, that the white powder just mentioned contained lime and phosphoric acid.

15. From these experiments Mr Scheele concludes, that all urine contains, besides the substances already known (viz. salt ammoniac, common salt, digestive salt, Glauber's salt, microscopic salt, fat, perlmutter, and an oily extractive matter), a concrete acid, or that of calculus, and animal earth. It is also remarkable, that the urine of the sick is more acid, and contains more animal earth than that of healthy persons. With regard to the fat perlmutter, it was afterwards discovered by Mr Scheele not to be a peculiar acid, but only a phosphoric acid digested by a small quantity of foal alkali united with it. The analysis is confirmed by synthesis; for, by combining foal alkali with phosphoric acid, our author obtained a true perlmutter.

In a supplement to Mr Scheele's dissertation on the calculus, Mr Bergman observes, that he could not succeed in dissolving it entirely either in pure water or in the nitrous acid, though the undissolved part was the larger proportion in the proportion of the powder to which the calculus was reduced. The undissolved part appears most conspicuous when small pieces, or small calculi of a raw grains weight only, are put into a supernumerous quantity of nitrum potass., and kept in a degree of heat very near to that which makes water boil. Here it will be observed, that the greatest part of the piece is dissolved; but that at the same time some small white powdery particles remain, which are affected by water, spirit of wine, acids, or caustic volatile alkali. If the liquor be made fully to boil, these particles divide into white rare floculi, and become almost imperceptible, but without any entire dissolution. Mr Bergman could not collect a sufficient quantity of them to determine their nature with accuracy; only he observed, that when exposed to a strong heat, they were reduced to a coal which burns slowly to ashes, and is not soluble in diluted nitrous acid.

16. When calculus vesicae (says he) is dissolved in nitrous acid, no precipitation ensues on adding the acid of sugar; whence one is readily induced to conclude, that there is no calcaeous earth present, because this experiment is the surest way to discover it. But I have found, in the variety of experiments concerning elective attractions, that the addition of a third substance, instead of dissolving two already united, often unites both very closely. That the same thing happens here I had the more reason to believe, because the acid of sugar contains some phlogistic matter, though of a subtle nature, that, on being burned, it does not produce any sensible coal; and the event of my experiment has shown, that I was not mistaken in my conjecture. In order to ascertain this point I retained coals of the calculus to ashes, which were quite white, and showed in every respect the same phenomena as lime; cau5ed some effervescence during their solution in acids, united with vitriolic acid into gypsum, were precipitated by the acid of sugar, and were partly soluble in pure water, &c. Notwithstanding this, there remains about one-hundredth part of the ashes insoluble in aquafort; being the remainder of the substance abovementioned, which, together with the concrete acid, constitutes the calculus. If the calculus be dissolved in nitrous acid, the solution filtered and evaporated to dryness, and the dry mass calcinated to white-ness, a calcareous powder is thus likewise obtained. As pure vitriolic acid contains no phlogiston, our author supposed, that by dropping it, in its concentrated state, into a solution of calculus in nitrous acid, the calcaeous earth, if any existed in it, would be discovered. In this he was not disappointed, for when the solution was saturated, some small crystals were thus immediately separated. These, on examination, were found to be gypsum, and, after being dissolved in distilled water, were precipitated by acid of sugar. When the solution of calculus was very much diluted, no change appeared at first on the addition of oil of vitriol; but after a little evaporation, the abovementioned crystals began to appear. Some of the bladder or kidneys at least certainly contain lime, but from more than one half in an hundred parts, or one in 200 parts.

By the assistance of heat, concentrated vitriolic acid dissolves the calculus with effervescence, and the solution is of a dark brown colour. On adding a little water, a kind of coagulation takes place; but by adding more, the liquor again becomes clear, and assumes a yellowish colour. Mr Bergman agrees with Mr Scheele in supposing that the muriatic acid has no effect upon the calculus; but he is in no doubt whether it may not extract some part of the calcaeous earth.

The red colour assumed by the solution of calculus in aquafortis is remarkable. A saturated solution dissolves no smell of nitrous acid, and if evaporated by itself in a large open vessel, the liquor assumes at last a deep red colour, and freely contains any nitrous acid: for, on the one hand, paper tinged with lacmus scarcely shows any redness; and, on the other, the colour is destroyed irrecoverably by the addition of any acid. By quick evaporation the solution at last swells into innumerable bubbles; the foam grows redder and redder, and at last becomes dark red after it is quite dry. This dry mass communicates its colour to a much larger quantity of water than before, and dissolves very readily in all acids, even such as have no action on the calculus; but they entirely destroy the colour, and that the more quickly in proportion to their degree of strength; even alum has this effect on account of the small quantity of loose acid it contains. Caustic alkalis also dissolve the colouring matter, and destroy it, but more slowly.

Our author endeavours to account for this red colour produced by the nitrous acid, from the peculiar nature of that acid and the effect it has upon phlogiston. In order to obtain it, a proportionable quantity of acid must be made use of, and it ought to be diluted, that there may be no danger of going beyond the necessary limit. If too much be used, it will not produce the proper effect; but if a supernumerous, more or less, or even the whole, will be destroyed in proportion to the quantity. By pouring it in an undiluted state on powdered calculus, it is con-
The following hour.

Experiments upon this subject.

Eight hundred and forty grains of dry and well powdered calculus were introduced into a glass retort. It was taken from a laminated stone with a small nucleus, which was likewise laminated. The outer crust appeared very porous, but increased in density towards the centre. By the application of heat, an effafto fluid was first slowly extricated; and which, on examination, appeared to be composed of equal parts of fixed and phlogificated air. The last portions came over very fast, and were attended with an urinous smell; and, by continuing the distillation, it became evident that fixed and alkaline air came over together without forming any union, as they ought, on the common principles of chemistry, to have done; though our author is at a loss to know why they did not unite, unless they were prevented by the small quantity of inflammable air which came over along with them.

From the beginning of the tenth measure, a black, charry, and greasy matter began to line the conical tube and air-vessel adapted to the retort; and as the process went on, the proportion of alkaline air decreased, while that of the inflammable air was augmented, until towards the end, when the last nine measures were all inflammable; after which no more would come over, though the retort was urged with a white heat. On breaking the distilling vessel, a black powder weighing 95 grains was found in it. On digesting this for an hour in ten ounces of distilled water, and then filtering and evaporating it to two ounces, a yellowish powder was precipitated, but no crystals were formed after standing a whole night. This powder was then separated by filtration, and the liquor evaporated to one ounce; during which time more powder was precipitated. It was then filtered a second time, and the liquor evaporated to half an ounce; when the more was depoct by a white powder, and to emit a subacid acrid put not unlike that of vitriolic acid. This white precipitate, when washed and dried, amounted only to one grain, had a shining appearance, and felt very soft, not unlike mica in powdery. It was not, however, looked whiter by exposing it to a fierce heat for ten minutes. It dissolved in distilled water without being precipitated by caustic volatile alkali. Mineral alkali, acid of sugar, and nitrated terra ponderosa, rendered the solution turbid; whence our author inferred, that the powder in question was seifelite.

After the separation of this powder, the remaining solution was evaporated to dryness with a gentle heat. During the evaporation it continued to emit subacid vapours, leaving eleven grains of powder of a dirty yellow colour, having an albuminous taste. To this powder he added as much distilled water as was nearly sufficient to dissolve it; after which it was left by for three weeks. At the expiration of this term several small, transparent, and cubical crystals appeared on the side of the vessel above the surface of the solution; and these likewise had an albuminous taste. The whole was then dissolved in distilled water, and the solution filtered. Acid of sugar produced no change in the liquor for at least five minutes, but an immediate cloudiness took place on a mixture with volatile alkali; and on filtering the liquor it was again rendered turbid by mineral alkali, though the caustic alkali already predominated. Nitrated terra ponderosa threw down a copious precipitate, and Prussian alkali discovered a small quantity of iron. This albuminous solution left a yellow substance on the filter; which, when collected and dried, weighed only half a grain; it dissolved without effervescence in nitrous acid; acid of sugar caused no precipitation, but caustic volatile alkali threw down a precipitate which dissolved in distilled water. This solution was rendered turbid by the acid of sugar and nitrated terra ponderosa, but no effect was produced by caustic volatile alkali or lime-water.

The yellow powder first deposited by the solution weighed two grains and a half, and by exposure to a strong heat acquired a deep orange colour. On digestion with distilled water, the insoluble part was reduced to three-fourths of a grain, and appeared to be iron: while the soluble part was found to be nothing else but gypsum. Our author, however, is of opinion, that this iron is impregnated with a small portion of vitriolic acid, though not in such quantity as to render it soluble.

The charred matter remaining in the retort was reduced by lixiviation with water to 60 grains. These were calcined with a red heat in an open fire, but could not be reduced to a grey powder in less than three quarters of an hour. When thoroughly calcined and cold, it weighed only 21 grains, which communicated to hot distilled water a limy taste, and gave it the property of turning syrup of violets green. Diluted vitriolic acid had no effect upon it, but it was rendered turbid by aerated volatile alkali and acid of sugar. The remainder when well dried weighed 16 grains, which dissolved in nitrous acid at first with a little effervescence; and when this ceased, the solution went on very slowly, until the whole was taken up. Acid of sugar made no change in the liquid, but the whole was precipitated by caustic volatile alkali. Prussian alkali threw down a grain, or perhaps more of blue;
blue; the precipitate digested with distilled vinegar lost a grain and a half, which was thrown down by cautic volatile alkali. The insoluble part being washed and digested in distilled water for half an hour, was partly dissolved; the solution was not affected by cautic volatile alkali, but acid of sugar and nitrate of terra pondersa caused an immediate coagulation. Seven grains and an half of the powder, which was insolu-
ble both in acetic acid and distilled water, were readily taken up by diluted vitriolic acid, and precipitated by cautic volatile alkali: the 16 grains last treated, therefore, appeared to contain, of clay 7; grains of felenite, 6 grains; magnetia, one and a half; and of iron, one grain. The proportions of the different ingredients in the whole calculus, therefore, according to Mr. Higgins, are as follows:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Grains</th>
</tr>
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<tbody>
<tr>
<td>Iron</td>
<td>27</td>
</tr>
<tr>
<td>Selenite</td>
<td>11</td>
</tr>
<tr>
<td>Clay</td>
<td>-</td>
</tr>
<tr>
<td>Alum</td>
<td>-</td>
</tr>
<tr>
<td>Pure calcareous earth</td>
<td>-</td>
</tr>
<tr>
<td>Aerated magnesium</td>
<td>-</td>
</tr>
<tr>
<td>Chary combustible substance</td>
<td>- 59</td>
</tr>
</tbody>
</table>

In all 94½

In this experiment, a darkish yellow sublimate adhered to the neck of the retort; the inner part next the retort more compact, but the rest of a lamellar spongy texture. This sublimate, when carefully collected, was found to weigh 425 grains, and readily dissolved in eight ounces of hot distilled water. A coaly sublimate was separated from this solution by filtration, which, when washed and dried, weighed ten grains, and when exposed to a red heat burned with a greenish flame, emitting white fumes, which smelled like vitriolic sal ammoniac: the residue after calcination weighed half a grain, and was of a whitish colour: appearing insoluble in distilled water, but disolving with effervescence in nitrous acid. Acid of sugar caused a very small precipitation, which did not take place until the mixture had stood for some time; but cautic volatile alkali instantly threw down a precipitate, which was taken up, when washed, by acetic acid.

The quantity was too small to be examined with greater accuracy; but it seemed to possess the properties of magnetia. The saline solution had the colour of small beer; and, when evaporated to two ounces, did not deposit any sediment, or yield any crystals. The black matter with which the conical tube and air vessel were lined, weighed 28 grains, and adhered so fast to the glads, that it was impossible to collect the whole from the fragments of the glads. When dissolved in distilled water and filtered, four grains of coals, similar to that obtained from the former, were procured; but no signs of crystallization were observed after evaporation to one ounce, and fusing the liquor to stand all night.

By this treatment the solution acquired the consistence of treacle; so that it was plainly not crystallizable, and therefore its analysis was plainly to be attempted after a different method. It was now put into a tubulated glass retort, together with six ounces of distilled water to wash it down. By distillation in a sand bath three ounces of water were procured, which disprovided in nothing from common distilled water, but in being coloured with a small quantity of the solution from the neck of the retort. On changing the receiver, about half an ounce of liquor of the same kind came over, after which the distillation began to be attended with an urinous smell. This continued barely perceptible for some time; but when about an ounce and a half had passed over, it became so very pungent, that our author could no longer doubt of its being in a cautic state. A small quantity of mild alkali, however, adhered to the lower part of the neck of the retort, some of which was washed down by the distillation; so that the proportions between the two could not be ascertained. The volatile alkaline solution in the retort had the colour of spirit of hartshorn, and like it became darker coloured by the contact of air; on account of the evaporation of part of the alkali, and the ret becoming less capable of suspending the coaly matter mixed with it.

After all the liquor had passed over, and nothing remained in the retort but a small quantity of black matter, the fire was raised; and, as the heat increased, this black substance acquired a white colour, with a kind of arrangement on the surface, which was occasioned by the heat applied to the bottom of the retort being only sufficient to raise the falt to the top of the matter in the retort; but as the falt became nearly red-hot, white fumes began to appear, which condensed on the upper part of the retort, and a little way down the neck. The process lasted until the matter was nearly red-hot, when the fumes ceased, and nothing more passed over. The sublimate, when collected, was found to weigh 72 grains, a black porous brittle sublimate remaining on the bottom of the retort, which weighed 12 grains. This residue, when exposed to a strong heat, emitted white fumes, with a slight alkaline smell; by which process it was reduced, with very little appearance of combustion, to a grey powder weighing three grains, which was accidentally lost.

Five grains of this purified sublimate, mixed with as much quicklime, emitted no smell of volatile alkali; and, when thrown upon a red-hot iron, emitted white fumes. The fume effect was produced by a mixture of equal quantities of vegetable alkali and sublimate. The remainder, consisting of 62 grains, was divided into two equal parts; the one of which was mixed with two ounces of distilled water, and on the other was poured 60 grains of vitriolic acid diluted with half an ounce of water. These two mixtures being suffered to remain for six weeks, seemed to be but little acted upon. That with vitriolic acid was then put into a small matras, and boiled on sand for half an hour with two ounces of distilled water, when the whole was taken up. The solution looked clear, and deposited nothing on standing. Mild mineral alkali had no effect upon it; but mild vegetable alkali threw down a copious sediment in white floculi, which was redissolved by cautic alkali, lime-water, and partly by mild mineral alkali. Phlogistified alkali, acid of sugar, and acid of tartar, had no effect upon it. The other portion of sublimate, which had been mixed with distilled water, was very little disolved; but in pouring it into a matras some small round lumps were observable on the bottom of the glads. These were fix
Calculi, sometimes called gravel, is composed of various mineral substances. The stones which were put into a retort and distilled with nitrous air contained iron in a volatile form. The precipitate was then washed and distilled vinegar poured upon it, which did not dissolve it. On filtering the solution to separate what had been deposited by cooling, no change was produced in the filtered liquor by mineral alkali; but mild vegetable alkali produced a cloudiness, which was instantly taken up on adding mineral alkali and lime-water. Neither Prussian alkali, nor the acids of arsenic, tartar, sulfur, or borax, nor any of the three mineral acids, had any effect upon it.

On filtering the solution to separate what had been deposited by cooling, no change was produced in the filtered liquor by mineral alkali; but mild vegetable alkali produced a cloudiness, which was instantly taken up on adding mineral alkali and lime-water. Neither Prussian alkali, nor the acids of arsenic, tartar, sulfur, or borax, nor any of the three mineral acids, had any effect upon it.

The precipitate was then washed and distilled vinegar poured upon it, which did not dissolve it; but it was dissolved by marine acid. Phlogisticated alkali had no effect upon it; and the acid of sugar occasioned very little cloudiness after standing three or four hours; from which our author supposed that the matter was phosphorated clay.

The solution, being now free from iron and phosphorated clay, had a fibrous taste, and looked clearer, though still retaining a yellow cast. Acid of sugar had no effect upon it; but nitrated terra pannera threw down a precipitate, as did likewise the caustic volatile alkali. Mild vegetable alkali caused no precipitation; which our author attributed to the solution of the manganese and clay by the fixed air extricated from the alkali. Two-thirds of the solution were then put into a small glass retort, and two ounces distilled off, which had no taste, but smelled very agreeably, and not unlike roe-water. After all the liquor had passed over, white fumes appeared in the retort, and there were soon followed by an aerial fluid. On collecting some of this, a candle was found to burn in it with an enlarged flame. Nitrous air did not diminish it in the least; and it seemed to be that species of air into which nitrous ammoniac is convertible. No more than 13 or 14 inches of this kind of air could be obtained; and as soon as it ceased to come over, crystals were observed in the lower part of the neck of the retort. On augmenting the heat, a white falt began to sublime and adhere to the upper part of the retort; the operation was continued until the falt was red-hot; but, on breaking it, the quantity of sublimate was so small, that very little of it could be collected; though, from the small quantity obtained, our author was convinced of its being the same in quality with what was obtained in the former analysis. The falt which crystalized in the neck of the retort was nitrous ammoniac, as appeared from its detonation perpe, &c. A grey powder was left in the bottom of the retort, which hot distilled water partly dissolved; nitrated terra pannera, acid of sugar, and vegetable alkali, rendered this solution turbid; but caustic volatile alkali had no effect upon it. The remaining part of the powder which was left by the distilled water, readily dissolved with effervecence in the marine acid, and was precipitated by caustic volatile alkali; the part soluble in distilled water appearing to be gypsum, and that soluble in marine acid to be magnesium silicate.

From all these experiments, Mr Higgins concludes the composition of the human calculus to be vastly different.
Calculus.

Mr. Scheele or Mr. Bergman have supposed it to be, "it appears (says he), that the calculus was composed of the following different compounds blended together: viz. sebacate, alum, microcosmic salt, mild volatile alkali, lime, and caustic volatile alkali, combined with oil, so as to form a faponaceous mass; calx of iron, magnetite combined with aeral acid, clay enveloped by a faponaceous and oyle matter, and the sublimate already described." Considering this to be the true state of the calculus in the bladder, the small proportions of clay, sebacate, magnetite, iron, which are the most insoluble of the ingredients; the great solubility of microcosmic salt and alum, and the miscibility of lime, volatile alkali, and oil, in water; tend to show, that the sublimate is the cementing ingredient. Indeed, its intollutibility in water, and property of forming nuclei out of the body, as above observed, leave no room to doubt it. The proportion of the other ingredients, and very likely their preference, depend upon chance. Volatile alkali and oil excepted; therefore this sublimate should be the object of our investigation.

Mr. Higgins concludes his dissertation with some practical remarks concerning the remedies proper for dissolving the stone, for counteracting that disposition in the body which tends to produce it, and concerning the regimen proper for those who are to undergo the operation of cutting for it. "The effect of mild mineral alkali (says he) on the sublimate, is well worth the attention of those who may have an opportunity of trying its efficacy. Mild mineral alkali may be taken in large doses, and continued for a length of time with impunity to the most delicate constitutions, only observing a few circumstances: but this alkali, in a caustic state, must very often be attended with mischievous conseqences. Besides, if we consider that it must enter the mafs of blood before any part can reach the bladder, and the small portion of the dose taken secreted with the urine, and, lastly, the action of caustic alkali upon animal substances; we shall be at a loss to know on what principle caustic alkali have been recommended in preference to mild. Soap itself might as well be recommended at once; for soon after caustic alkali is taken, it must be in a faponaceous state. Fixed vegetable alkali should be avoided, and the preference given to the other two alkali. As it is evident that alkali have no real action on the stone in the bladder, though their efficacy has been experienced in alleviating the difafe when timely administered, their mode of action is only explicable in the following manner: They either prevent the generation of the sublimate in the system, or else keep it in solution in the mafs of fluids: and being in the utmost degree of divisibility, its ultimate particles are capable of passing through the most minute emnuncies; by which means it is carried off by other secreotions as well as the urinary. Thus urine, not being satureted with this matter, acts as a solvent on the stone; and as the most soluble parts are first walled away, it falls through time into fragments of irregular surfaces, which by their friction irritate and inflame the bladder, as has been observed by several practitioners.

"Allowing that the sublimate is the cementing subfance in the calculus, and judging, from the effects of alcalies upon it, their modus operandi in the constitutition, it remains now to inquire into the origin of the calculus. Mr. Scheele has found this sublimate in the urine of different persons; and hence inferred, that it was a common secretion; but it still remains to be ascertained, whether there be a greater quantity of it procured from the urine of patients who labour under this disorder than in those who do not? If this should not be the cafe, may not a deficiency of volatile alkali in the constitutition be the cause of the concretions in the kidneys, bladder, &c.; or, which must have the fame effect, too great a proportion of acid, which, uniting with the alkali, may take up that portion which would have kept the sublimate in solution until conveyed out of the system by the urinary and other secreotions; and may not this he the phosphoric acid? If this latter should be the cafe, an increase of microcosmic salt must be found in the urine; but if the former, a decrease of the volatile alkali, and no increase of the neutral salt. The small quantity of phosphoric acid found in the calculus proceeds from the solubility of microcosmic salt. Do not volatile alkali and phosphoric acid constitute a great part of the human frame? and is their not a proces continuallly carried on to generate these in the system? and is not this proces liable to be retarded or checked by intemperance, &c. which may vary their quantities and proportions? and may not a due proportion of these be necessary to a vigorous and sound constitution? If so, no wonder that an increase or deficiency in either or both of these should be productive of several disorders."

On this subject, however, our author has not had sufficient leisure to make the experiments necessary for its elucidation. Indeed, it seems not easy to do so; as, in his opinion, at least 500 would be required for the purpose. "That the urinary sublimate is present in tubercles found in the lungs of persons who die of pulmonary consumptions, and likewise in what are vulgarly called chalk fones, is what I have experienced; but in what proportion, or whether in quantities sufficient to cause the concretion, is what I cannot say; I ple for I have had but a few grains of each to examine. I have every reason to suspect, that consumptions and feborbitic complaints very frequently arise from a superabundence of this sublimate in the system; and that it is chiefly the cause of the gout and rheumatism, and solely the cause of the stone in the bladder. I make no doubt but these disorders generally proceed from obstructions; and it is probable, that either a precipitation of this sublimate in the system, or else a deficiency of some other secretion, which would hold it in solution until conveyed out of the body, may be the chief cause of those obstructions; and likewise, that different degrees of precipitation may produce different symptoms and disorders."

"That mineral or volatile alkali and bark have been useful in the above disorders, has been affirmed by experienced physicians; and I know an instance of mineral alkali and nitrous ammoniac being serviceable in a pulmonary complaint of some standing."

With respect to the stone, when it acquires a certain magnitude, it is absurd to attempt to dissolve it in the bladder, it wastes so very slowly; and during this time the patient must suffer vast pain, particularly when..."


CONTAINING SUCH DISCOVERIES AS HAVE APPEARED SINCE THE COMPILED SESSIONS OF THE ARTICLE, AND WHICH COULD NOT BE INSERTED IN THEIR PROPER PLACES.

I. VITRIOLIC ETHER.

Mr. Higgin's observations.

On this subject Mr. Higgins has several curious and interesting observations. It is not an easy matter (says he) to ascertain exactly the greatest quantity of dephlogisticated air, which a given quantity of nitrous acid may contain. I always found nitre to vary, not only in its product of phlogisticated and dephlogisticated air, but likewise in their proportion to one another. The purest nitre will yield, about the middle of the process, dephlogisticated air so pure as to contain only about \( \frac{1}{4} \) of phlogisticated air. In the beginning, and nearly about the latter end of the process, air will be produced about twice better than common air. On mixing the different products of a quantity of pure nitre, it was found that, by exposure to the waters of sulphur, \( \frac{1}{4} \) part was left unabsorbed; and this was the utmost purity in which I obtained dephlogisticated air from nitre.

According to M. Lavoisier, 100 grains of nitrous acid contain 79\% of dephlogisticated air, and 20\% of phlogisticated air, which is not quite four to one. But his experiments contradict this; for whatever mode he adopted to decompose nitrous acid, it appeared that the proportion of dephlogisticated air was nearly as five to one of phlogisticated air.

Mr. Cavendish has proved, that nitrous acid may be formed by taking the electric spark in a mixture of three parts of phlogisticated air, and seven of dephlogisticated air, which is but \( \frac{1}{4} \) more of dephlogisticated air than nitrous acid contains; which may apparently contradict Mr. Lavoisier's, as well as my own, estimation of the proportion of the constituent principles of nitrous acid, when in its perfect state. The red nitrous vapour contains three parts of nitrous air and one of dephlogisticated air, or one of phlogisticated and three of dephlogisticated air; but nitrous vapour may be formed with a less proportion of dephlogisticated air; and which, though it may not be so condensible as a more perfect nitrous vapour, yet will, when in contact with pure alkali, unite with it, and form nitre, as was the case in the experiment of Mr. Cavendish.

The common straw-coloured nitrous acid contains more dephlogisticated air than the red nitrous acid or vapour; the proportion appears to be about four to one; but the colour of the vapours may be dispelled by diluting with a few drops of phlogisticated air.

Having once a charge of nitrous and vitriolic acid in a green glass retort, I put it in a sandpot to distil; but the pot being small, the edge came too near the retort, about a quarter of an inch or more above the charge; which, before the process commenced, and when it acquired more than the heat of boiling water, cracked it all round in that direction. Being thus situated, I was obliged to withdraw the fire, and, before the charge got cold, to ladle it into an earthen pan. On introducing it into a fresh retort, I obtained from it nitrous acid nearly as water. The vitriolic acid used in this process not being very perfect, the goodness of the nitrous acid was attributed to the purity of the nitre from whence it was distilled; but in another process, though the same nitre was used with much purer vitriolic acid, the produce was of an high straw colour. On recollecting the abovementioned circumstance, the vitriolic acid and nitre were next mingled in due proportion, and exposed in an earthen pan set in sand, to nearly the heat of boiling water, for half an hour or more, continually exposing fresh surfaces to the air. When the charge was quite cold, I introduced it into a retort, and distilled as colourless nitrous acid as the former. As no nitrous air was emitted during digestion, it must have imbibed dephlogisticated air from the atmosphere.

Mr. Prout found, that strong nitrous acid will set fire to charcoal if it be rendered very dry. He likewise remarked, that nitrous acid, after calcination, was unfit for the experiment. Charcoal, he observes, attracts moisture very forcibly. The first effect of the charcoal on the nitrous acid, he observes, is to withdraw a portion of its water from it; by which it is rendered highly concentrated, at the same time that the condensation of the water heats the charcoal in a small degree, but sufficiently to volatilize a nitrous vapour; which, as soon as it reaches that portion of dry charcoal next the humid part, is condensed.
Effect of nitrous acid on blood.

Mr. Higgins, is very singular. Two parts of blood procured fresh at the butcher's, one of strong nitrous acid, and about one fifth of the whole of water, were digested in the heat nearly of boiling water (fresh portions of water being occasionally added until the whole of the acid was expelled), when it acquired almost the colour, and exactly the taff, of bile. When mixed with a large quantity of water, it acquired a fine yellow colour; and, on standing, deposited a substance of a brighter yellow, though the supernatant liquor still retained a yellow colour and bitter taff, but not so intensely as when the precipitate was suspended in it. The different phases of this process were well worthy of observation. No nitrous acid was produced, and the acid was expelled in the state of a white vapour. The liquor was found to increase in bitterness as the acidity vanished. About the middle of the process, the solution first taffed acid, but was quickly succeeded by a bitter effusion. It appears that the nitrous acid took dephlogisticated air from the blood; for though red nitrous acid was used, it was expelled in a perfect state.

III. NITRE.

Though the artificial generation of the nitrous acid, from a mixture of dephlogisticated and phlogisticated air, is now sufficiently understood, yet we do not well know in what manner nature performs the operation. Some chemists, particularly M. Thouvenal, have found, that purefaction favours the production of nitrous acid. All animal substances, during their decay, give out a vast quantity of phlogisticated air; therefore, if dephlogisticated air be present, it will unite to the phlogisticated air in its nascent state, and form nitrous acid: but Mr. Higgins has observed, that nitrous acid may be generated in plenty where there is no putrid process going on. "The chemical laboratory at Oxford (says he) is near six feet lower than the surface of the earth. The walls are constructed with common limeflour, and arched over with the same; the floor is also paved with stone. It is a large room, and very lofty. There are separate rooms for the chemical preparations, so that nothing is kept in the laboratory but the necessary implements for conducting experiments. There is an area adjoining it on a level with the floor, which, though not very large, is sufficient to admit a free circulation of air. The ashes and sweepings of the laboratory are deposited in it. There is a good link in the centre of this area, so that no stagnated water can lodge there. Notwithstanding all this, the walls of the room afford fresh crops of nitre every three or four months. Dr. Wall, who paid particular attention to this circumstance, and who told me it contained fixed vegetable alkali, requested I would analyze it, and let him know what it contained. I found that two ounces of it contained six drachms of nitrate of nitre, and three of calcareous nitre. The nitre first appears in small whitish filaments as fine as cobweb, which, when they get a little larger, drop off; so that they never acquire sufficient growth to distinguish their figure to a naked eye. On finding that they contained fixed vegetable alkali, I concluded that it proceeded from minute vegetation; but in this I was mistaken; for I found that they were soluble in water, and that they denoted with charcol at every stage of their growth. Having swept this saline efflorescence from the wall, I dug deep into it, but could not obtain nitre from it. When a part had been white-washed, it yielded nitre, but not so abundantly as a neighbouring spot which had not been treated in the same manner. Hence it is evident, that nitrous acid may be formed without the assistance of putrefactive processes in a still damp air, where there is a substance to attract it when half formed, whereby it is in time brought to perfection. The above facts moreover prove, that fixed vegetable alkali is a compound."

IV. MARINE ACID.

Mr. Higgins informs us, that he has, with a view Unsuccessful to decompose fætus, mixed it with manganese in various proportions, and exposed them in a reverberating furnace in a well cloised crucible for three hours, to a fætus heat nearly sufficient to melt cast iron. In the same manner he treated manganese, fætus, charcoal, as well as clay, fætus, and charcoal, and fætus and clay alone, with very little success. He treated calcined bones, fætus, and charcoal, and calcined bones and fætus, as well as lime and fætus, in the same manner, without effecting any apparent change in the fætus. He was informed, however, by Mr. Robertson, apothecary in Binchopgate-Ericeet, that he had partially alkalized it, by expoting it with clay to a fierce heat; but that soon after it got into contact with air, it became neutral again. "If common salt and litharge be fusied (says Mr. Higgins), it is in part decomposed; the acid suffers no decomposition, but unites with the lead; whereby it acquires, when the saline matter is wafted away, a yellow colour. It is evident (adds he) from these facts, that the basis of marine acid is a combustible body, and quite different from light inflammable air, charcoal, or any known inflammable substance; and that it attracts dephlogisticated air with greater force than any substance hitherto discovered. Though charcoal will decompose all other acids, except a few, when united to bodies which will fix them until they acquire a sufficient degree of heat, yet it has no effect upon marine acid."

According to Fourcroy, if alkaline air be confined by mercury, and dephlogisticated marine acid air be added to it (which must be done quickly, as the acid air would disolve the mercury), each bubble produces a slight detonation, and furnishes a very amusing spectacle.

Though in Britain the distillation of the spirit of Method of Method spirit of fætus with clay has long been entirely laid aside for the distilling spirit of fætus with clay, in other countries, and may be effected in the following manner: Having previously deprecitated the fætus, and dried the clay, they are then to be ground, mixed, and sifted together. The mixture is next to be worked with a spatula, and then with the hands, until it is brought into a moderately stiff and uniform mass.
CHEMISTRY.

Marine acid.

This is to be divided into balls about the size of a pigeon's egg, so that they can pass through the neck of the retort; but before they are put into the distilling vessel, it is proper to dry them thoroughly. The retorts must be of stone-ware, and carefully coned, in order to prevent them from breaking with the intense heat to which they are exposed. They are to be filled two-thirds full of embers, and the distillation must be performed in a reverberatory furnace. The receiver at first is not luted on, because that which rises in the beginning of the distillation, being very aqueous, is to be put by itself. When this has come over, another receiver is then to be applied, and cemented with fat lute, and covered with a cloth daubed with a mixture of lime and the whites of eggs. The heat is to be raised until the retort is red-hot, and continued in this degree until the distillation ceases.

Various proportions of clay and salt have been recommended for this process; but it seems probable that not less than ten parts of clay to one of salt, as Pott has directed, will be found necessary. Instead of the clay, some direct the use of bone; but this is inconvenient on account of the iron it contains. Powdered tallow has also been recommended, but this is not always free from iron; and where a very pure spirit is wanted, there is a necessity for having recourse to oil of vitriol, and glass or stone-ware vessels. As the marine acid cannot be separated from the earthy matters, the former theory was abandoned.

1485 Effect of marine acid upon phlogistic matters.

As the marine acid has very little action upon phlogistic matters, it cannot therefore affect oils, either expressed or essential, in a manner similar to the vitriolic matter or nitroils. M. Marges, however, has observed yellow crystals resembling amber formed in bottles, containing a mixture of oils and marine acid of moderate strength, which had stood for several months. The little effect which the marine acid has upon these substances was first suppos'd to be owing to its want of phlogition in itself; but when it was afterwards found, that, by the application of certain substances, which had a great attraction for phlogition, the marine acid was rendered capable of uniting very readily with inflammable matters, the former theory was abandoned. It was now ascertained, that the acid, instead of containing no phlogition, was naturally endowed with a very considerable quantity; and that, in its new state, it was dephlogiticated by the substances applied. On the other hand, the antiphlogitons ascertained, that no change was thus made upon it, farther than adding a quantity of pure air, which they suppose to be the basis of all acids. On this subject, however, M. Corneille maintains, that the marine acid seems to have little action upon inflammable substances, merely because it is weaker than the rest; and likewise that it is often previously combined with some inflammable matter, by which its attraction is prevented. He maintains, that if the marine acid be concentrated in such a manner as to render its specific gravity to that of water as 19 to 16, it will then act upon oils with heat and effervescence, reducing them to a black and thick substance, and even burning them to a kind of coal. Some experiments have been made by Mr Hale, with a view to investigate the action of the marine and vitriolic acids upon balsams and oils; for which purpose he mixed two drachms of smoking spirit of vitriol with one of each of the oily substances to be tried. The results were, that Canada balsam gained one scruple in weight; balsam of caprif 19 grains; flox, and Venice turpentine, each one scruple; apitalum 18 grains; but the essential oils of antifeed, benzoin, bergamot, coriander, and many others, were not altered in any degree. The action of this acid upon inflammable matters, however, is augmented by its being reduced into the form of air.

1486 Gmelin relates, that, by distilling a mixture of five parts of salt, twelve of spirit of wine, and four of vitriolic acid, to which he had previously added one or two parts of water, he obtained a completely dulcified spirit of salt, and an imperfectly dulcified spirit of vitriol, upon rectifying the liquor.

Homburg found, that glass was corroded by the Gläser cor­nigest, and his observation has been confirmed red by Dr Prie­fley, who finds that its corrosive power is augmented by confining the acid in tubes hermetically sealed. Its power is exercised not only on flint­glass, but even on common green gläze; though more powerfully on the former, where it chiefly attacks the red-lead used in its composition. By including marine acid gas for some weeks in a glass tube exposed to heat, an incrustation was formed on the inside, while the air was diminished to 5 of its original bulk, one half of which was absorbed by water; the other was phlogi­gitized air.

1487 The marine acid is generally met with of a yellow or reddish colour, which by Macquer is given as one of the yellow colour of marine acid.

1488 Dephlogiticated spirit of salt.

When the action of this vapour upon any thing is examined, the substance must be put into a bottle in such a manner as to remain in contact with it; or that it may be put into a glass tube, which is suspended and fixed to the stopper, and thus introduced into the bottle.—From its property of destroying all vegetable colours, it promises to be of very considerable use in the arts, provided it could be had in sufficient quantity, and cheap. It bleaches yellow wax, and when properly applied to linen, will whiten it sufficiently, and with out injury in a few hours. This may be effected by steeping the linen for that space of time in water impregnated with the dephlogiticated marine gas. It unites with this fluid rather more easily than fixed air.
Berthollet, in order to impregnate water with it without exposing the operator to the fume, which is extremely disagreeable, put the mixture of marine acid and manganèse into a retort. To this he applied first an empty bottle, and then several others filled with water, and communicating with each other by means of bent tubes; surrounding the whole with ice. When the water in the bottles was saturated, the gas became concrete, and fell to the bottom; but with the smallest heat it arose to the top in bubbles. The specific gravity of the saturated water was that of distilled water, when the thermometer was only five degrees above the freezing point, as 1005 to 1000. This impregnated water is not acid, but has an astringent taste, and has the same action as the gas, though in a weaker degree.

Mr Berthollet has observed, that the addition of alkalis does not prevent, but rather promotes, the discharge of colours; for which reason he directs to add a fixed alkali to the impregnated water in which linen is to be bleached, but which has not hitherto come into use, principally through the high price of the dephlogisticated gas.

The dephlogisticated marine acid does not discharge all colours with equal ease. Those of litmus and syrop of violets are entirely destroyed, and turned white. The colouring matter of Brazil-wood, and some green parts of plants, retain a yellow tint. The leaves of evergreen plants resist its action for a long time, and at last only acquire the yellow colour which they allume by long exposure to the air; and in general the changes of colour which vegetable matters suffer from this gas, are similar to those which take place on long exposure to the air; and by this operation the gas is converted into common marine acid.

Oils and animal fats are thickened by this gas; and by these and other inflammable substances it is reduced to the state of common marine acid. Light is said to produce the same effect. It unites with fixed alkalis and calcareous earths, but without any sensible effervescence; and thus they lose their peculiar taste and colour. M. Berthollet having boiled a retort, to which a pneumatic apparatus was affixed, some of the dephlogisticated marine acid liquor with mineral alkali, thus obtained a considerable quantity of elastic fluid, composed partly of fixed air, partly of the air contained in the vessels, and partly of air considerably rarer than that of the atmosphere. The result of the combination was common salt. On repeating the experiment with lime, no fixed air was obtained; but that which came over became gradually more and more dephlogisticated. Volatile alkali, even when caustic, occasioned an effervescence, and emitted a peculiar kind of air, which was neither fixed nor dephlogisticated, but of a peculiar kind.

Green vitriol is changed to a red by the dephlogisticated gas, but the colour of blue and white vitriol is not affected. By the affittance of light, it acts upon phosphorus, and the result is phosphoric and common marine acids. It does not dissolve ice nor camphor; in which respects it differs from the common marine acid gas.

On mixing marine acid, manganèse, and spirit of wine, and distilling them with a very gentle heat, little air of any kind is produced, but a quantity of ethereal aqua regia very slightly acid. The proportion used by Pelletier were an ounce and a half of manganèse, five ounces of concentrated marine acid, and three ounces of spirit of wine. "In this process (says Mr Kier), the whole of the dephlogisticated acid seems to have united with the spirit of wine, and to have formed ether. The difficulty of combining marine acid with spirit of wine, so as to form an ether, is well known, and though there have been some approximations to it, yet the only instances in which it has been completely effectuated, have succeeded in consequence of the marine acid being dephlogisticated; by which its action on spirit of wine, as well as on all inflammable matters, is greatly increased."

M. Pelleter has observed, that when we put a bit of phosphorous into dephlogisticated marine gas, the former is immediately dissolved, and a light is perceived, the vessel being filled at the same time with white vapours. He has likewise observed, that sea-salt, with excessive quantities of pure air, throws into heated vitriolic acid a product which produces small detonations. To make this fail detonating salt from in quantity, take, for instance, ten pounds of sea-salt, mixing it with three to four pounds of manganèse, and pour on the mixture ten pounds of vitriolic acid, and distil with Woulfe's apparatus. Pass the difengaged acid through a solution of fixed vegetable alkali, either caustic or otherwise. A little more than ten ounces of the new marine salt with excessive of pure air is obtained, and a quantity of salt of Sylvius, or digestible salt. The salt with excessive of pure air crystallizes first, and by means of repeated crystallizations, is entirely disengaged from the other.

V. AQUA REGIA.

This acid, which is named from its property of dissolving gold, is compounded of the nitrous and marine acids. Gold and platinum cannot be dissolved in preparing any other menstruum, nor can regis of antimony and tin be so easily dissolved by any other as aqua regia. It may be made various ways. 1. By adding the two acids to each other directly. 2. By dissolving in the nitrous acid some salt containing marine acid, particularly salt ammoniacal and common salt. 3. By distilling nitrous acid from either of these salts. And, 4. In Dr Prieley's method of impregnating marine acid with nitrous acid vapour.

The only difference between those liquors prepared by the methods above-mentioned is, that when salt ammoniacal or sea-salt are dissolved in the nitrous acid, the aqua regia contains a quantity of cubic nitre, or nitrous ammoniacal, which, tho' it cannot much affect the acid as a solvent, may make a considerable difference in the nature of the precipitate. Thus, gold precipitated from an aqua regia formed by the pure nitrous and marine acids, does not fulminate, though it does so when precipitated from one made with salt ammoniacal. There are no established rules with regard to the proportions of nitrous and marine acids, or of nitrous acid and salt ammoniacal, which ought to be employed for the preparation of aqua regia. The common aqua regia is made by dissolving four ounces of salt ammoniacal in 16 ounces of nitrous acid; but these proportions must be varied, according to the nature of the intended solution.
Methods of preparing borax, and evaporation only; but sometimes the operation is more easily and effectually performed by previous calculation; but then the product is a little less refined, especially if the calcined mass be not well powdered, and then boiled sufficiently in water. Powder of charcoal, he says, may sometimes advantageously be employed in the purification; but in general there is no difference between the crude and purified borax, except in the addition of extraneous matters; at least, as the quantity of acids in the same, the addition of mineral alkalis is useless; these extraneous matters are an animal fat, and a sand composed of clay, lime, and a marl, earth. If the oily matter of tar be separated by passing the lixivium through a stratum of clay, as is done in the preparation of the crystals at Montpelier, it would suggest a method of greatly abbreviating the process of the purification of borax.

VI. BORAX.

In a memoir in Crel's Chemical Annals, by M. Tychon, the author shews, by different experiments, that it may sometimes be purified by solution, filtration, and evaporation only; but that sometimes the operation is more easily and effectually performed by previous calculation; but then the product is a little less refined, especially if the calcined mass be not well powdered, and then boiled sufficiently in water. Powder of charcoal, he says, may be sometimes advantageously employed in the purification; but in general there is no difference between the crude and purified borax, except in the addition of extraneous matters; at least, as the quantity of acids in the same, the addition of mineral alkalis is useless; these extraneous matters are an animal fat, and a sand composed of clay, lime, and a marl, earth. If the oily matter of tar be separated by passing the lixivium through a stratum of clay, as is done in the preparation of the crystals at Montpelier, it would suggest a method of greatly abbreviating the process of the purification of borax.

VII. ACID OF BORAX, OR SEDATIVE SALT.

On the preparation of this salt Mr Beamé observes, that a little more acid ought to be added to the borax than what is just sufficient to saturate its alkaline bases. Unless this be done, the sedative salt remains confounded with the other saline matters in the solution, and of consequence the crystallization must be disturbed. The salt, though formed in an acidulated liquor, is easily deprived of its superfluous acid by draining upon paper. It does not crystallize as soon as the stronger acid separates from its bases, even though the borax had been previously made as strong as possible; but this delay is occasioned by the heat of the liquor; for as soon as it cools, a considerable quantity of crystals is formed.

The acid of borax does not fall into powder when exposed to the air, but rather attracts a little moisture from it. Its taste is at first somewhat astringent, then cooling and bitterish; and lastly, it leaves an agreeable sweetish taste on the tongue. It makes a slopping sound, and feels a little rough between the teeth; and when vitriolic acid is poured upon it, it exhales a transient odour of musk. It is soluble, according to some chemists, in the proportion of one to 20 in cold water, or of one to eight in boiling water. Wenzel informs us, that 960 grains of boiling water dissolve 484 of the salt; while, on the other hand, Morveau affirms, that he could dissolve no more than 183 grains in a pound of distilled water. Roufs informs us, that fixed air of vitriol prevents the solution of the salt in water; and Morveau, borax and its combination.

1. With volatile alkali. The produce of this is a peculiar ammoniacal salt, which does not evaporate when thrown on burning coals, or otherwise intensely heated, but melts into glass of a greyish colour, but transparent, which cracks when exposed to the air; and, on dilution in water, shoots into small crystals, which appear to have lost none of their alkaline bases. It may be decomposed by the acetates as well as the mineral acids, and by fixed alkalis and lime.

2. With magnesia this acid shoots into irregular crystalline grains soluble in vinegar and acid of ants, in which liquids they crystallize like small needles joined together at right angles. They are decomposed by all other acids, and likewise by spirit of wine. In the fire, however, they melt easily without any decomposition; and in the dry way sedative salt decomposes all the earthy parts formed by magnesia and any of the volatile acids.

3. With pure earth of alum, sedative salt forms a salt very difficult of solution, when one part of earth is ground with four times its weight of sedative salt and water. The same kind of earth, mixed with half its weight of sedative salt, forms a hard grey mass, resembling pumice stone; part of which is soluble in water, and yields a mealy sediment, together with some sedative salt unchanged.

4. With flueous earth the sedative salt does not unite in the moist way; but, on melting one part of acid with two of this earth, we obtain a frothy, hard, greyish-white mass, from which, however, the acid may be again procured.

5. Cold is not acted upon in the wet way by acid of borax; nevertheless Roufs observed, that when sedative salt was melted with gold-leaf, it did not vitrify, but became frothy and hard, did not colour the flame of spirit of wine, and only a little of it was soluble in water in which sedative salt had been crystallized.
A solution of borax in which sedative salt was dissolved, did not precipitate gold.

6. *Platinum* is not precipitated from aqua-regia by sedative salt.

7. *Silver* is not affected by melting with an equal quantity of sedative salt; but the latter is vitrified in such a manner as to become insoluble in water.

8. *Mercury* is not dissolved either in the dry or wet ways; but a solution of borax saturated with sedative salt precipitates it in a yellow powder from nitrous acid.

9. *With copper.* On this metal sedative salt acts but weakly, even when the solution is boiling hot; nevertheless, as much of the metal is dissolved, as gives a little white precipitate on the addition of fixed alkali; but volatile alkali does not throw down a blue precipitate, nor turn the solution of that colour. The solution of borax precipitates all solutions of copper in liquids, and then the sedative salt unites with the copper in form of a light green jelly, which, after drying, is of very difficult solution in water. Bergman says, it is of an agreeable green colour, which preserves after being dried; and that, when exposed to the fire, it melts into a dark-red vitreous substance.

Wenzel affords, that by long continued trituration of copper filings with sedative salt he obtained a solution of the metal, which yielded crystals on being evaporated. With twice its weight of copper in a covered crucible, an infusible vitreous mass was obtained.

10. *Tin* is not apparently acted upon by boiling with sedative salt; nevertheless, the solution becomes turbid on the addition of an alkali. By melting the calx with half its weight of sedative salt, we obtain a black mass like the dark coloured tin ore. By rubbing for a long time filings of tin with sedative salt and water, and afterwards digesting the mixture with heat for some days, an hard, sandy, and irregularly shaped mass was obtained, which, by dilution in water, yielded transparent, white, polygonous crystals; and a lot of these crystals obtained was only obtained from the flag produced by melting equal parts of sedative salt and tin filings.

11. *Lead* is not acted upon directly; but, on adding a solution of borax to solutions of the metal in vitriolic, nitrous, marine, or acetous acids, the sedative salt unites with the lead. One part of sedative salt with two of nitric acid gives a fine, greenish-yellow, transparent, and infusible glas.

12. *With iron.* The acid of borax dissolves this metal more easily than any other. The solution is amber-coloured, and yields an ochry sediment, with clusters of yellow crystals containing a little iron. The metal is precipitated by borax from its solutions in vitriolic nitrous, marine, and acetous acids, and the precipitates are soluble in sedative salt. A solution of iron may also be obtained by melting this salt with iron filings, and lixiviating the mafs.

13. *Zinc* communicates a milky colour by digestion with solution of sedative salt. By evaporation it affords a confused saline mass, and a white earthy powder by precipitation with alkali. Flowers of zinc, melted with sedative salt, form a light green infusible flag.

14. *Bismuth,* in its metallic state, is not acted upon by sedative salt, but is precipitated by borax from a mixture of vitriolic and marine acids, in form of a very white powder, which keeps its colour when exposed to air, and melts in the fire to a white, transparent, and permanent glas.

15. *Regulus of antimony* is not acted upon directly, but its calx is dissolved when precipitated by borax from a solution in aqua-regia.

16. *White arsenic* unites with sedative salt either in the dry or moist way, and forms a crystallizable compound, forming elastic ramifications, or white, greyish, and yellowish feline powder.

17. On regulus of cobalt the acid has no direct action; but borax precipitates it from its solution, and the calx melts with the salt into a flag of a bluish-grey colour; and this, by lixiviation and evaporation, affords a feline salt impregnated with cobalt, of a reddish white colour, and of a crumpled form.

18. *Nickel* is precipitated from its solution, and the sedative salt unites with it into a feline substance difficult of solution.

A variety of opinions have been formed concerning the nature of sedative salt. M. Beaneé and M. Cadet particularly have made a great number of experiments on the subject; but as none of these have led to any certain conclusion, we forbear to mention them at present. Thoé of Meffrs. Exchiquet and Struve have indeed established some kind of relation between the acids of borax and phosphorus, and they have made several attempts to analyze the former, but with little determinate success. The most remarkable of these experiments are the following. They distilled, with a fire of the sedative salt, heat, two parts of phosphoric acid evaporated to the confidence of honey, one of sedative salt, and two of water. Towards the end of the distillation a very acid liquor was obtained; and the residuum was a white earth, in quantity above three-fourths of the sedative salt employed, and which, on examination, was found to be the illicious earth; the liquor which passed over into the receiver being found to be the volatile phosphoric acid. If, in this experiment, too much phosphoric acid be added, a greasy matter remains; and, if too little, a part of the sedative salt will remain undecomposed. In their attempts to compose borax, they combined phosphoric acid with mineral alkali, the result of which was a compound resembling borax in many respects. When exposed to the fire it melts into a very fusible glass, which has a mild taste, and seems neutral, but on exposure to the air, becomes moist and acid. On being saturated with alkali a second time and vitrified, it again deliquesces and becomes acid; and the more frequently this operation is repeated, the greater is the resemblance it bears to borax. In this experiment they supposed that the alkali was decomposed, and converted into an earth similar to that of sedative salt.

With earthy substances the results were very remarkable. With earth of alum a crystallizable salt was obtained, which made paper burn with a green flame. Fixed alkali added to a solution of this salt precipitates an earth, and the salt then formed by crystallization resembles borax in several properties. In the dry way the earth of alum, with the phosphoric acid, melts into a glass of the same fusibility as that of borax, and like it is fixed in the fire. The solution of this glass did not crystallize. Common clay
Acid of amber.

It is known to Agricola, that a particular kind of salt could be obtained from amber by distillation; but neither he, nor any succeeding chemist for some time afterwards, ascertained its acid properties. On the contrary, some erred so far as to imagine that it was a volatile salt; but, about the beginning of the present century, its acidity began to be generally acknowledged. This property indeed discloses itself by the taste, which is manifestly acid and empyreumatic, along with the peculiar flavour of amber. According to Scheele, also, the aqueous liquid which passes over in the distillation of amber, is an acid resembling vinegar both in taste and chemical properties; and which of consequence ought not to be confounded with the true acid of amber, which manifests qualities of a very different kind.

The properties of the salt of amber can hardly be investigated until it has been purified; for which, of consequence, various methods have been proposed. Pott recommends crystallization, after having filtered the solution through cotton-wool, in order to retain the oil. Carthey attempts the purification by dissolving the impure salt in spirit of wine, then diluting with six times its quantity of water, and crystallizing the salt. Others recommend sublimation with common salt or sand, and Bergman with pure clay.

The salt of amber digests, by the affinity of heat, in nitrous and marine acids, and in the vitriolic without heat. In none of these combinations, however, does it either alter the dissolving acids, or suffer any alteration itself, except that it becomes whitier; with nitre it detrones and flies off; and if the quantity of salt of amber has been greater than that of nitre, the latter is alkaliized. Stockar informs us, that it expels the marine acid from salt ammoniac, and sublimes before that salt; with which it does not form any union. When sublimed from common salt, it does not alter the latter in any other respect than giving it a darker colour. It precipitates calcareous earth from its solution in vinegar; and it decomposes sugar of lead; but the precipitate differs from plumbo cornue. It does not prevent the solution of lead in the acids of sea-salt and nitre; nor does it produce any phosphorous acid by calcination with charcoal. Hence it appears that it is neither a vitriolic, nitrous, nor marine acid; and M. Bourde-}

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**CHEMISTRY.**

**Practice.**

1. **With fixed vegetable alkali.** By saturating salt of amber with the fixed vegetable alkali, and then slowly evaporating the solution, we obtain, according to Wenzel, a light deliquecent saline mass; but, according to Stockar, who experimented by the method of Mr Keir, the solution abovementioned affords shining white transparent crystals of a triangular prismatic figure, with the terminating points truncated. These crystals readily dissolve in water, deliquesce in the air, and have a peculiarly bitter saline taste. In the fire they decompose, melt, and remain neutral; though Wenzel has observed, that with an intense heat they are decomposed and become alkaline. These crystals do not change aquafortis into aqua-regia; and though they precipitate both the solutions of lead and silver, the precipitates are neither plumbum cornue nor luna cornua.

2. **With Mineral alkali.** This combination produces long three-sided columnar crystals, intermixed with some that are foliated. These crystals do not deliquesce in the air, and have a saline, bitter, and smoky taste. They are less soluble than common salt, and melt with more difficulty than nitre. They do not become alkaline on burning coals, and, in their other properties, resemble the former.

3. **With volatile alkali.** This salt flows into acicular crystals, having a sharp, saline, bitter, and cooling taste; when heated in a silver spoon, they melt and evaporate entirely; in close vessels they sublime. They do not precipitate solution of silver, nor change spirit of nitre into aqua-regia. A powerful antispasmodic remedy is prepared from rectified spirit of hartshorn and salt of amber.

4. **With lime.** This salt flows into oblong pointed crystals, which do not deliquesce in the air, and are soluble with difficulty even in boiling water; nor, according to Mr Stockar de Neuforn, can they be decomposed by distillation either with acetic or marine acids. They decompose by distillation with nitrous acid, and are decomposed, either in the moist or dry way, by the vitriolic. When mixed with common salt ammoniac in the dry way, they suffer a decomposition; the succinated ammoniacal salt flying off and the combination of marine acid with lime remaining behind.

5. **With magnesia.** This yields a white, gummy, frothy, saline mass, which acquires a yellowish colour when dried by the fire; and, when cool, deliquesces in the air. It is decomposed by alkalies and lime, as well as by the vitriolic acid.

6. **With clay.** By uniting the acid of amber with an edulcorated precipitate of alum with vegetable alkali, Wenzel obtained prismatic crystals, which could not be decomposed by alkalies.

7. **With silver.** The acid of amber has no effect on silver.
Acid of amber and its combinations.

8. With copper. By a long digestion of copper with acid of amber, a green solution is obtained, which by mixture with common salt is rendered turbid, by vitriolic acid white, and lets fall a green precipitate on the addition of fixed alkali. Wenzel, however, could not obtain this precipitation by alkalis. His solution yielded groups of green crystals, gave a crust of copper to zinc, and was precipitated by liver of sulphur.

9. With iron. Wenzel dissolved a precipitate of this metal in acid of amber, and from the solution obtained small, brown, transparent, and slightly coloured solution of metallic iron. Zinc precipitated the precipitate formed by fixed alkali; and the sulphurous acid more; and lead, iron, or zinc, nothing.

10. With tin. Acid of amber dissolves tin when precipitated by a fixed alkali; and the solution yields thin, broad, and foliated transparent crystals. Alkalis throw down but little from this solution; liver of sulphur more; and lead, iron, or zinc, nothing.

11. With lead. Acid of amber whitens the surface of lead in its metallic state, but does not dissolve it; neither can lead be precipitated from its solutions in nitrous and marine acids by salt of amber, though this is denied by Pott. According to Stockar, however, it forms a white precipitate with sugar of lead. This metal precipitated by an alkali, and dissolved in acid of amber, forms long foliated crystals lying upon one another; from the solution of which the lead may be precipitated by alkalis in the form of a grey powder, and by zinc in its metallic state.

12. Zinc, in its metallic state, is readily dissolved by the acid of amber; and by a combination with the precipitate formed by fixed alkali, we obtain long, fleuder, foliated crystals, lying upon one another. The solution lets fall a white precipitate on the addition of fixed alkali only; but this is denied by Stockar, who says that volatile alkali produces a red precipitate.

13. Bismuth. By means of heat, Stockar obtained a solution of this metallic in acid of amber, which was decomposed by alkalis. Wenzel obtained, from a precipitate of bismuth prepared by means of fixed alkali, small, flender, foliated, and yellow crystals; which alkalis cannot decompose, though black precipitates are thrown down by lead and zinc.

14. Regulus of antimony. Little or none of this metallic, in its reguline form, is dissolved in the acid of amber; but it attacks the precipitate made with fixed alkali. This solution is very copiously precipitated by liver of sulphur, but not by alkalis.

The combinations of this acid with gold, platinum, nickel, arsenic, and manganese, have either been found impracticable, or not yet attempted; all those above described are non-deliquescent, and part with their acid when exposed to the fire. The elective attractions of this acid, according to Bergman, areingular, as it adheres more strongly, not only to terra ponderosa and lime, but to magnetia, than to fixed alkali.

On the origin of salt of amber, Mr Keir remarks, that it deserves to be considered as a pure and definite acid. No proofs have been adduced of its being Acid of amber and its combinations.

The former, having distilled spirit of salt with oil of lavender, obtained an acid which smelled like salt of amber, but on evaporation was found not to contain the properties of the muriatic acid. He also relates, that when purifying a considerable quantity of the salt of amber which he had prepared for himself, some sea-fall was separated, which in the distillation had arisen along with it. But this observation cannot be justly applied to show any resemblance between these two, any more than the smell in the former case could show an analogy between it and oil of lavender. This mixture of sea-fall with acid of amber, however, may, readily explain the mistake of M. Bourdelin already mentioned. M. Weilram and M. Hermilliat have both laboured in vain to convert the acid of amber into acids of sugar and tartar by frequent distillations with spirit of nitre; and their want of success confirms the account already given, that the acids of nitre and amber have no action upon each other, farther than that the former is phlogi- or changed into red fumes, and the latter becomes whiter. Nevertheless, if Mr Scheele's observation of the identity of the acid liquor, which comes over in the distillation of amber with acetic acid, holds good, we shall have the best reason yet given to ascribe the origin of this acid to the vegetable kingdom; and when we consider the very different properties that are ascribed by the vegetable acids, which, however, are convertible into one another, no reason can be drawn from the diversity of its properties with those of other vegetable acids, against its having a common origin with them. Indeed the natural history of amber, its similarity to gums and resins, and its involved infefts, afford other arguments in favour of the opinion.

IX. Acid of Arsenic.

M. Berthollet remarks upon Mr Scheele's process. M. Pellecier, that during the operation a great quantity of the muriatic acid is expelled from the acid. M. Pelleier has found another method of procuring the arfenical acid. He mixes common white arsenic with nitrous ammoniac, and distills the mixture. At first phlogi- or changed into red fumes, and the latter becomes whiter. Nevertheless, if Mr Scheele's observation of the identity of the acid liquor, which comes over in the distillation of amber with acetic acid, holds good, we shall have the best reason yet given to ascribe the origin of this acid to the vegetable kingdom; and when we consider the very different properties that are ascribed by the vegetable acids, which, however, are convertible into one another, no reason can be drawn from the diversity of its properties with those of other vegetable acids, against its having a common origin with them. Indeed the natural history of amber, its similarity to gums and resins, and its involved infefts, afford other arguments in favour of the opinion.

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the arsenic, as it had that necessary to convert it into calx before the operation of converting it into an acid was begun. On the other hand, M. Bergman affirms, that one-fifth of white arsenic is phlogiston, and that this calx is converted into acid merely by being deprived of its phlogiston. Thus the facts related by these two celebrated chemists differ enormously from one another; M. Berthollet affirming that the arsenic gains a ninth of its original weight in the process of acidification; and M. Bergman, that it loses a fifth part of the same. M. Berthollet endeavours to reconcile this, by supposing that Bergman had employed marine acid for the preparation of his arsénical acid, which is well known to carry off with it some part of most of those substances with which it is capable of combining; and to this he attributes the loss of weight in Bergman’s process.

IX. Acid of Molybdæna.

The opinion of M. Bergman concerning the metallic nature of the acid of molybdæna has obtained some confirmation from the experiments of M. Pelletier. He was not able indeed to obtain any regular; but by means of oil alone he procured, by two hours' vehement heat, a substance slightly agglutinated with a metallic lustre, containing small round grains of a grey metallic colour, very visible by the help of a magnifier. These he supposes to have been a true regium of molybdæna; which he found to possess the following properties. 1. It is calcinable by fire into white calx. 2. It detaches with nitre, and the residuum is a calx of molybdæna united with the alkali of the nitre. 3. It is converted into a white calx by means of nitrous acid. 4. It yields inflammable air when treated with alkalies in the dry way, and forms peculiar compounds with them. 4. It forms regenerated molybdæna with sulphur. 6. It unites, and forms peculiar substances with metals. By uniting it with silver, iron, and copper, we have friable reguline masses; and refractory powders with lead and tin.

Our author, in consequence of his experiments, considers molybdæna as a metallic substance mineralized by sulphur; and the earth called the acid of molybdæna as a calx much dephtophosphated, which has retained part of the air contained in the nitrous acid. He observes likewise an analogy between molybdæna and antimony in their chemical refuls. Both of them yield vitrifiable argentine flowers by similar operations, and both are changed into white earths by nitrous acid; but they differ in the two following respects.

1. The latter easily gives a flible regulus; but the molybdæna seems to be the most refractory of all the semimetals. 2. The calx of regium of antimony is soluble by alkalies in the moist way; but that of molybdæna is not.

X. Acid of Tungsten or Wolfram.

Mr Luyant, who has examined this mineral, gives the following account of it. 1. It is infusible by the blow-pipe, though the angles of the pieces into which it is broken are thereby rounded. 2. It effervescs with microcosmic salt, and melts before the blow-pipe into a reddish glass. 3. With borax it effervescs; and by the outward flame of the blow-pipe is changed into a reddish glass; by the internal flame into a green-tined one. 4. Heated by itself in a crucible, it swelled, became spongy, semi-inflamed, and was attracted by the magnet. 5. With an equal part of nitre it denatured, or boiled up with a blue flame round the edges, and nitrous vapours arose. The mass was soluble in water, and let fall a white precipitate with acid. 6. It melted readily with fixed alkali, leaving a kind of black matter in the crucible, and a smaller quantity of lighter coloured sublimate on the filter. Thefe refuls showed a mixture of iron and manganese. 6. With nitrous acid the filtered solution let fall a white precipitate, at first sweet, but afterwtrds bitterish and harsh, and which caused a disagreeable fenation in the throat; and the acidity of the solution of it was manifested, by its turning the tincture of turnip or red.

Having examined the substance by means of liquids in Mr Scheele's way, they obtained the same yellow powder which he had characterized as the acid of wolfram, along with a very small residuum, which appeared to contain a mixture of tin. Proceeding further in the analysis, they found that wolfram is composed of manganese, calx of iron, the yellow matter called the acid of tungsten by Bergman and Scheele, with a very little mixture of quartz and tin, and which they considered as accidental.

They now proceeded to examine the yellow matter, of the yellow matter produced by the two celebrated chemists just mentioned, called the acid by Mr Scheele.
not allow to be a simple acid, though they admit that it contains one; and affirm, that its properties are various according to the circumstances of its precipitation. The properties of it, as described by them, are the following. 1. It is fusible before the blow-pipe, exhibiting the same phenomena as the yellow matter. 2. By calcination in a little pot or telt, it emits the smell of nitrous acid, and turns yellow; but, on cooling, remains white, infipid, and infusible; and this residuum melts by itself before the blow-pipe. 3. A yellow colour is produced either by vitriolic or marine acids; and the filtrated liquor affords a neutral salt with balls of fixed alkali, according to the nature of the acid employed. If the vitriolic acid is employed, and the operation performed in a retort, a quantity of nitrous acid passes over. If, instead of pouring the acid on the salt, it be poured upon its solution, no precipitation will be formed, not even by making the liquor alkali, but without any loss of its property, a fluid is produced, which did not emit the smell of that sort. Having poured nitrous acid upon a portion of the falt, which did not dissolve entirely, in volatile alkali, but without any perfect saturation taking place; and the alkali always prevails. 2. The solution being set in a sand-bath, produced needle-like crystals, which had a sharp bitter taste, exciting a disagreeable sensation in the throat. Their solution turned the tincture of turpentine red, and the liquor from which they were crystallized had the same properties. 3. Having repeated these experiments with different quantities of the same crystals, leaving some longer on the fire than others, solutions were obtained, whose acidity was in proportion to the time they had remained on the fire; but during the operation they all emitted the smell of volatile alkali. By calcination this salt was entirely disintegrated, and the residuum was a yellow powder, perfectly similar to that with which the operation was begun. On making use of a retort for the operation, the remaining powder was blue. 4. This salt precipitates the vitriolic salts of iron, copper, zinc, and alun, calcareous nitre, marine mercurial salt; the acetic salts of lead and copper; and with lime-water regenerates tungsten. The vitriolic acid decomposes it, and forms a blue precipitate; the nitrous and marine acids produce a yellow; but no precipitate is occasioned by the Prussian alkali. 

Having poured nitrous acid upon a portion of the solution with excess of alkali, a white powder was precipitated, which, after edulcoration, had a taste at first sweet, but afterwards sharp and bitter, and its solution turned the tincture of turpentine red. This, on examination, appeared to be a triple salt formed of the yellow powder, volatile alkali, and the precipitating acid.

The following experiments realize the conjecture of Bergman, that the acid of tungsten is the basis of a preparation of the metal.

1. "Having kept 100 grains of the yellow powder (says M. Luys) in a Zamora crucible well covered, and set the whole in a strong fire for half an hour, it became a spongy mass of a bluish black colour, the surface of which was crystallized into fine points, like plumo antimony, and the inside compact, and of the same colour. It was too hard to be broken in pieces by the fingers; and, when ground, was reduced to a dark-blue colour.

2. "Having mixed 100 grains of the same powder with 100 of sulphur, and put the mixture in a Zamora crucible on a strong fire for a quarter of an hour, it came out a dark-blue mass, which was easily broken by the
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Having placed this portion again to calcine over a strong fire in a muffle; it suffered no sensible alteration in weight or colour; for it neither grew yellow, nor took the brown colour of the platinum, but kept the same blackness as before it was calcined. It must be attended to, that in the washings there was not so much care taken to collect all the platinum as to deprive it of the yellow colour, and for this reason the water carried off part of the fine black powder: and consequentially the increase which the platinum preferred, after being washed and calcined the second time, ought to be computed more than the 18 grains which it showed by its weight.

Having mixed the yellow powder with other metals in the preceding proportions, and treated them in the same manner, the result was as follows:

1. With silver it formed a button of a whitish-brown colour, something spongy, which with a few strokes of a hammer extended itself easily, but on continuing them split in pieces. This button weighed 142 grains, and in the most perfect mixture we have obtained, except that with iron.

2. With copper it gave a button of a copperish red, which approached to a dark brown, was spongy, and pretty ductile, and weighed 133 grains.

3. With crude or cast-iron, of a white quality, it gives a perfect button, the fracture of which was compact, and of a whitish brown colour: it was hard, harsh, and weighed 137 grains.

4. “With lead it formed a button of a dull dark-brown, with very little lustre; spongy, very ductile, and splitting into leaves when hammered: it weighed 127 grains.

5. “The button formed with tin was of a lighter brown than the last, very spongy, somewhat ductile, and weighed 136 grains.

6. “That with antimony was of a dark-brown colour, shining, something spongy, harsh, and broke in pieces easily: it weighed 108 grains.

7. “That of bismuth presented a fracture, which, when seen in one light, was of a dark-brown colour, with the lustre of a metal; and in another appeared like earth, without any lustre: but in both cases one could distinguish an infinity of little holes over the whole mass. This button was pretty hard, harsh, and weighed 68 grains.

8. “With manganese it gave a button of a dark bluish-brown colour and earthy aspect; and on examining the internal part of it with a lens, it resembled impure drops of iron: it weighed 107 grains.

ETMULLER is among the first authors who mentions the existence of this acid, and speaks of obtaining it by distillation. Nothing of its properties, however, was known, until Margraafa undertook to examine it; of whose experiments we have an account in the Memoirs of the Berlin Academy for 1749. Since his time a number of chemists have profected the subject.

(a) “The first time we made this experiment, we broke the crucible without letting it cool entirely; and as soon as the matter was in contact with the air, it took fire, and its dark brown colour turned instantly yellow.”
Acid of ants.

The acid in question is a natural juice which the insects discharge when irritated, and which is very pungent to the smell as well as taste. Thus it may instantly be perceived on turning up an ant-hill in spring or summer. The *formica rufa* of Linnæus are those insects which have hitherto supplied this acid. Mr Arvidfon advises to collect them in the months of June and July, by laying some smooth sticks upon an ant-hill; which being then disturbed, the ants will run upon the sticks in great numbers, and may then be swept off into a vessel containing water until it be full. Hermbfadt collects them in the same manner, but into a dry bottle, to avoid the evaporation of the superfuous liquid. Bucholtz having moistened the inside of a narrow necked glass bottle with honey and water, sunk it in a disturbed ant-hill until the mouth was level with the ground; on which the insects, allured by the smell of the honey, went into the bottle, and could not get out.

For obtaining the acid, Margraaf employed distillation, with the addition of fresh water. Thus he obtained, from 24 ounces of fresh ants, 11 ounces and two drachms of acid, some volatile alkali, empyreumatic oil, and a residuum containing earth and fixed salt. Arvidfon made use of two methods: One consisted in distilling the ants when dry; from a pound of which, in this state, he obtained eight ounces of acid besides the empyreumatic oil. His other method was to collect, in a piece of linen, the ants previously cleaned by washing in water, then to pour boiling water upon them, and to repeat the operation until it could extract no more acid; which is then obtained by squeezing the linen, mixing all the liquors, and filtering them. Thus from a pound of ants he obtained a quart of acid liquor, which tasted like vinegar, but was specifically heavier. By distillation Hermbfadt obtained from a pound of dry ants ten ounces and a half of yellow empyreumatic liquor, which did not taste more strongly acid than the spirit obtained by distilling wood, on which floated three drachms of a brown fettid oil, in all respects like that of hartthorn. In the retort was left a black residuum weighing one ounce six drachms, which exhibited signs of containing volatile alkali. By distilling a pound of ants with three of water, according to Mr Margraaf’s method, he obtained an acid liquor and some oil in the receiver; and from the surface of that which remained undistilled, he collected a drachm and an half of fat oil.

The specific gravity of the acid liquor obtained by Mr Arvidfon’s maceration was 1.0011; that of the same liquor, when distilled, 1.0075; and of the acid concentrated by freezing, 1.0453. According to Bucholtz, the acid liquor thus obtained by maceration did not grow in the leaft mufdy in the space of four weeks; during which it was allowed to rest in order to free itself perfectly from the impurities it contained. Mr Hermbfadt, however, prefers Margraaf’s method of distillation to that of Arvidfon’s macerations, not only as being more rapid, but also as less laborious; though he finds fault also with Margraaf’s method, as diluting the acid too much, and altering it so that it has not the smell of living ants. He totally disapproves of the method of distilling dried acid of ants, as the acid is thus in a great measure decomposed, and the remainder united with much oil. To avoid all these inconveniences, he contrived another method, namely, to express the juice of the insects; by which means he obtained at once a concentrated liquor fit for distillation. In this way he obtained from two pounds of dried ants 21 ounces and two drachms of juice, which had a pungent and highly acid smell, resembling the vapours of fluoro acid; in taste resembling concentrated vinegar and acid of tartar; to which last it might be compared for strength of acidity. By distilling eight-ounces of this expressed liquor, he obtained six ounces and a half of clear acid, equal in strength to a very concentrated vinegar.

The acid, when thus procured in purity, has a pungent, not unpleasant smell, a sharp, caustic taste, and of the pure an agreeable acidity. It reddens blue paper, syrups of violets, and litmus; blackens the vitriolic acid, and converts part of it into a sulphurous vapour. It is also decomposed by distillation with nitrous acid. Spirit of falt likewife, when dephlogisticated, decomposes it, but not in its ordinary state. It does not form sulphur by an union with phlogiston, but produces inflammable vapours by dissolving iron or zinc. By the affinities of a gentle heat it dissolves foot, but oils with much more difficulty, and powder of charcoal not at all. It does not unite with vitriolic ether; but in distilling a mixture of this acid with spirit of wine, Mr Arvidfon saw some traces of an ether, and M. Bucholtz perfectly succeeded in making an ether by means of it. It unites with fixed alkali, forming, according to M. Margraaf, a neutral falt, consisting of oblong deliquecent crystals, from which very little acid could be procured by distillation per fe, but on adding concentrated oil of vitriol, a very strong and pure acid was obtained, from a mixture of which with spirit of wine, M. Bucholtz readily obtained a true ether. With mineral alkali it forms deliquecent foliated crystals of a fatty bitter taste, and soluble in twice their weight of water. With volatile alkali it forms an ammoniacal liquor; which, according to Arvidfon, cannot be brought into a dry state; but Mr Arvidfon says he has obtained crystals from it, though very thin and deliquecent. Margraaf obtained dry crystals by uniting this acid, with chalk or coral; and Arvidfon observes that this salt is transparent, cubical, or rhomboidal, nondeliquecent, soluble in eight parts of water, of a bitter taste, and insoluble in spirit of wine. No acid can be obtained from it by distillation per fe. From a solution of magnesia in this acid, Mr Arvidfon obtained some saline particles by deposition, and afterwards an efflorescence of transparent salt rising round a saline mass. This salt had scarcely any taste, was soluble in 12 parts of water, and insoluble in spirit of wine. With ponderous earth the acid formed a cluster of bitter needle-like crystals, which did not deliquece, were soluble in four times their quantity of water, insoluble in spirit of wine, and when burnt gave out a smell like that of burnt sugar, leaving a coal which effervesed with acid. It unites with difficulty to the earth of alum, and can scarcely be saturated with it. It does not precipitate silver, lead, or mercury, from their solution in nitrous acid; whence it seems to have no affinity to the ma-
Acid of apples

An acid hath an affinity with the acetous acid.

Its effects on metals.

Acid procured from various insects.

Acid of citrons how procured.

Another acid procured from the juice of fruits.

Chemistry.

Practice.

that the

ripe acid; and as it does not precipitate lime from the marine acid, it seems to have as little with the vitriolic.

From his experiments, however, Margraaff concluded, that the acid of ants, in many respects, though not in all, has a great affinity with the acetous acid. From this it is distinguished by forming different compounds, and likewise by having different affinities. It dissolves the acetous acid also in all instances, and the arseneal acid from cobalt and nickel. It has a greater attraction for fixed alkalis than for lime.

As a solvent it acts but weakly upon copper; not at all, or very little, on silver, lead, tin, regulus of antimony, or bimuth, but strongly on iron or zinc. It dissolves, however, the calces of copper, silver, zinc, and lead, without affecting those of tin, regulus of antimony, or bimuth. The calx of quicksilver, according to Margraaff, is revived by it. According to Avdion, it crystalizes with iron, zinc, or lead; does not act upon the regulus of antimony, of arsenic, cobalt, or nickel; though it dissolves their calces as well as the precipitate of manganife. Gold, mercury, and the calx of platina, are not affected by it; but it crystalizes with those of copper, silver, lead, bimuth, and mercury.

In its strength of attraction, the acid of ants exceeds those of vinegar, borax, and the volatile sulphurous and nitrous acids. Infests armed with stings, as bees, wasps, and hornets, are likewise said to difcharge a very acid juice when irritated; and Mr Bonnet has observed a very strong acid ejected by a caterpillar which he distinguishes by the name of grande cheville du faul a quest fourche. None of these, however, have been as yet particularly examined.

XII. Acid of Apples.

That the juices of unripe fruits contain some kind of an acid has been universally known, and attempts to investigate the nature of it have been made some time ago; but it is to Mr Scheele that we owe the discovery of the particular acid now treated of. He had observed that the juice of citrons contained a peculiar acid; which, by being united with lime, formed a salt very insoluble in water; and which therefore by means of lime could be readily separated from the mucilaginous part of the juice. By adding vitriolic acid to this compound of lime with the acid juice, almost in the same manner in which he used to procure the acid of tartar, the lime was again separated, and the pure acid of citrons obtained. Proceeding in the same manner with other fruit, he found that an acid, agreeing in every respect with that of citrons, could be procured from the juice of the ribes grossularia.

Examining the juice which remained after the separation of the former acid from the citrons, he found that it still contained another acid; which being saturated with more calcareous earth, formed a salt easily soluble in water, and therefore remained suspended in the juice. To separate this new salt, he added some spirit of wine, by which the salt was precipitated; but finding that it still contained much gummy matter, he judged that it would be proper to attempt a separation of this gum before he precipitated the salt. For this purpose he evaporated some of the juice of the ribes grossularia to the consistency of honey, dissolving the mass afterwards in spirit of wine. Thus the acids, which are soluble in the spirit, were easily separated by filtration from the insoluble gum. He then evaporated the spirit, adding to the remainder twice its quantity of water, with as much chalk as was necessary for the saturation. The liquor was next boiled for two minutes; during which the insoluble salt was precipitated, and the liquor separated from it by filtration contained the solution of chalk in the new acid. To this solution he added spirit of wine, which again precipitated the salt, while some faphonaceous and fuccharine matters remained dissolved in the spirit.

Having thus at last obtained the salt in a state of purity, he proceeded to examine its nature; and found, 1. That some of it, spread on his nail, soon dried, and assumed the appearance of varnish. 2. It was very soluble in water, and turned litmus red. 3. When the solution had stood some days exposed to air, it was found to have deposited a number of small crystals, which could only be dissolved by a quantity of boiling water; and this salt was also found to be completely neutralized, so that, it yielded its calcareous earth to a fixed alkali.

The salt was decomposed by heating per fac in a crucible, and left a mild calcareous earth. The acid was separated from the earth by adding oil of vitriol diluted with water until gypsum was no longer precipitated, and the new acid was left disengaged, so that it could be separated by filtration. By this operation, however, all the lime was not precipitated; so that the separation of the acid was not complete. He observed that the acid had a greater attraction for lead than for lime; and therefore made use of the method he had formerly discovered for separating the acid of forrel. To the acid he added a solution of fugar of lead; by which the acid was precipitated along with the lead, and the vinegar was left in the liquor. To this precipitate, cleaned from the acceous acid by filtration, he added vitriolic acid, which expelled the weaker vegetable one, and thus left it quite pure and free from any heterogeneous mixture.

The juice of apples, either ripe or unripe, was found to contain no acid of citrons, but a large quantity of the new acid; which, being thus alone, he could more easily procure by a single operation. The best method of procuring this he found to be by saturating the juice of the apples with a solution of fixed vegetable alkali, and pouring a solution of fugar of lead to that of the salt just mentioned. The effect of this was a double decomposition, and a precipitate of lead combined with the new acid. To the carbonated precipitate he then added a dilute vitriolic acid till he could no longer perceive any sweet taste in the liquor; for the first portions of the vitriolic acid dissolve a part of the calx of lead, and impart a sweetish taste to the liquor, which is fusible, notwithstanding its acridity; but when the quantity of vitriolic acid is sufficient to saturate the whole of the calx, all the metal falls to the bottom, and the sweetness ceases; so that the acid is at once obtained pure.

The acid of apples is possessed of the following properties. 1. It cannot be crystallized, but always remains in a liquid state; or, if much evaporated, extracts the moisture of the air. 2. With fixed alcalies.
Acid. of apples. of all kinds forms deliquescent salts. 3. With calcareous earth it forms small irregularly shaped crystals, which cannot be dissolved in a large quantity of boiling water; but if the acid is superabundant, the salt readily dissolves in lime-water. 4. It is effectual by pungent, earth in the same manner as by lime. 5. Earth of alum, with the acid of apples, a salt not very soluble in water. 6. With magnesia the acid forms a deliquescent salt. 7. Iron is dissolved into a brown liquor, which does not crystallize. 8. The solution of zinc affords fine crystals. 9. On other metals it has no remarkable effects. From the acid of citrons it differs. 1. The acid of citrons yields into fine crystals. 2. The acid of apples can be easily converted into that of sugar, which Mr. Scheele could not accomplish with that of citrons; though Mr. Wetzlumberg has since done it. 3. The salt formed with the citron acid and lime is almost insoluble in water; but that with acid of apples and lime is easily soluble. 4. Acid of apples precipitates mercury, lead, and silver from their solution in nitrous acid, but likewise the solution of gold, when diluted with water; but the acid of citrons does not alter any of these solutions. 5. The acid of citrons seems to have a greater attraction for lime than that of apples.

It is remarkable that this acid is the first produced in the process for making sugar. If a dilute acid of nitro-sulfur be drawn off from a quantity of sugar until the mixture becomes a little brown, which is a sign that all the nitrous acid is evaporated, the syrup will be found to have acquired a fourth taint; and if, by means of lime, we next separate all the acid of sugar, another will still remain, which dissolves the calcareous earth. When this acid is saturated with chalk, and the solution filtered and mixed with spirit of wine, a coagulation takes place. On separating the coagulated part by means of a sieve, dissolving it in water, and then adding some vinegar of lead, the clax of lead will be precipitated; and if the new acid is then separated from the metal by means of diluted oil of vitriol, it will be found to possess all the properties of the acid of apples, and is indeed the same. The spirit of wine, which has been employed to precipitate the calcareous salt, leaves on evaporation a residuum of a bitter taste, very deliquescent, similar to the sapodaceous extract of the citron.

The following are the results of Mr. Scheele's experiments with the nitrous acid upon different substances.

1. From gum arabic he obtained both the acid of apples and of sugar. 2. The same products were obtained from manna. 3. From sugar of milk he obtained not only its own peculiar acid, but those of apples and sugar. 4. Gum tragacanth, during its solution in nitrous acids, lets fall a white powder, which was found to be the acid of the sugar of milk. This gum contained also the acid of apples and of sugar, and a salt formed from lime and the acid of apples. 5. Starch left an undissolved matter; which being separated by filtration, and washed, resembled a thick oil like tallow, which, however, was found to be soluble in spirit of wine. By distillation he obtained from this oil a man sugar acid similar to that of vinegar, and an oil which has the smell of tallow, and congeals by cold; and, besides these substances, he found that starch yielded the acids of apples and sugar.

Acid of apples, with a large quantity of calcareous faccharine salt. 7. Extract of aloes indicated the existence of the acids of sugar and apples, and left the greatest part of its bitter taste. During the digestion a resinous matter was separated, which smelled like flowers of benzoin, and took fire on being heated in a retort. 8. Extract of coloquinti was converted by nitrous acid into a resinous substance, and showed some signs of containing acid of sugar. 9. The extracts of Peruvian bark and of the other plants examined by Mr. Scheele, gave both the acids of apples and sugar.

10. These two acids were likewise obtained from an infusion of roasted coffee, evaporated to the condensation of a syrup. 11. The same products were obtained from an extract of rhubarb, which yielded also a resinous matter. 12. Juice of poppies afforded the same results. 13. Extract of galls did the same. 14. The essential oils afforded little, if none of the acids; but the oil of parley and seeds seemed to be entirely convertible into them. 15. With a very concentrated acid he was able also to decompose animal substances. From glue he thus obtained fine crystals of acid of sugar, and afterwards acid of apples. Fingolfs, whites and yolks of eggs, afforded the same products. From all these substances, especially the last, a fat matter was separated: but it was remarkable that the gas, expelled during the process, was composed of a little fixed air, a great quantity of phlogisticated air, and very little nitrous air, whereas no phlogisticated air is obtained in the usual process for preparing acid of sugar. He observed also that in the process for this acid, a small quantity of vinegar is found in the receiver. He could not obtain the acid of sugar from the sapodaceous extract of urine; but got instead of it a salt, which, when completely purified, resembled exactly the flowers of benzoin. The same salt is precipitated in abundance by adding to the extract of urine a little vitriolic or marine acid; and Mr. Scheele had already remarked that the same salt is obtained in the distillation of sugar of milk.

From the various experiments which have been made on this acid, it seems, according to Mr. Keir, to be in truth of this an intermediate state between acid of tartar and acid of sugar. This, however, ought not to prevent it from being accounted a separate and distinct acid.
and he further informs us, that this acid of apples may be changed entirely into those of sugar and vinegar, by means of strong nitrous acid.

XIII. Acetous Acid.

It is generally believed, that the combination of this acid with volatile alkali is altogether incapable of crystallization; but Scheffer and Morveau inform us, that it may be reduced into small needle-shaped crystals, when the spiritus Mindereri is evaporated to the confine of a syrup, and left exposed to the cold. The salt has a very sharp and burning taste, but a considerable quantity is lost during the evaporation. Weftendorf, by adding his concentrated vinegar to volatile alkali, obtained a transparent liquor which did not crystallize. By distillation it went over entirely into the receiver, leaving a white spot on the retort. A saline transparent mass, however, appeared in the receiver under the clear fluid. On separating it from the liquid, and exposing it to a gentle heat, it melted, threw out white vapours, and in a few minutes shot into sharp crystals ressembling nitre. These remained unchanged in the cold; but when melted with a gentle warmth, smoked and evaporated. Their taste was first sharp, and then sweet.

The salt formed by uniting acetous acid with calcareous earth has a sharp bitter taste, and flowers into crystals somewhat resembling ears of corn. These do not delugate in the air, unless the acid has been superabundant. They are decomposed by distillation per fe, the acid coming over in white inflammable vapours smelling like acetous ether, somewhat empyreumatic, and condensing into a reddish brown liquor. By rectification this liquor becomes very volatile and inflammable; on adding water, it acquires a milky appearance, and drops of oil seem to flow upon the surface; a reddish brown liquor, with a thick black oil, remain after rectification in the retort. On mixing this calcareous salt with that of Glauber, a double decomposition takes place; we have a gypsum and the mineral alkali combined with acetous acid. By calcination, the mineral alkali may be obtained from this salt in a state of purity. This acetous calcareous salt is not soluble in spirit of wine.

On saturating this acid with magnesia, and evaporating the liquor, we obtain a viscid salinie mass like mucilage of gum arabic, which does not flow into crystals, but dilates in the air. It has a sweetish taste at first, but is afterwards bitter. It is soluble in spirit of wine, and parts with its acid by distillation without addition.

Acetous acid dissolves zinc both in its metallic and calciform state, and even when mixed with other metals. By concentrated vinegar the zinc is dissolved with great heat, sulphureous smell, and exhalation of inflammable matter. By this union we obtain a congealed mass, which on dilution with warm water flows into oblong sharp crystals, or the first crystallization, and afterwards into crystals of a flattened form. From this liquor indeed crystals of various forms have been obtained by different chemists. Mounet obtained from it a pearl-coloured salt in friable talcy crystals; which when thrown on the coals, crystallized a little at first, and gave a bluish flame, and then melted, letting its acetous acid escape, while a yellow calx remained. Hellest acid informs us, that this salt by distillation per se in water, affords an inflammable liquor, and an oil at first yellow and then green, with white flowers burning with a blue flame. Weftendorf obtained no oil in this distillation, but some acetous acid; a sweet-tasted empyreumatic liquor impregnated with zinc; sweet flowers, or sublimate, soluble in water, and burning with a green flame. On applying a stronger heat, the zinc was sublimed in its metallic form, leaving a spongy coal at the bottom of the retort. The solution gives a green colour to syrup of violets, lets fall a white precipitate on the addition of alkalis or an infusion of gall. It is not precipitated by common salt, vitriolated tartar, vitriolic or marine acids, blue vitriol, or corrosive sublimate; but forms a red precipitate when added to a solution of gold; a white precipitate with solution of silver; a crystalline pearly precipitate with solution of mercury; and crystalline precipitates with solutions of bismuth and tin. According to Bergman, it is decomposed by acid of arsenic.

Though regulus of arsenic is not soluble in this hydrochloric acid, its calx may be dissolved either in common or distilled vinegar. M. Cadet obtained a smoking liquor by distillation from a mixture of white arsenic and terra foliata tartari. This experiment has been repeated by the chemists of Dijon, and attended with the following curious circumstances. “We digested (say they), in a sand-bath, five ounces of distilled vinegar on white pulverized arsenic; the filtrated liquor was covered, during evaporation, with a white faine crust. Of this substance were formed 150 grains; on which fixed alkali appeared to have no effect, and which was at first considered as pure arsenic. However, a cat, which had swallowed 72 grains of it, was only affected with vomitings that day and the next, and afterwards perfectly recovered. A similar dose of vinegar was given to a little dog; but as he ran away, the supposed to effect it had upon him could not be discovered; but he was afterwards returned after good health, and never showed any uneasiness—whence it may be concluded that vinegar is in some measure an antidote against the pernicious qualities of arsenic. “On redissolving this faine crust in pure water, filtering and mixing it with liquid alkali, an irregularly crystallized salt was formed in it afer a few days standing. By this salt a yellow precipitate was thrown down from the nitrous solution of silver; whereas the solution of arsenic and terra foliata tartari threw down a white one.

Equal parts of terra foliata tartari and arsenic, distilled in a retort, gave first a small quantity of limpid liquor with a penetrating smell of garlic, and which had the property of reddening syrup of violets; while solution of arsenic in water turns that syrup green. The vinegar which now arose was not faturated when arsenic, but effervesced strongly with fixed alkali, with which it became turbid, but did not let fall any precipitate. On changing the receiver, there came over a reddish brown liquor, accompanied with thick vapours, diffusing an intolerable smell, in which that of arsenic could scarcely be distinguished. On continuing the operation, a black powder sublimed into the neck of the
Acetous acid.

The red liquor still preserved its property of smoking though cold; diffusing at the same time its peculiar and abominable fetor, from which the apartment could scarce be freed in several days. This liquor does not alter the colour of syrup of violers, but effervesces slightly with fixed alkali, letting fall at the same time a yellow precipitate, which, however, disappeared on an attempt to separate it by filtration.

M. Cadet had observed, that the smoking liquor of arsenic did not kindle at the approach of a lighted candle; but that, on pouring it from the receiver into another vessel, it had kindled the fat lure with which the juncutures had been cloathed, and which had been dried during the operation: but we, being devious of examining more fully the nature of the red liquor which collects at the bottom, and has the appearance of oil, having decanted that which swims on the top, and poured the remainder on several days paper, before many drops had passed, there arose a thick smoke forming a column from the vessel to the ceiling; a flight ebullition was perceived at the sides of the vessel, and a beautiful rose-coloured flame appeared for a few moments. The paper filter was burnt at one side, but most of it was only blackened. After the flame was extinguished, a fat reddish matter remained: which being melted on burning coals, swelled considerably, emitting a white flame. It then sunk, and left on the coal a black spot, which could not be effaced but by the most vehement fire.

At the time these observations were made, the liquor had been distilled for three weeks, and the bottle frequently opened. The inflammability could not proceed from the concentration of the vinegar: for the rofe-colour of the flame, the precipitation of the sublimate, and the fixity of the spot remaining on the coal, evidently showed that the two substances were in a state of combination; which is also further evinced by the los of the inflammable property when the liquor was decomposed by fixed alkali. The smell of the liquor, however, though so intolerably fetid, was attended with no other inconvenience than a disagreeable sensation in the throat, which further strengthened the suspicion that vinegar is an antidote against arsenic.

The saline brown mass remaining in the retort was partly dissolved by hot water; and the filtrated lixivium was very limpid, but emitted the peculiar smell of the phosphoric liquor. By evaporation it yielded a salt which did not deliquece in the air, of an irregular shape; and which being put on burning coals, did not smear febibly of arsenic; lost its water of crystallization; and became mealy and white without being disipated by heat. On exposing the residuum to the air, it was found next day resolved into a liquor; whence it is probable that most of it was composed of crystallized alkali, having received from the decomposition of the vinegar as much fixed air as was necessary for its crystallization.

This acid does not act upon mercury in its metallic state, but dissolves the mercurial calces, as red precipitate, turbid mineral, and the precipitate formed by adding fixed alkali to a solution of mercury in nitrous acid; with all which it forms white, shining, feally crystals, like those of sedative salt.

Vinegar does not act upon silver in its metallic state, but readily dissolves the yellow calces precipitated from its solution in nitrous acid by microcosmic salt and volatile alkali. By the help of a boiling heat also it very copiously dissolves the precipitate obtained by means of a fixed alkali. The least mentioned solution yields shining, oblong, needle-shaped, crystals, which are changed to a calx by means of several acids, especially the muriatic. The silver is thrown down in its metallic form by zinc, iron, tin, copper, and quicksilver.

Though the acetic acid has no effect upon gold in its metallic state, yet a solution of this metal is decomposed by crude vinegar, which produces both a metallic precipitate and dark violet-coloured powder. Diftilled vinegar throws down the gold in its metallic form. The precipitate by fixed alkali digested with and volatile acid is of a purple colour. This, as well as fulminating gold, is dissolved by Westendorff's concentrated vinegar; the fulminating gold very easily.

The solution is of a yellow colour; and with volatile alkali affords a yellow precipitate; with lixivium fanguinis, a blue one, both of which fulminate. The dry salt of gold dissolves in the acetic acid, and produces oblong yellow crystals.

This acid has no effect on far oils, farther than that on inflammable when distilled together, some mixture takes place, as malleable subliment the Abbe Rozier has observed. Neither does distilled vinegar act upon essential oils, though M. Westendorff's distilled vinegar dissolved above a fixth part of oil of rosemary, and about half its weight of camphor. The latter solution was inflammable, and let fall the camphor on the addition of water. The acid dissolves all the true gums, and some of those called gum-refins, after being long digested with them. By long boiling, Boerhave observes, that it dissolves the bones, cartilages, flesh, and ligamaments of animals.

The concentration of this acid may be effected by concentrating it with alkalies, earths, and metals. By tincture of the combining it with copper, and then crystallizing and acetic acid distilling the compound, we obtain the acid in the highest state of concentration in which it is usually produced. To produce this, we have only to distill verdigris, or rather its crystallized form in a retort. The operation must be begun by a very gentle fire, which brings over an aqueous liquor. This is to be set aside, in order to procure the more concentrated acid, which comes over with a stronger fire.

On changing the receiver, and augmenting the heat, we obtain a very strong acid which comes over partly in drops, and partly in white vapours. It is called radical vinegar, or sometimes spirit of Venus, and has a very pungent smell, almost as suffocating as that of volatile sulphurous acid. As the last portions of it adhere pretty strongly to the metal, we are obliged to raise the heat to such a degree as to make the retort quite red in order perfectly to separate them. Hence some part of the metal is raised along with the acid, which, dissolving in the receiver, gives the liquor a greenish colour; but from this it may be easily freed by a second distillation, when it rises with a very gentle heat, and the retort, together with a little arsenic in its metallic form, and a matter which took fire by a lighted candle like sulphur.

"The red liquor still preserved its property of smoking though cold; diffusing at the same time its peculiar and abominable fetor, from which the apartment could scarce be freed in several days. This liquor does not alter the colour of syrup of violers, but effervesces slightly with fixed alkali, letting fall at the same time a yellow precipitate, which, however, disappeared on an attempt to separate it by filtration."
Acetic acid.

And becomes extremely white. Crystals of verdigris afford about one half their weight of radical vinegar; but verdigris itself much less, and of a more oily quality.

If this acid be heated in a wide-mouthed pan, and fire applied to it, it will burn entirely away like spirit of wine. This observation we owe to the count de Lauragais, who has likewise observed, that it is capable of crystallization. This, however, takes place only with the last portions which came over, and the crystals appear in the form of plates or needles. The marquis de Courtrivon, who has repeated and confirmed the experiment of the count de Lauragais, supposes this phenomenon to be owing to a sulphur-like mixture of acetic acid and phlogiston. Leonhardi supposes an analogy between these crystals and the white crystals of acetic acid and phlogiston. Leonhardi supposes an analogy between these crystals and the white salt of copper expelled at the end of the operation by the count de Laflone. This salt was at first very white, and fixed on the neck of the retort pretty thick; but unless quickly collected, was soon destroyed by the succeeding vapours. When exposed to the air, it attracts moisture, and runs into a greenish liquid. It is uncommonly light, and in such small quantity, that scarce five or six grains can be collected from a pound of verdigris. Its taste is acid, astringent, very unpleasant and permanent. It readily and totally dissolves in water, and partially in spirit of wine, leaving a yellow powder totally soluble in volatile alkali, and imparting a leathery, not oily, but roughened appearance to its air.

Experience has shown that radical vinegar differs considerably in its properties from the common acid. It has a greater attraction for alkalis, forms with them more perfect combinations, and is less volatile. M. Berthollet observes, that when vinegar concentrated by frost and radical vinegar, are reduced to equal densities, by adding water to the heavier of the two, they differ very much both in smell and taste. Laflone found, that radical vinegar formed a crystallizable compound with volatile alkali; and Berthollet has observed the same with regard to fixed vegetable alkali. The crystals of the latter with radical vinegar were flat, transparent, and flexible, slowly deliquescent in the air. On comparing the salts formed by the two acids, he found, that the accesor salt rendered the syrup of violets green; but its colour remained unaltered with that made with radical vinegar. The latter also required a stronger fire to expel part of its acid; it was also whiter, and had a less acid taste. On pouring radical vinegar on the acetic salt, the solution afforded, by evaporation and crystallization, a salt perfectly similar to that procured directly from radical vinegar and fixed alkali. On distilling the mixture, the radical vinegar appeared to have expelled the common acetic acid, as the liquor which came over effervesced with vegetable alkali, and formed with it a terra fossilataria.

"It seems probable (says Mr Keir), that the radical vinegar contains a larger portion of the aerial principle than the common acetic acid; by which it undergoes a change similar to that of marine acid, when brought into that state in which it is said to be dephlogisticated. This air it may acquire from the metallic salt, which being deprived of its air is reduced acid.
small feathery crystals are formed, of a sharp saline taste, and easily soluble in water. 11. An arfrigent salt is formed with earth of alum.

All these earthy salts are easily decomposed by the mineral acids as well as by alkalies. The acid of benzoin itself reddens litmus, but has little effect upon fyrup of violets.


effects of nitrous acid upon it.

From it spirit of nitre, as in the preparation of acid benzoin cured from nitre, either by precipitation, from the nitrous acid, and ur unarmed from that on treatment tallow in the usual manner for obtaining acid of fugar; for thus, not the sebaeous, but the facharine acid is found to be produced. It has a very great force of attraction, and by means of heat decompounds even the vitriolic salts themselves; but in the moist way is expelled by the three mineral acids, though it expels all the vegetable ones, as well as those of flour and arsentic. Its most remarkable property is its effect on tin. The filings of this metal, especially with the assistance of heat, are corroded by it into a yellow powder, and at the same time give out a very fetid smell. The solution, though filtered, still continues turbid, and deposits more yellow powder, acquiring at the same time a fine rofe-re colour. By adding water to this yellow powder, a white deliquecent salt may be obtained, and a similar one obtained by dissolving a yellow powder precipitated by this acid from solution of tin in aqua-regia.

It corrodes lead rather than dissolves it; but dissolves a considerable quantity of minium, and changes the reft to a white powder. This solution is sweetish, and is not precipitated by common salt. The metal is precipitated by sebaeous acid from the nitrous, in white needle-like crystals, easily soluble in water. A like precipitation takes place in solution of fugar of lead; but the precipitate is fill soluble in strong vinegar, provided it be not adulterated with oil of vitriol.

In its elective attractions it agrees with the acids of apples and of flour, preferring magnesia to fixed alkali.

XVI. Acid of galls.

Though it has for a long time been known that the infusion of galls has the property of reddening vegetable juices, dissolving iron, and decomposing liver of sulphur, these effects were generally ascribed to its astringency. Of late, however, it has been found that besides this astringent principle a true acid exists in galls; and to this, rather than to the astringent principle, are we to ascribe the properties of galls in inflating a black with solution of vitriol, &c.

To separate the acid from the other matters contained in the galls, we must add fixed alkali to a decoction of them; by which means the astringent matter will be thrown down, and the acid remain in the liquor joined to the alkali, the precipitate, washed with clean water, dried, and redissolved, blackened a solution of vitriol but faintly, and no more than what may be supposed to proceed from some remaining acid, which could not be abstrafed. This is proved by dissolving

(a) By this is meant urine evaporated to a thick consistence, and deprived of most of its salts by solution in spirit of wine.
CHEMISTRY.

Acid of galls.

An acid obtained from galls by distillation.

Filling the astringent matter in question, when an acid liquor comes over, has the property of blackening solution of vitriol. Scheele observed, that when acid liquor of an agreeable smell, without oil, and afterwards a kind of volatile salt, which is the true acid of the galls. Hence he infers, that this salt is contained ready formed in the galls themselves; but so much involved in some gummy or other matter, that it cannot be easily obtained separately.

The acid of galls is capable of being separated by crystallization. In an infusion made with cold water, Scheele observed a sediment which appeared to have a crystalline form, and which was acid to the taffe, and had the property of blackening solution of vitriol. By expelling the infusion for a long time to the air, and removing from time to time the muddy skin which grew upon it, a large quantity of sediment was formed.

On redissolving this in warm water, filtering and evaporating it very slowly, an acid salt was obtained in small crystals like sand, which had the following properties: 1. It tasted acid, effervesced with chalk, and reddened litmus. 2. Three parts of boiling water dissolved two of the salt; but 24 parts of cold water were required to dissolve one. 3. It is likewise soluble in spirit of wine; four parts of which are required to dissolve one of the salt when cold, but only an equal quantity when afflited by a boiling heat.

The salt is deliquescent by an open fire, melts and burns with a pleasant smell, leaving behind a hard insoluble coal, which does not easily burn to ashes.

By distillation an acid water is first obtained without any oil; then a sublimate, which remains fluid while the neck of the retort is hot, and then crystallizes. This sublimate has the taste and smell of flowers of benzoin; is soluble in water and in spirit of wine; reddens litmus; and precipitates metallic solutions of the following colours, viz. gold of a dark brown; silver of a grey colour; copper of a black; lead of a white colour; mercury of an orange; bismuth, lemon-coloured. The acid of molybdana became yellow coloured, but no precipitate ensued. Solutions of various kinds of earths were not altered; but lime-water afforded a copious grey-coloured precipitate. 6. By treating this acid with that of nitre, in the manner directed for producing acetic acid of fugar, it was changed into the latter.

XVII. Identity of the Vegetable Acids.

On the proofs of the identity of the vegetable acids with one another, Mr Keir makes the following remarks: "The experiments and observations which have been made, prove evidently a strong analogy between the acetic acid, spirit of wine, tartar, and acid of fugar; and they seem to show the existence of a common principle or basis in all of them, modified either by the addition of another principle not common to all of them, or by different proportions of the same principle. None of the opinions on this subject, however, are quite satisfactory. The production of the acetic acid by treating spirit of wine with other acids, does not prove that the acetic acid was contained in the spirit of wine, but only in concurrence with them, that they contain some common prin-

There is no fact adduced to support Morveau's identity, that fixed air is absorbed during the acetic fermentation; or that the presence of this fixed air is necessary. The decomposition of all vegetable acids by heat, and the production therefrom of fixed and inflammable gases, show that these acids contain none of the same principles as these elastic fluids, but do not prove that the gases existed in the fluids. We have good reason to believe that acetic acid does not contain any fixed air already formed; for it yields none when vitriolic acid is added to it, or to foliated earth; nevertheless, my opinion that vegetable and animal acids are, by heat, in a great measure convertible into fixed air, seems to be sufficiently proved by experiments.

Thus Hales has shown the great quantities of this gas which tartar yields on distillation. Berthollet has obtained the fixed and inflammable gases from foliated earth; and Dr Higgins has verified this experiment, and deduced the quantities. From 7680 grains of foliated earth, the Doctor obtained:

Cautic alkali - 3862.994 grains.
Fixed air - 1475.594.
Inflammable air - 1047.6018.
Oily matter retained in the re- 

Iiduum - 78.
Oil - 182.
Water condensed - 340.
Deficiency attributed chiefly to water - 726.0402.

As fixed and inflammable gases may be obtained from every vegetable substance by fire, nothing can be inferred from these experiments to explain particularly the nature of the acetic acid, excepting that it contains some of the inflammable matter common to the vegetable kingdom, and especially of the matter common to vegetable acids; all which also, when analysed, furnish large quantities of these two gases.

"Although we are far (adds our author) from the knowledge requisite to give a complete theory of the acetic fermentation, yet it may be useful to explain the ideas that appear most probable. In all the instances that we know of the formation of acids, whether effected by combustion, as the acids of sulphur and phosphorus, or by repeated abstractions of nitrous acid, as in the process for making acetic acid of sugar, a very sensible quantity of pure air is absorbed. In the case of combustion we know, from the weight acquired, that there is a great absorption of air; and in the latter case, of acids being produced by application of nitrous acid, as this acid consists of nitrous and pure air, and as in these operations a quantity of the nitrous gas is expelled, there seems but little doubt that there also the pure air of the nitrous acid is united with the substance employed in the formation of the new acid. Hence, from all that we know, the absorption of air takes place in all acidifying processes. But it also actually takes place in the acetic fermentation, as has been observed, particularly by the Abbé Rozier; and it is generally known, that air is necessary to the formation of vinegar. The next question is, What is the basis? And from the experiments already related, of forming the acetic acid by means of spirit of wine, it seems probable, either that this spirit is the basis of the acetic acid, or that it contains this basis; and from the convertibility of the acids of tartar and of fugar.
Identity of sugar into the acetic acid by the processes above described, it seems probable that these also contain the same common bases; which, being united with a determined quantity of pure air, forms acid of tarter; with a larger quantity, acid of sugar; and with a still larger, the acetic acid.

"An inflammable spirit is said to appear at the end of the distillation of radical vinegar from verdigris. Now, if the ardent spirit were contained in the verdigris, as it is more volatile than the acid, it ought to come over first; but as it appears only towards the end of the distillation, it seems to be formed during the operation; and I imagine, that the metal, when almost deprived of its acid, attracts some of the air of the remaining acid; and the part or basis of the acid thus deprived of its air becomes then an inflammable spirit, and in some cases an oil appears. But as the quantity of acid thus decomposed is very small, and little air of consequence remains united with the metallic part of the verdigris, the copper appears rather in a metallic than calciform state after the operation. But zinc, during its solution in concentrated vinegar, decomposes the acid as it does the vitriolic and other strong acids, and accordingly inflammable vapours are produced; and what is remarkable, these vapours have a sulphureous smell. Iron always, during its solution to like inflammable gas.

We must not imagine that we are yet able to explain completely what passes in the acetic fermentation, or that the acetic acid is a compound of mere spirit and pure air. Besides this combination of spirit and air, it is observed, that a precipitation always takes place before the fermentation is completed, of some mucilaginous matter, which dipoles the vinegar to putrefy, and from which it therefore ought to be carefully separated. Stahl affirms, that without a deposition of such sediment, vinegar cannot be made from sugar, wine, or other juice. Besides the matter that is deposited, probably as mucilaginous as the liquor as ever been observed therein; for, by distillation, much of a similar extractive matter is left in the retort. What the nature of this matter is, and how it is formed, has not yet been examined. Though distillation frees the acid from much of this extractive substance, yet we have no reason to believe that we have ever obtained it entirely free from inflammable matter; as it retains even when combined with alcalies and with metals. When sugar of lead and other acetic salts are distilled with a strong heat, the substances remaining in the retort have been observed to possess the properties of a pyrophorus; and this will happen whatever pains have been taken to purify the vinegar employed. See the article Pyrophorus. This shows the existence of an inflammable matter in this acid; and which may perhaps be essential in its composition, and necessary to its properties. Although fermentation is the usual mode of obtaining acetic acid, yet it appears from the instances observed by latter chemists, that it is not essential to its formation, but that it is also formed in various chemical processes; and the acid obtained by distillation from woods, wax, &c. are very analogous to vinegar. It appears also on treating the acid of sugar with nitric acid, as has been observed both by Weframb and Scheele. The latter further acquaints us, that he obtained it in analysing a tallow like oil, which remained undisolved upon digesting starch in nitrous acid. As acid of sugar also may be obtained from a variety of animal substances, and as this acid is convertible into the acetic we have one reason more added to many others, to prove that the matters of vegetable and animal substances are not capable of any chemical distinction."

XVIII. ADDITION TO SECT. I. § 20. concerning the volatility of a Mixture of Marine and Nitrous Acids.

This is much less sensible when the acids are weaker than when they are concentrated. On mixing the two when moderately smoking, and which had remained for a long time separate without occasioning any disturbance, a vividly smoking aqua-regia has been produced, which would either drive out the flopple, or burst the bottle in warm weather. On distilling a pretty strong nitrous acid from sal ammoniac, Mr. Bèrthé observed, that the vapours which came over were so exceedingly elastic, that notwithstanding every precaution which could be taken in such a case, the distillation could not be continued. By letting this escape, however, Mr. Cornette observed, that the distillation of these two substances may be carried on to the end, without any inconvenience, and the aqua-regia will then be no longer troublesome.

XIX. TEST for ACIDS and ALKALIES.

The general method recommended for discovering a small quantity of acid or alkali in any liquid, is by trying it with any vegetable blue, such as syrup of violets; when, if the acid prevails in the liquor, the syrup will acquire a red colour, more or less deep according to the quantity of acid; or if the alkali prevails, it will change the syrup green in like proportion. Since the late improvements in chemistry, however, the syrup has been found deficient in accuracy, and the infusion of turpentine, or of an artificial preparation called litmus, have been substituted instead of it. The infusion of limus is blue, and, like syrup of violets, becomes red with acids. It is so sensible that it will discover one grain of oil of vitriol though mixed with 100,000 of water. Unfortunately, however, this infusion does not change its colour on mixture with alcalies; it is therefore necessary to mix it with just such much vinegar as will turn the infusion red, which will then be restored to its blue colour by being mixed with any alkaline liquor. The blue infusion of limus is also a test of the presence of fixed air in water, with which it turns red, as it does with other acids.

The great sensibility of this test would leave very little reason to search for any other, were it always an exact test of the point of saturation of acids and alcalies; but, from the following fact, this appears to Mr Watt to be dubious. A mixture of phlogisticated nitrous acid with an alkali will appear to be acid by the test of limus, when other tests, such as the infusion of the petals of the scarlet rose, of the blue iris, of violets, and of other flowers, will show the same liquor to be alkaline, by turning green so evidently as to leave no room to doubt.

When Mr. Watt made this discovery, the scarlet rose...
Red cabbage answers the purpose of both more sensibility with regard to acids than litmus, but much less than paper, and dry them in a dry, put them up in glass bottles well corked; and, with vitriolic acid, and digest or infuse the dry leaves in it, ... filter it immediately; otherwise it ... green nor purple; when it has received this colour, filter it immediately; otherwise it ... paper, and dry them in a gentle heat; when perfectly dry, put them up in glass bottles well corked; and, when you want to use them, acidulate some water with vitriolic acid, and digest or infuse the dry leaves in it, until they give out their colour; then strain the liquor through a cloth, and add to it a quantity of fine whiting or chalk, stirring it frequently, until it becomes of a true blue colour, neither inclining to green nor purple; when you perceive that it has acquired this colour, filter it immediately; otherwise it will become greenish by standing longer on the whitening. This liquor will deposit a small quantity of gypsum, and, by the addition of a little spirit of wine, will keep good for some days; but will then become somewhat putrid and reddish. If too much spirit is added, it destroys the colour. If the liquor is wanted to keep longer, it may be neutralized by a fixed alkali instead of chalk.

2. As thus the liquor cannot be long preferred without requiring to be neutralized aforest jove before it is used; and as the putrid fermentation which it undergoes, and perhaps the alkalies or spirit of wine mixed with it, seem to lessen its sensibility; in order to preserve its virtues while kept in a liquid state, some fresh leaves of the cabbage, minced as above directed, may be infused in a mixture of vitriolic acid and water, of about the degree of acidity of vinegar; and it may be neutralized, as it is wanted, either by means of chalk, or of the fixed or volatile alkali. It must be observed, however, that if the liquor has an excess of alkali, it will soon lose its colour, and become yellow; from which state it cannot be restored; care should therefore be taken to bring it very cautiously to a blue, and not to let it verge towards a green.

3. In this manner, Mr. Watt prepared a red infusion of violets; which, on being neutralized, formed a very sensitive test, though he did not know how long these properties would be preserved; but he is of opinion that the coloured infusions of other vegetables may be preserved in the same manner by the antifeptic power of the vitriolic acid, in such a manner as to lose little of their original sensibility. Paper fresh stained with these tests, in their neutral state, has sufficient sensibility for many experiments; but the alum and glue which enter into the preparation of writing paper, seem, in some degree, to fix the colour; and paper which is not fixed becomes somewhat transparent when wetted; which renders small changes of colour imperceptible. Where accuracy is required, therefore, the test should be used in a liquid state.

Mr. Higgin's claims the first discovery of the constituent parts of volatile alkali, or at least of an experiment leading to it. "About the latter end of March 1785 (says he), I found that nitrous acid poured on tin filings, and immediately mixed with fixed vegetable alkali, generated volatile alkali in great abundance: so singular a fact did not fail of deeply impressing my mind, though at the time I could not account for it. About a fortnight after, I mentioned the circumstance to Dr. Brockleby. He told me he was going to meet some philosophical gentlemen at Sir Joseph Banks's, and desired I would generate some alkali to exhibit before them; accordingly I did; and had the pleasure of accompanying him thither. The December following I mentioned the fact to Dr. Cauet, and likewise the copious generation of volatile alkali from Prussian blue, vegetable alkali, and water; on which we agreed to make a set of experiments upon the subject. At present I shall only give an account of the following, which drew our particular attention. Into a glass cylinder, made for the purpose, we charged three parts of alkaline air, and to this added one part of dephlogisticated air; we passed the electrical spark repeatedly in it, without apparently effecting the smallest change. When it had received about 100 strong shocks, a small quantity of moisture appeared on the sides of the glass, and the brastr conductors seemed to be corroded; when we had passed 60 more shocks in it, the quantity of moisture seemed to increase, and acquire a greenish colour, though at this time the column of air suffered no diminution. On examining the air, it burned with a languid greenish flame, from which we inferred that the dephlogisticated air was totally condensed: it still retained an alkaline smell; and the alkaline part was not readily absorbed by water.

XX. VOLATILE ALKALI.
Prussian blue.

XXI. **Prussian Blue.**

The acid of this substance, as far as it contains an acid, is supposed to be that of phorphorus. Mr. Woulfe proposed a test of this kind for discovering iron in mineral waters, which, he observed, would not be affected by acids; but the lixivium described by him had the bad property of letting fall the Prussian blue it contains in a few weeks. The precipitate of copper, however, treated again with alkali, retained this property upwards of nine months. The volatile alkali, he observes, is dissolved by the Prussian acid; and the crystals deposited are rendered blue by the colouring matter, though the colour at first is lost by the union of the alkali with the substance already made. The metals were precipitated by this test of the following colours: Gold of a brownish yellow, the precipitate afterwards becoming of a full yellow; platina of a deep blue, but when quite pure, of a yellow colour, turning slightly green. Silver in the nitrous acid was precipitated of a whitish colour; copper from all the different acids was precipitated of a deep brown colour, the liquid remaining greenish; green vitriol left a deep blue powder, leaving a colourless lixivium; sugar of lead and mercurised tin gave a white powder; nitrated mercury a white or yellowish precipitate; the Hillfeld manganese a brownish blue, but that from Devonshire a blue, which first became ash-coloured and then reddish. Nitrated bismuth afforded a white precipitate, and the lixivium was slightly green; mercurised antimony yielded a white precipitate, with a yellowish lixivium: vitriolated zinc a whitish cobalt in aqua-regia a reddish white powder: the precipitate of arsenic and the different earths was commonly white.

XXIII. **New Chemical Nomenclature.**

When this nomenclature was first published, M. Lavoisier informs us, that some blame was thrown upon the authors for changing the language, which had received the function of their matters, and been adopted by them. In answer to this, however, he urges, that Meffrs. Bergman and Maquer had expressed a wish for some reformations in the chemical language. Mr. Bergman had even written to M. Morveau on the subject in the following terms. "Show no favour to any improper denomination: those who are already possessed of knowledge, cannot be deprived of it by new terms; those who have their knowledge to acquire, will be enabled by your improvement on the language of the science to acquire it sooner."

The following is M. Lavoisier's explanation of the principles on which his new language is composed, and new nomenclature.

"Acids confit of two substances, belonging to that order which comprehends such as appear to us to be simple substances. The one of these is the principle of acidity, and common to all acids; from it therefore should the name of the class and genus be borrowed: the other, which is peculiar to each acid, and distinguishes them from one another, should apply the specific name. But in most of the acids, the two constituent principles, the acidifying and the acidified, may exist in different proportion, forming different degrees of equilibrium or saturation; this is observed of the sulphur and sulphurous acid. These two states of the same acid we have expressed by varying the termination of the specific name.

"Metallic substances, after being exposed to the compound action of air and fire, lose their metallic luster, gain an increase of weight, and assume an earthy appearance. In this state they are, like acids, compound bodies, consisting of one principle common to all, and another peculiar to each of them. We have therefore in like manner classed them under a generic name, derived from the principle which is common to them all, the name which we have adopted is Oxide: The peculiar names of the metals from which they are formed, serve to distinguish these compounds from one another.

"Combustible substances, which, in acids and metallic oxides, exist as specific and peculiar principles, are capable of becoming, in their turn, the common principle of a great number of substances. Combinations of sulphur, were long the only compounds of this sort known; but of late the experiments of Meffrs. Vandremonde, Monge, and Berthollet, have shown that coal combines with iron and perhaps with various other metals; and that the result of its combination with iron are, according to the proportions, steel, plum-bago, etc. It is also known from the experiments of M. Pelletier, that phorphorus combines with many metallic substances. We have therefore arranged these different combinations together under generic names, formed from the name of the common substance, with a termination indicating this analogy; and have distinguished them from each other by specific names derived from the names of the peculiar substances."
CHEMISTRY.

It was found some time more difficult to form a nomenclature for the compounds of those three simple substances; because they are so very numerous, and

still more, because it is impossible to express the na-
ture of their constituent principles, without using more
compound names. In bodies belonging to this class,
such as neutral salts for instance, we had to consider,
1. the acidifying principle common to them all; 2. the
acidifiable principle which peculiarizes the acid; 3.
the saline, earthy, or metallic base, which determines
the particular species of the salt. We have derived the
name of each class of salts from that of the acidifiable
principle, common to all the individuals of the class;
and have then distinguished each species by the name of
the saline, earthy, or metallic base peculiar to it.

As salt, consisting of any three principles, may,
without losing any of these principles, pass through
different states by the variation of their proportions;
our nomenclature would have been defective without
expressions for these different states. We have expres-
sed them chiefly by a change of termination, making
all names of salts in the same state to end with the
same termination.


In Wiegleb's General System of Chemistry translita-
ted by Hopln, we have another nomenclature formed
on different principles. In this he gives to fixed ve-
getable alkali the name of Spodium, from the Greek
word ςποδίων (spodion). The mineral alkali he calls natrum,
the name by which it was anciently distinguished; and
the volatile alkali ammonium, from sal ammoniac which
contains it in great quantity. The compound salts
may be distinguished into double, triple, and quadru-
ple; though, in the scheme given in the work, the first
division is omitted, as tending only to create confusion.
The irregular salts, consisting of those which are triple
and quadruple, are admitted. Such as are imperfect
by reason of an excess of acid, he says, are best deno-
minated by converting the adjective, expressive of the
base, into a participle; a practice which, on many oc-
casions, though countenanced by the authority of a late
eminent writer, seems awkward and stiff. The excess
of acid is denominated by the word hyperoxys, and a
defect of it by hypoxys. Hence his denominations are
formed in the following manner.

Salts with excess of acid. Cream of tartar, or tarta-
rus spodatus, or tartaroxys spodicus. Acid vitriolated
tartar, or vitriolatum spodatum, vitrioloxys spodicus.
The salts which are imperfect from a defect of acid
have their denominations by mentioning the base before
the acid, and expressing the former substantively, the
latter adjectively. Thus,

Salt of tartar, aerated vegetable Oxyfpeodium, aero-
alkali, spodium aerocraticum, { arocraticum.
Acid vitriolated alkali, ammoni-
Oxysmonium, o
um aerocraticum.

Oxycalcitis aero-

Oxynatrum bora-
cisticus.

With respect to other terms, Mr Wiegleb expresses
the acid with which any base is combined, by the ter-
mination erotic, from the Greek σποδις (spodion), added
to it; excepting only those with the nitrous and mu-
riatic acids: and these (for what reason does not ap-
pear) he calls Aponitra and Epimurit. His genera of
salts are as follow,

6. Arsenicates. 7. Barylithicrates, (those with acid
of tungsten). 8. Molybdanocrates. 9. Photocrates,
(with acid of phosphiur). 10. Elecrocates. 11. Oxy-
crates, (with the acetic acid); or epoxycrates, with
the aerated acid). 12. Tartars; or, with the acid changed
(with the acid of gall). 15. Citriocrates. 16. Meli-
crates (with the acid of apples). 17. Benzocrates. 18.
Acrocates. 22. Galacocrates. 23. Galac-meliiocrates
Cyanoocrates (with the colouring matter of Prussian
blue). 26. Serocrates. 27. Bombycicrates. 28. Zo-
halithocrates, (with adjadic of calculus).

On the subject of nomenclatures it is obvious to
remark, that whatever may be the defects of the old
one, we are ready to be involved in much greater
difficulties by the introduction of a new one. Or sup-
pousing a new language to be adopted, where would
be the security for its permanence? That which ap-
pears most specious at one period, may still be su-
perfected by the refinements of another; and colourable
pretensions would never be wanting to succesive inno-
vators. Hence a continual fluctuation, and an endless
vocabulary. As the nomenclature first abovemention-
ed, however, has attracted so small degree of attention,
we shall here subjoin a scheme of it, as well for the
satisfaction of our readers in general, as for the gratifi-
cation of those in particular who may have imbibed the
doctrines of its authors.

[Follows The Whole-sheet Table.]
TABLE, showing the Manner in which Natural Bodies, considered in a Chemical View, may be divided into Clases; with their several Subdivisions; their Properties defined; and the Manner in which they are obtained, pointed out.

NATURAL BODIES, considered as the Objects of Chemistry, may be divided into the following Clases, viz.

1. SALTS. 2. EARTHS. 3. METALS. 4. INFLAMMABLES. 5. WATERS. 6. AIRS.

I. SALTS.

These are soluable in water, rapid, and not inflammable. They are either Acids or Alkalis.

1. Acids are distinguished by turning syrup of violets red, or forming with alkalis neutral salts; and are supposed to consist of dephlogisticated air condenved, as their acidifying principle. The different acids yet known are, 1. Vitriolic, fixed. The most ponderous of all fluids next to mercury, the most fixed in the fire, and the most powerful of all the acids. Obtained chiefly from sulphur by inflammation.

2. Vitriolic, volatile. Obtained also from sulphur by inflammation; air being admitted during the process. It acts less powerfully as a solvent than when in its fixed state.

3. Nitrous or Aquafortis: a volatile fluid, generally met with of a reddish colour, and emitting noxious fumes, when in its concentrated state; though this is found not to be essential to it, but owing to a mixture of phlogiston. In its pure state it is almost as colourless as water, and stinks very little. It is next in strength to the vitriolic acid, and obtained chiefly from nitre. It consists of dephlogisticated and phlogisticated air condenved, and may be obtained by taking the electre spark for a long time in a mixture of these. By uniting with some metals it appears to be converted into volatile alkali.

4. Muriiure, or spirit of sea-salt. A volatile fluid, generally of a fine yellow colour; though this also is owing to the admixture of foreign substances, generally of iron. Inferior in power to the former, and obtained from sea-salt. Naturally this acid seems to be in an aerial state, but easily contracts an union with water. On mixture with manganese, it is wholly converted into a yellow, and almost indecomposible vapour, called dephlogisticated spirit of salt; but which, on mixture with inflammable air, recombines the marine acid.

5. Florid acid. Obtained from a species of spar, has little acid power, but is remarkable for its property of corroding glasses.

6. Acid of borax, or volatile salt. Obtained from borax in the form of fclay crystals; found also naturally in some waters in Italy, and in certain minerals in other countries.

7. Acetic acid. Obtained by allowing any fermentable liquor to proceed in the fermentation till past the vinous state. It is much less corrosive, and less powerful as a solvent, than the vitriolic, nitrous, or marine acids.

8. Acid of tartar. Procured from the hard substance called tartar, deposited on the fides of wine vessels.

9. Acid of sugar. Found naturally in the juice of ferrel, and procured artificially by means of nitrous acid from sugar and a great variety of other substances. Assumes a dry form.

10. Acid of phosphorus. Obtained artificially from urine, and in large quantity from calcined bones; found naturally in some kinds of lead-ore; and in vast quantities in Spain united with calcareous earth. Assumes a solid form, and melts into gla6s.

11. Acid of ants. Procured from the animal from which it takes its name, by expression or distillation, in a fluid form.

12. Acid of amber. Obtained in a solid form from amber.

13. Acid of arsene. Obtained from that substance by means of nitrous acid. It is extremely fixed in the fire.


15. Acid of lapis pondersius, tungsten, or wolfram. Obtained as an acid, per fo, from this substance by Mr. Scheele; but its real acidity is denied by other chemists. Is in the form of a yellow powder.

16. Acid of milk. Obtained in a fluid form from that liquor.

17. Acid of sugar or milk. Obtained in a form of a white powder, by means of nitrous acid, from sugar of milk.


19. Acid of benzoin. Obtained in a solid form from that gum by sublimation or lixiviation with quicklime.

20. Acid of lemon. Obtained from the juice of that fruit by crystallization.

21. Sebaceous acid, or acid of fat. Obtained in a fluid state from fruit by distillation.

22. Acid of citrus. Obtained in a fluid state from the juice of that and other fruits.

23. Acid of apples. Obtained in a fluid state from the juice of apples and other fruits.

24. Acid of forrel. Obtained in a solid form from the juice of that plant, the same with acid of sugar.

II. ALKALIS. These turn syrup of violets green, and with acids form neutral salts. They are,

1. Fixed vegetable, or Potassa. Always obtained from the ashes of burnt vegetables. A deliquescent salt.

2. Fixed jada. A solid crystalline salt, sometimes found native, as the natrum of Egypt; and sometimes by burning sea-weed as kelp.

3. Volatile. Obtained from sal ammoniac, from the foot of burning bodies, and from the putrefactive fermentation. It is naturally in the state of an invisible and elastic vapour, constituting a species of aerial fluid, and consists of phlogisticated and inflammable air.

NEUTRAL SALTS.

These are always compofed of an acid and an alkali, and are of many different kinds, as may be seen in the following table.

EARTH SALTS.

Composed of an acid joined to an earthy basis, as alum and gypsum. See the following table.

METALLIC SALTS.

Formed of an acid and metal. The principal of these are vitriols, the others may be seen in the following table.

ESSENTIAL SALTS.

Obtained from vegetables, and contain an acid joined with the juices of the plant in a particular manner not to be imitated by art. To these belong sugar, mansa, honey, and others of that sort.

II. EARTHS.
CHEMISTRY.

II. EARTHS.

These are solid bodies, not soluble in water, nor inflammable; and if fused in the fire, never resume their earthy form again, but take that of glass. They are divided into absorbent, crystalline, and argillaceous.

I. Absorbent Earths are capable of being united with acids, and are either calcareous, or not calcareous.

1. **Lime-stone, or marble.** This is of infinite variety as to colour and texture. Marble is the hardest and finest. Those kinds of lime-stone which feel unctuous to the touch, are generally impregnated with clay; those that feel gritty, or where the lime is hard and weighty, contain sand; this is the best for building; the other for manure.

2. **Clay.** A white, friable, soft substance. This is much more free of heterogeneous matters than any lime-stone, and is easily calcined into quicklime. It is probably nothing else than lime-stone suddenly concreted without being crystallized.

3. **Sea shells.** Such as found plentifully everywhere. With alkaline substances they are easily changed into glass; and hence are used in medicine.

4. **Terra pondersa.** A fine white earth sometimes found combined with fixed air, but more commonly with the vitriolic acid; and forming with it a very heavy compound, named lapathum pondersa. It is found in mines and veins of rocks.

b. The absorbent earths which cannot be reduced into quicklime are,

1. **Magnesia alba.** A white earth, usually found combined with the vitriolic acid, and forming bitter purging salt. It is likewise obtained from the mother-levy of nitre, the ashes of burnt vegetables, &c.

2. **Earth of alum.** A particular kind of absorbent earth, found in many places mixed with sulphureous pyrites, as in Yorkshire, &c. Clay of any kind may by a particular process be converted into this earth.

3. **Earth of animals.** This is obtained by the calcination of animal substances, and by precipitation in the process for making acid of milk. It can hardly be converted into glass; and is therefore used as a basis for white enamels, &c. It is said to consist of the phosphoric acid united to calcareous earth.

II. Crystalline or Vitreous Earths, are hard, and strike fire with flint; may be calcined in the fire; but are not soluble in acids.

a. Of this kind are,

1. **Sand and Flint;** found plentifully everywhere. With alkaline substances they are easily changed into glass; and hence are termed vitreous.

2. Precious stones of all kinds are likewise referable to this class; but they are of a much greater degree of hardness and transparency than the others.

III. Argillaceous Earths are distinguished by acquiring a very hard consistence when formed into a paste with water, and exposed to a considerable degree of heat; not soluble in acids. They are,

1. **Common clay.** It is of many different colours; but chiefly red, yellow, or white. The purest is that which burns white in the fire.

2. **Medical bauxite.** These are of different sorts; but are only a purer kind of clay, sometimes mixed with a little iron or other matters.

3. **Lapis nephriticus, or fleasite.** These are indurated clays, found in various parts. They are at first soft and readily cut; but turn extremely hard in the air. Many other varieties of these earths might be mentioned; but as they do not differ in their chemical properties so much as in their external appearance, and being all mixed with one another, they more properly belong to the natural historian than the chemist.

III. Metallic Substances.

These are bodies of a hard and solid texture; fusible in the fire, and resuming their proper form afterwards; not miscible with water, nor inflammable. They are divided into Metals and Semimetals.

I. Metals are malleable; and the species are,

1. **Gold.** The most ponderous and fixed in the fire of all bodies except platinum, and the most ductile of any. It has a yellow colour, and is more commonly found in its metallic state than any other metal. It has no proper ore; but is found in ores of silver, and almost all sands contain some of it.

2. **Silver** is next to gold in malleability and ductility; but less fixed in the fire than either it or platinum. It is sometimes found in its native state; but most commonly in that of an ore with sulphur, sometimes with arsenic, and assuming different appearances.

3. **Platina.** A white metal of a greater specific gravity than gold, and altogether as fixed in the fire; the most difficult to be melted of all known substances; refuting the tales which usually have been applied for discovering the purity of gold, supposed from hence to be the fairest of the ancients. Found in South America.

4. **Copper.** Of a reddish colour, hard and sonorous; admits of being extended greatly under the hammer, either hot or cold. It is difficult of fusion. It is generally found in the flake of an ore with sulphur. There are a great variety of ores of it, extremely beautiful, blue, red, green, and yellow.

5. **Iron.** A grey-coloured metal, extremely ductile when hot; the lightest of them all except tin. It is the only metal certainly known to admit of being welded; though platina is likewise said to posses some share of this property. It is likewise the only one capable of being tempered by cooling. It is found almost everywhere; and its ores are infinitely various.

6. **Tin.** A white soft metal, the lightest of the whole, and very ductile. The ores of it are generally arseneal, and assume a crystalline appearance; their colour being most usually of a dark brown, and sometimes very beautiful.

7. **Lead.**
Table.

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7. Lead. A metal of a dull bluish colour, exceedingly soft and malleable, and very weighty. Seldom found in its metallic state, but usually in an ore with sulphur or arsenic; but seldom with sulphur alone. The principal ores of it are the cubic, called galena and the glaysy, called spar.

8. Mercury or quicksilver; formerly accounted a semimetal, on account of its fluidity, but now reckoned among the most perfect metals. It is a white, opaque, metallic body; fluid, except in a very intense degree of cold; very heavy, and easily volatilized by heat. Sometimes found in its fluid form, but usually in a beautiful red ore with sulphur, called cinnabar.

II. SEMIMETALS are brittle, and do not stretch under the hammer. They are,

1. Zinc. A bluish white substance of a fibrous texture, considerably hard and sonorous, with a small degree of ductility; easily fused and volatilized. Its principal ore is lapis calaminaris.

2. Bismuth or tin-glaf. A white ponderous, hard, brittle and sonorous body, of a plated texture; easily fused and vitrified. It is only reduced to an ore by arsenic. Its appearance much the same with regulus of antimony.

3. Antimony. A blackish substance, of a fibrous needle-like texture; hard, brittle, and of a considerable weight; not difficult of fusion, and easily convertible into glafs. Its only ore is with sulphur, which is the crude antimony.

4. Arsenic. A bright, sparkling, whitish-coloured semimetal; of a plated texture; very brittle, and extremely volatile. It is generally found in the ores of other metals.

5. Cobalt. A brittle semimetal fusible in a moderate heat, and easily convertible into a beautiful blue glafs, called finalt. It is always obtained from an arfenchale ore, likewise called cobalt.

6. Nickel. A reddish white substance, of a close texture, and very bright; easily melted, but very difficult to vitrify.

IV. INFLAMMABLE SUBSTANCES,

Are those which continue to burn of themselves when once set on fire. They are divided into oils, sulphur or brimstone, alcohol or ardent spirits and charcoal.

I. OILS are thickish, viscous fluids, not miscible with water. Divided into animal, vegetable, and fossil.

a, b. The animal and vegetable oils are,

1. Expressed. These are of a mild and bland taste, inodorous, and not soluble in alcohol. They are obtained by expression, as oil of olives, rape-seed, almonds, &c. Animal fats are of the same nature, as is also wax.

2. Essential. These are always obtained by distillation, posses the taste and flavour of the subject from whence they are drawn, and are soluble in alcohol. Of this kind are oil of cloves, spike, &c. The oil of ants is an example in the animal kingdom.

3. Empyreumatic. These are obtained by a considerable degree of heat, and posses an acidic taste and burnt-like flavour, as oil of hartshorn. They are soluble in spirit of wine.

4. Fossil oils. These are found in the earth in their native state; and are called, when pure, naphtha; which is of an acidic taste, and extremely volatile, not miscible with alcohol. A great many inflammable fossils contain this, as bitumens, pit-coal, &c.

II. SULPHUR or BRIMSTONE. This is a dry friable substance, not miscible with water. It is found in many mineral substances, metallic ores, &c. but is for the most part met with in pyrites. Great quantities of it are found in the neighbourhood of volcanoes.

III. ALCOHOL or ARDENT SPIRITS. This is a fluid of an acidic and volatile nature, miscible with water; obtained from fermented vegetable juices by distillation; as from the juice of the grape, malt-liquors, rice, &c.

IV. CHARCOAL. The residuum of most inflammable matters after undergoing distillation with a strong fire. A black substance, acted upon with difficulty by acids; soluble in bary-sulphur, and entirely dissoluble into inflammable air by a very violent heat. Of great use as fuel, and essentially necessary in metallurgy and other arts.

V. WATER.

A colourless inelastic fluid well known. It is either simple or mineral.

I. Simple, or pure-rain-water, as it called, though the most homogeneous fluid of this kind with which we are acquainted, is not perfectly pure, but always contains a portion of mucilaginous matter, which can never be perfectly separated. It is supposed to consist of dephlogisticated and inflammable air condensed.

II. MINERAL waters are these spring-waters impregnated with saline substances; the diversity of which is exceeding great; but they all agree in having an acid joined with them. The most common sorts are impregnated with iron and sulphur.

VI. AIR.

An invisible and permanently elastic fluid, is of the following kinds: Dephlogisticated, phlogisticated, fixed or fixable, inflammable, nitrous, vitriolic acid air, marine acid air, dephlogisticated marine acid, alkaline air, hepatic air, atmospheric air.

1. Dephlogisticated. An elastic fluid naturally extricated in the processes of vegetation; artificially procured from nitre, sulphuretum, manganese, water, &c. eminently capable of supporting flame and animal life. One of the component parts of our atmosphere.


TABLE, showing the several Combinations that the SIMPLE CHEMICAL ELEMENTARY BODIES admit of with one another; the Compound resulting from that Mixture; and the Manner in which the Union is effected: With some Account of the principal Uses to which these are applied in Arts or Manufactures.

N. B. This mark*, put above any word, denotes that there is some difficulty in the process, or that the union is not very complete.

**VITRIOLIC ACID may be combined with the following substances, viz.**

<table>
<thead>
<tr>
<th>ACIDS.</th>
<th>ALKALIES.</th>
<th>EARTHS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrous Acid. A mixture which readily inflames oils. By solution, generating heat.</td>
<td>Muriatic, Vegetable, and all other Acids yet known. By solution, generating heat. But these mixtures are applied to no particular use in medicine or arts.</td>
<td>Calcareous. Secret ammonia. By solution. Formerly suppos'd a most powerful menstruum for metals, &amp;c. but without any just foundation.</td>
</tr>
<tr>
<td>Muriatic, Vegetable, and all other Acids yet known. By solution, generating heat.</td>
<td>Vegetable. Nitrum vitriatum. A vitriolated tartar, obtained by distilling from nitre with the vitriolic acid.</td>
<td>Terra ponderosa. With this it unites in preference to alkalis, forming a very heavy and insoluble substance called <em>spathum ponderosum</em>.</td>
</tr>
<tr>
<td>Vitriolated tartar. By solution and crystallization, or double elective attraction from a great variety of bodies.</td>
<td>Sal polychrestum. By deflagrating nitre with sulphur. There are many other kinds of vitriolated tartar, known formerly by different names, and suppos'd to be pollosed of particular properties, but they are now neglected.</td>
<td>Cyphium or Paris-plaster. Often found in a native state. May be artificially formed by precipitating from a solution of chalk in a very concentrated nitrous acid. Used as a cement: for taking impressions from medals, &amp;c.</td>
</tr>
<tr>
<td>By precipitation from a very dilute solution of chalk in the nitrous acid, by means of the vitriolic acid.</td>
<td>A corroded calx. By simple corrosion. This when perfectly edulcorated with water is found to be a true gypsfum.</td>
<td>Tale aæffet, &amp;c. A native production which cannot be perfectly imitated by art. Used for holding objects in microscopes, making incombustible cloth, &amp;c.</td>
</tr>
</tbody>
</table>

**CALCAREOUS EARTHS.**

- Magnesia. Effon, or magnesia Glauber's salt. By solution and crystallization. Much used in medicine for the same purposes as real Glauber's salt.
### CHEMISTRY

**Earth of Alum.** *Alum.* By solution, crystallization, &c. Used by dyers as a preparatory for taking on the colours, papermakers, goldsmiths, &c.

**Earth of Animals, Osteocella, &c.** By solution. The mixtures of these are not applied to any particular use.

**Clay*.** *Aluna.* By digelling pure clay for some time in this acid, and exposing it for some time to the air, an alum is produced; and if the clay is precipitated from this aluminous concrete, it is found to be a pure earth of alum, soluble in all acids.

**Flint.** A thickish coagulum. By digelling the liquor filices in the vitriolic acid.

**Gold*.** Imperfectly. By a particular process after being separated from aqua regia.

**Silver*.** By solution, after it has been precipitated from the nitrous acid by alcalies. The fumes which arise in this solution are inflammable.

**Copper.** *Blue vitriol.* This is sometimes a native production, but in this way it is never pure. It is artificially prepared by solution in a very concentrated acid, and crystallizing it.

**Iron.**

- *Salt of iron.* By calcining the crystals of green vitriol till they are converted into a white powder.
- *Caleochar of vitriol.* By continuing the calculation till it assumes a brown colour.

**Lead.** An indiffoluble concretor. By precipitation from the nitrous acid.

**Tin.** *Jupiter corrosivus,* or *infertilis* of Paracelsus. By boiling heat, and repeated coctions with fresh acid when it is evaporated.

**Mercury.**

- *Ignis Oechnus,* or *infernalis* of Paracelsus. By a boiling heat, and repeated coctions with fresh acid when it is evaporated, and then washing with water.

**Antimony*.** A metallic salt. By elective attraction from butter of antimony.

**Zinc.** *White vitriol.* Often found in its native state. Artificially made by solution and crystallization in a diluted acid. Used by painters for drying.

**Bismuth.** A corroded calx. By solution in a concentrated acid.

**Arsenic.** By ditto.

**Cobalt.** A rose-coloured mixture. By solution. If this is precipitated by a fixed alkali, and again dissolved, the liquor appears of a beautiful red.

**Expressed.** A blackish gummy-like mass. By solution, generating a considerable heat. Native gums are supposed to owe their origin to a mixture of this kind.

**Essential.** A dark-coloured resinous mass. A great heat and violent efferecence being produced by this mixture. Native refrains supposed the same.

**Oils.**

- **Empyreumatic.** Little known. By solution.
- **Fossil.** A substance resembling amber. By solution.

**Sulphur*.** Here there is no proper union of substances; but if sulphur is boiled in this acid, it becomes less inflammable and more fixed than any ordinary sulphur.

- *Vitrineal ether.* By careful solution and distillation, the ether being separated by the addition of water.
- *Spirit of vitriol dulext.* By solution and distillation.
- *Oleum dulext.* By continuing the heat after the ether has arisen.
- *Oleum aurcrentum mineral.* By redistilling the residuum of the last with alcohol. A medicine much celebrated by Hoffman.
- *Sulphur.* By putting the heat after the oil comes over. It is to be observed that this is produced in every combination of this acid with metals or alum.

**WATER.** An acidulated water. Sometimes, though seldom, found issuing along with native springs. Applied to no particular use.

**Nitrous Acid** may be combined with the following substances, viz.

**Vitriolic,** as above.

**Acids.**

- *Muratic.* *Aqua regia.* By solution. This is the only proper menstruum for gold; and it is a solution of tin in this menstruum which is the basis of the scarlet dye.
- *Vegetable,* and all others. By ditto. These compounds have no particular names, nor are applied to any particular uses in medicine or arts.

**ALKALIES.**

- *Fossil.* *Cubic nitre.* By solution.
- *Volatile.* *Nitrous ammoniac.* By solution. This differs from all the other ammonical salts, by being soluble in alcohol.

**EARTHS.**

- *Calcaneous.* Deliquescence crystals. By ditto and crystallization.
- *Earth of Alum,* and all other absorbent earths. By solution. The compounds have no names nor any remarkable properties hitherto discovered.

**Crystaline Earths*.** By solution after precipitation from the liquor filices.
## CHEMISTRY

Table.

### GOLD
- Slightly impregnated. By a boiling heat in close vessels, after the ordinary method of separating silver from gold by the nitrous acid. It spontaneously subdues in the air.
  - A fluid solution. By solution. This when diluted with water stains hair and bones black; as also marble, agate, jasper, &c. of different colours.

### SILVER
- Sal metalleum. By solution and crystallization.
  - Catarrhium lunaire, lunar caustik, or lapic infernalis. By inculpating the solution to dryness.

### COPPER
- A green-coloured solution. By solution.

### IRON
- A greenish solution, if a diluted acid is employed; if otherwise, it is of a yellowish colour: evaporated to dryness, it depletes in the air.
  - A yellow solution. By dissolving in a diluted acid. If much water is added, the metal is precipitated.

### LEAD
- Saturati fulminans. By inculpating the solution. This explodes when put upon the fire with greater force than nitre, and has been proposed to be used as an ingredient in gun-powder to augment its force.

### TIN
- A solution or corroded calx. By a careful solution without heat it remains suspended; if otherwise, it falls down in form of a calx. This is commonly shipped to be the composition used in dyeing scarlet; but by mistake: for it is a solution of tin in aqua-regia that communicates that fine colour to cochineal. The same solution is the basis of the powder which tinges glass of a ruby colour. It is the precipitate of gold from aqua-regia by means of tin.
  - A limpid solution, intently corrosive. By solution.

### MERCURY
- Red precipitate. By evaporating the solution to dryness, and then calcining till it is reduced red.
- Mercurius corrosivus fistus. By precipitating from the nitrous acid by fixed alkali.
  - White precipitate. By ditto with the volatile alkali.

### BISMUTH
- A greenish solution. By using a concentrated acid. This might be applied in some cases in the art of dyeing; but is not yet come into general use.
  - Magistery of bismuth. By precipitating from the solution by means of water. This has been employed as a cosmetic, but is inefficacious and unsafe. If mixed with pomegran, this stains hair of a dark colour without injuring it.

### ZINC
- A corroded solution. By the ordinary means.
  - A colourless calx. By simple corrosion.

### ANTIMONY
- Bzoaric mineral. By distilling from butter of antimony, after having added the nitrous acid.
- Antimonium diaphoreticum. By adding nitre to crude antimony, and desaglating.
- Cerusa antimonii. By desaglating regulus of antimony with nitre.

### COBALT
- Rose-coloured crystals. By adding muriatic acid, and allowing it to crystallize.
- Green sympathetic ink. By dissolving these crystals in water. The solution is red when cold, and green when warm; when wrote with, it disappears when dry; but when held to the fire it becomes green; and again disappears when cold.

### NICKEL
- An expressed. A thick bituminous-like substance. Upon the mixture a considerable degree of heat is generated, and sometimes, though very seldom, actual flame is produced.
  - Expressed. A thick bituminous-like substance. Upon the mixture a considerable degree of heat is generated, and sometimes, though very seldom, actual flame is produced.

### ESSENTIAL
- Ditto. A more violent heat is generated upon the mixture with these oils than any other, and with many of them an actual flame is produced.

### OILS
- Empyreumatic. This mixture has no name, nor is it applied to any remarkable use in arts.

### FOSSILE
- Ditto.

### ALCOHOL
- Nitrous ether. By distilling; the ether arising to the surface.
- Spiritus nitri dulcis. By distilling a little, and then distilling.

### WATER
- Acidulated water. By solution.

The MURIATIC ACID may be combined with the following Substances. viz.

### ACIDS
- Vitriolic and Nitrous. As in the former part of this Table.
- Vegetable, and all others yet known. By solution: but as none of these mixtures are applied to any particular purpose, we take no notice of them.

### VEGETABLE
- Digilose. By solution and crystallization.

### FOSSILE
- Sal grem. A native foible salt, found in mines in Poland, Spain, etc. of the same nature as common salt, but more pure.

### VOLATILE
- Common ammoniac. Obtained at large by a particular process from foot. Artificially made by mixing the acid and alkali, and crystallizing.

### EARTHS
- Liquid shell. By solution. A substance whose effects in medicine have been greatly extolled.
- Calcareous. By evaporating liquid shell to dryness. It naturally deliquesces.

### OSTROCHELLA, MAGNESIA, and other absorbents. By solution: but the properties or uses of these are not known.
### Table.

#### Chemistry.

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gold</strong>, <em>A yellow liquor.</em></td>
<td>By boiling a calx of gold (in whatever way obtained) in this acid. It does not act upon it in its metallic state.</td>
</tr>
<tr>
<td><strong>Silver</strong>, <em>A fluid solution.</em></td>
<td>By dissolving the ore of silver in this acid. It does not act upon pure metallic silver.</td>
</tr>
<tr>
<td><strong>Luna corrua</strong></td>
<td>By elective attraction from the nitrous acid.</td>
</tr>
<tr>
<td><strong>Platina</strong> <em>A fluid solution.</em></td>
<td>With difficulty effected, after having been precipitated from aqua-regia by alkalies.</td>
</tr>
<tr>
<td><strong>Iron</strong>, <em>Tinctura martis aurae.</em></td>
<td>By solution. The iron is in some measure rendered volatile by the operation.</td>
</tr>
<tr>
<td><strong>Lead</strong>, <em>A limpid solution.</em></td>
<td>By a boiling heat, and frequent cohabitations with fredi acid.</td>
</tr>
<tr>
<td><strong>Cornus Saturni</strong></td>
<td>By precipitation from the nitrous acid.</td>
</tr>
<tr>
<td><strong>Tin</strong>, <em>Bitter of tin.</em></td>
<td>By distilling from corrosive sublimate.</td>
</tr>
<tr>
<td><strong>Mercury</strong>, <em>Corrosive sublimate.</em></td>
<td>By subliming from sal ammoniaca, common salt, or many other bodies.</td>
</tr>
<tr>
<td><strong>Mercurialis dulcis</strong></td>
<td>By subliming corrosive sublimate with more quicksilver.</td>
</tr>
<tr>
<td><strong>Mercurialis panaea</strong></td>
<td>By subliming corrosive sublimate.</td>
</tr>
<tr>
<td><strong>Bismuth</strong>, <em>A solution very slightly impregnated.</em></td>
<td>By employing a very concentrated acid.</td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td>A solution of a very slight yellow colour.</td>
</tr>
<tr>
<td><strong>Arsenic</strong>, <em>Butter of arsenic.</em></td>
<td>By distilling corrosive sublimate with arsenic; the arsenic uniting with the acid, and leaving the mercury.</td>
</tr>
<tr>
<td><strong>Cobalt</strong></td>
<td>A reddish solution. By the ordinary means. It becomes green by a gentle heat.</td>
</tr>
<tr>
<td><strong>Nickel</strong></td>
<td>A green solution. By the ordinary means.</td>
</tr>
<tr>
<td><strong>Oils</strong></td>
<td>By solution. The union here is imperfect, nor have they any particular name.</td>
</tr>
<tr>
<td><strong>Alcohol</strong></td>
<td>Spiritus falti dulcis. By digestion, and afterwards distilling. The acid here is never totally dulcified.</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>Acidulated water. Generating heat by mixture.</td>
</tr>
</tbody>
</table>

**V I N E G A R** may be combined with the following Substances, viz.

**ACIDS.**

**VITRIOLIC** | Nitrous, and Muriatic, as in the above table. It likewise unites with all other acids, generating heat; but the properties or uses of these are not known.

**Vegetable.** Regenerated tartar. By solution and crystallization.

**Alkalies.**

**Fossil.** Polybrest of Rochelle. By ditto.

**Volatile.** Spiritus Mindereri. By solution.

**EARTHS.**

**Magnesia.** Dr. Black's purging salt. By solution. It unites with all the other absorbent earths; but the properties of these mixtures are unknown.

**Copper.** Verdegri. By solution and crystallization; or at large, by stratifying copper-plates with the hulks of the grape.

**Iron.** Sal martis aperiens. By solution and crystallization.

**Lead.** Saccharum Saturni. By solution and crystallization.

**Tin** | This is not properly dissolved; but the acid is evidently impregnated. By the ordinary means of solution.

**Mercury** *A fluid solution.* | By employing a precipitate of mercury from the nitrous acid by alkalies.

**Zinc** | A colourless solution of a sweetish taste. By digesting for some time.

**SEMIMETALS.**

**Antimony**, *Vinum benedictum.* This is not a proper solution of the metal, but the acid is impregnated with an emetic quality.

**Arsenic** | Vinum arsenicicum. By ditto. A curious phosphoric liquor.

**Bismuth** | An auffere flippic liquor. By strong coction.

**Oils** | The union here is imperfect, nor have any of them obtained particular names.

**Alcohol.** A mixture much used for anointing sprains, &c.

**Water.** Acidulated water.

**ACID** or **TARTAR** may be combined with the following Substances, viz.

**ALKALIES.**

**Vegetable.**

Cream of tartar with excess of acid.

Soluble tartar, when completely saturated.

**Fossil.** Rochelle salt.

**ALKALIES.**

A salt very difficult of solution with excess of acid.

**Volatile.** A beautiful and soluble salt when perfectly saturated.

**EARTH.**
CHEMISTRY.

Table.

EARTH.  
Calcaceous. An indissoluble felenite.
METALS.  
Copper. A fine green colour for painting.
SEMIMETAL.  
Cobalt. Emetic tartar.

ACID or URINE may be combined with the following substances, viz.

ACIDS of all kinds. The nature of these not known.

Fixed Vegetable. A salt not easily crystallized, the nature of which is not known.

Fossil. A fine crystallized salt used in medicine.

Volatile. A glass-like saline substance called microcrystalline salt. The acid is always found in this state by evaporating urine.

VITRESCENT EARTHS. A glass of different sorts. By fusion.

Lead. An inflammable malleable mass. By calcining the dry salt with lead.

Tin. A mass resembling zinc; and inflammable. By ditto.


Copper. A corroded powder, or green solution. By a boiling heat in a watery solution of the acid.

Mercury. A semi-opaque mass. By fusion with the acid, in its solid form.

Zinc. A true phosphorus. By fusion with the dry acid.

Antimony. A brilliant striated mass. By fusion with the dry acid.

Arsenic. A mixture but little changed in appearance from ordinary bismuth. By fusion.


OILS. BALDWIN'S PHOSPHORUS. By distilling with substances that contain oils or inflammable matter.

FLUOR ACID, may be combined with the following substances, viz.

ALKALIES.

Fixed Vegetable. A gelatinous saline mass which cannot be crystallized. Great part of it is also diffused by evaporation to dryness.

Fossil. A substance similar to the foregoing.

Volatile. Lets fall a quantity of siliceous earth, and forms a crystallizable ammoniacal salt.

Lime.

Magnesia. A gelatinous matter.

Earth of Alum.

Siliceous Earth. After long standing, crystals of quartz.

Silver. The calxes of these metals partially dissolved; but the properties of the solution unknown.

Quick Silver.

Copper. The calx easily soluble, and affording blue crystals; the metal only partially so.

Iron. Disolved with violence with the emission of inflammable vapours into an uncrystallizable liquor.

ACID or SUGAR may be combined with the following substances, viz.

ALKALIES.

Fixed Vegetable. A salt scarce capable of crystallization when perfectly neutral.

Fossil. A salt difficultly soluble in water.

Volatile. An ammoniacal salt flowing into quadrangular prisms.

Lime. A kind of felenite from which the acid cannot be separated by a burning heat.

Terra Ponderosa. A salt formed into angular crystals, scarce soluble in water.

Magnesia. A white powder insoluble without an excess of acid.

Earth of Alum. A yellow pellucid mass incapable of crystallization, and liquefying in the air.

Gold.

Silver.

Platina.

Quick Silver.

The calxes of all these metals dissolved, but the nitre of the solutions unknown.

SEMIMETAL. Cobalt. A yellow-coloured salt forming a sympathetic ink with sea-fall.

INFLAMMABLES. Alcohol. An ether which cannot easily be set on fire unless previously heated, and burning with a blue flame.

ACID or BORAX or SEDATIVE SALT may be combined with the following substances, viz.

ALKALIES.

Fixed Vegetable. A native substance, which may be imitated by art. It is of great use in promoting the fusing of metals and earths.

Volatile. An ammoniacal salt flowing into small crystals, and melting by an intense heat into a greyish-coloured glass.

EARTHS.

Magnesia. A salt crystallizable in vinegar and acid of ants. Decomposed by other acids and spirit of wine.

Earth of Alum. In certain proportions a salt difficult of solution; in others a hard mass resembling pumice-stone, yet partially soluble in water.

METALS.
**Table.**

<table>
<thead>
<tr>
<th>METAL.</th>
<th>SEMIMETAL. (BISMUTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IRON.</strong></td>
<td>An amber-coloured solution yielding crystals of a yellow colour.</td>
</tr>
<tr>
<td><strong>ARSENIC.</strong></td>
<td>A crystallizable compound shooting into pointed ramifications, or forming a greyish, white, or yellow powder.</td>
</tr>
<tr>
<td><strong>ALKOHOL.</strong></td>
<td>A solution with a considerable heat, which burns with a green flame.</td>
</tr>
<tr>
<td><strong>WATER.</strong></td>
<td>A solution in a considerable heat. The other mixtures with this acid not known.</td>
</tr>
</tbody>
</table>

**ALKALIES.**

- **FUSED VEGETABLE.** A transparent and crystallizable salt, but deliquescent.
- **FOSSIL.** A crystallizable salt not deliquescent.
- **VOLATILE.** An ammoniacal salt shooting into acicular crystals.
- **LINE.** A crystallizable salt, difficult of solution and not deliquescent. Decomposed by common salt ammoniac.
- **MAGNESIA.** A gummy deliquescent saline mass, not crystallizable.
- **EARTH OF ALUM.** A prismatic salt incapable of decomposition by alcalies.
- **SILVER.** A salt shooting into thin oblong crystals obtained from the precipitate; but no solution of the perfect metal.
- **COPPER.** A crystallizable salt of a green colour.
- **IRON.** A crystallizable salt of a brown colour.
- **TIN.** A crystallizable salt from the precipitate, scarcely to be decomposed by alcalies.
- **LEAD.** A crystallizable salt from the precipitate.
- **ZINC.** A crystallizable salt.

**SEMIMETALS.**

- **BISMUTH.** A crystallizable salt from the precipitate, not to be decomposed by alcalies.
- **REGULUS OF ANTIMONY.** A solution of the precipitate.

**ALKALIES.**

- **FUSED VEGETABLE.** A crystallizable salt, deliquescent in the air.
- **FOSSIL.** A salt of a similar nature.
- **VOLATILE.** An ammoniacal liquor, crystallizable with difficulty.
- **CHALK OR CORAL.** A crystallizable salt which does not deliquesce.
- **MAGNESIA.** A saline liquor scarcely crystallizable.
- **TERRA PONDEROSA.** An ammoniacal liquor, crystallizable with difficulty.
- **EARTH OF ALUM.** Unites with difficulty, and scarcely to the point of saturation. The nature of the compound not known.
- **SILVER.** By solution. The calx of silver precipitated from aquafortis by alcalies; but does not act upon it in its metallic state.
- **COPPER.** Beautiful green crystals. By dissolving and crystallizing calcined copper. It acts slowly upon it in its metallic state.
- **LEAD.** A salt resembling faccharum saturni. By dissolving the red calx of lead. But it does not act upon it in its metallic state.

**SEMIMETALS.**

- **ZINC.** Elegant crystals. By the ordinary means.

The effects of this acid upon other bodies, or the use to which these combinations might be applied, are not yet sufficiently known.

**ALKALIES.**

- **FUSED VEGETABLE.** A ponderous salt shooting into fine crystals by supersaturation with acid.
- **FOSSIL.** A salt crystallizable when perfectly neutral.
- **VOLATILE.** A peculiar kind of ammoniacal salt parting with the alkali, and decomposing some of it in a strong fire.
- **CHALK.** A crystallizable salt scarcely soluble.
- **MAGNESIA.** A gelatinous mass which cannot be crystallized.
- **TERRA PONDEROSA.** An in soluble white powder.
- **COPPER.** A green-coloured solution.
- **IRON.** A very thick gelatinous solution.
- **LEAD.** A solution which cannot be crystallized.
- **TIN.** A gelatinous solution in the moist way. A mixture taking fire in close vessels in the dry way.
- **SILVER.** A solution in the moist way, and in the dry, a mixture taking fire in close vessels.
- **BISMUTH.** A partial solution.
- **ZINC.** A partial solution.
- **REGULUS OF ANTIMONY.** A partial solution.
- **COBALT.** A partial solution of a red colour.
- **MANGANESE.** A partial solution in its natural state. When the manganese is phlogisticated, a crystallizable salt may be obtained.

**INFLAMMABLES.**

- **CHARCOAL.** A mixture taking fire and subliming when heated in close vessels.
- **OIL OF TURPENTINE, &c.** A thick black substance after some days digestion.
- **SULPHUR.** A red sublimate.
ALKALI. Fixed Vegetable. A cryflallizable salt.
Volatilc. A neutral salt, the nature of which is unknown.

ACID or MILK may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable. A deliquecent salt soluble in alcohol.

ACID or MILK may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable. A deliquecent salt, parting with much of the alkali by heat.

EARTHS. Calcareous and Argillaceous. Deliqucenl salts.
Maganesia. A salt more easily crystallized, but deliquecent.
Copper. A blue solution, which cannot be crystallized.

METALS. Iron. A brown solution, with the emission of inflammable air, yielding no crystals.
Lead. An astringent fuscithion solution, which does not crystallize.

SEMIMETAL. Zinc. A cryflallizable salt, with the emission of inflammable air during the solution.

ACID of SUGAR or MILK may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable. A salt very difficult of solution.

EARTHS. Absorbsent and Argillaceous. Insoluble salts.

ACID of APPLES may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable, Fossil, and Volatile. Deliquecent salts.

EARTHS. Magnesia. A deliquecent salt.
Earth of Alum. A salt very difficult of solution.

METALS. Iron. A brown solution, which does not crystallize.

SEMIMETAL. Zinc. A fine cryfiallizable salt.

ACID of FAT may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable, and Fossil. Neutral salts of a particular nature.

EARTHS. Magnesia. A cryfiallizable salt of a brown colour.
Earth of Alum. A gummy mass, which refuses to cryfiallize.

METALS. Silver. A solution of the calx.
Platinum. The calx copiously dissolved, and even the perfect metal attacked by distillation to dryness.
Copper. A green solution, which cannot be cryfiallized.

SEMIMETALS. Zinc. Disolved in its metallic state.

ACID of BENZOIN may be combined with the following Substances, viz.

ALKALIES. Fixed Vegetable. A salt shooting into pointed feathery crystals.

EARTHS. Magnesia. A cryfiallizable salt easily soluble.

METALS. Gold*. After having precipitated it from aqua-regia, it dissolves it if the alkali has been calcined with animal substances.
Silver*. After having precipitated it from the nitrous acid, it dissolves it if the alkali has been calcined in contact with the flame.
OILS. EMPYREUMATIC.

SEMMETALS. ANTIMONY. • COBALT.

SULPHUR.

WATER.

ALKALI, as above.

SEMIMETALS.

ACIDS.

AIR.

METALS.

TIN. A corroded powder. By the ordinary means of solution.

COPPER. By ditto.

LEAD. A fluid solution. By ditto. This stains hair black.

IRON*. A blood-coloured solution. By dropping a solution of iron in the nitrous acid, into an alkaline lixivium.

MERCURY*. A fluid solution. After precipitating it from acids, if the alkalai is in too large proportions, it then dissolves it, especially if the alkalai has been calcined in contact with the flame.

ZINC*. By solution, after having precipitated it from the nitrous acid.

BISMUTH*. By solution, after having precipitated it from the nitrous acid.

Kerne1 mineral. By dissolving antimony in an alkaline lixivium, filtering, and allowing it to stand in a cool place till it precipitates.

Golden sulphur of antimony. By dissolving a crude antimony in an alkaline lixivium, and precipitating by an acid.

Hepar antimonii. By deflagrating crude antimony with nitre.

Gross metal1orum. Is hepar antimonii pulverized and edulecorated with water.

Diaphoretic antimony. By deflagrating regulus of antimony with nitre.

Antimoniated nitre. By dissolving diaphoretic antimony in water, and allowing it to crystallize.

Magdebury of antimony. By precipitating a solution of diaphoretic antimony by adding vinegar.

Regulus antimonii medocinalis. By fusing crude antimony with alkali. This is not properly a compound of alkali and antimony, but of another kind. But as it is a term much used, it was proper to explain it.

ARSENIC*. A metallic arsicalc fall. By a particular elective attraction from regulus of antimony and nitre.

EXRESSED. Soap. The best hard soap is made of olive-oil and foilial alkali. The ordinary white soap of this country is made of tallow and potash; black soap with whale-oil and potash.

ESSENTIAL. Saponaceous mafs. Best made by pouring spirit of wine upon caustic alkali and then oil, digesting and skaking.

OILS.

EMPYREUMATIC. This mixture dissolves gold when precipitated from aqua regia; and is the basis of the fine colour called Prussian blue; and has various other properties, as yet but little known.

FOSSILE. This has no name, nor are the properties well known; but from some observations that have been made on native soapy waters, it is probable that it would keep linen much longer white than any other kind of soap.

SULPHUR. Hepar sulphuri. By injecting alkalis upon melted sulphur.

WATER.

Alkalies lixivium, when caustic, or even the ordinary solution of mild alkali, is a fluid of great power in washing, bleaching, &c.

AIR. Fixed. Mild alkali. This is the general state in which alkalis are found; but if they are rendered caustic by means of quick-lime or otherwise, they again absorb it from the air, or from many other bodies, by elective attraction. When perfectly mild, this alkali may be made to assume a crystalline form.

The volatile alkali, or spirit of sal ammoniac, can be united with these bodies, viz.

ACIDS: Vitriolic, Nitrous, Muriatic, Vegetable; of Urine, of Amber, of Ants, &c.

ALKALI, as above.

GOLD*. Aurea fulminans. A powder obtained by precipitating it from aqua regia by volatile alkalis.

A liquid solution. By adding a large proportion of alkali after it has been precipitated from aqua regia. This deposits the gold when long exposed to the air. The curious vegetation called arbor Dianae is formed by adding mercury to this solution. A violently fulminating powder obtained by digestion.

SILVER*. A solution. After it has been precipitated from the nitrous acid. A fulminating powder by digestion.

PLATINA*. By solution, after having precipitated it from aqua regia.

A blue-coloured solution. By the ordinary means. This when evaporated to dryness, and mixed with tallow, tinges the flame green.

COPPER. Sapphire-coloured crystals. By crystallizing the solution.

Venus fulminans. By evaporating the solution to dryness.

Aqua cerulea sapphirina. By mixing sal ammoniac, quick-lime, and thin plates of copper, with water, and allowing them to remain a night.

IRON. By ordinary solution.

LEAD. By ditto.

TIN. The mixts that are produced by these metals are little known.

BISMUTH*. By solution, after having precipitated it from the nitrous acid.

ANTIMONY.

COBALT. A reddish liquor. By solution.

NICKEL. A blue liquor. By ditto.

EXPRESSED. Has no name. By solution.

ESSENTIAL. Sal volatile oleiforun. By ditto with some difficulty, unless the alkali is in a caustic flame.

OILS. EMPYREUMATIC. A pungent oily substance, of great power in medicine. The principal one of this kind in use is spirit of hartbhorn.

FOSSE. A particular kind of soapy substance.
CHEMISTRY.

SULPHUR. Smoking spirit of sulphur. By distilling sal ammoniac, quick-lime, and sulphur.
ALCOHOL*. By distilling alcohol from volatile alkalies, it acquires a caustic fiery taste; but the union is not complete.
WATER. This solution might be of use in washing or bleaching; but, unless in particular cases, would be too expensive.

It coagulates with alcohol.
AIR. Fixed. Mild volatile alkali. The usual state in which it is found; nor has any method yet been discovered of rendering it solid but in this state.

EXPRESSED OILS may be combined with the following Substances, viz.

ALCALIES: Fixed and Volatile, as above.
METALS. Lead*. Ditto. By folution when the tin is in the state of a calx.
SEMIMETALS. Zinc*. Ditto. By ditto.
OILS: Of all kinds. By mixture or mixture.

SULPHUR. Balsam of Sulphur. By solution in a boiling heat.

ALCOHOL. After expressed oils are freed from soap or plasters, they are soluble in alcohol; but not in their ordinary state.

ESSENTIAL OILS may be combined with the following Substances, viz.

ACIDS: Vitriolic, Nitrous, Murieatic, Vegetable, of Urine, of Amber, as in the foregoing part of this Table.
ALCALIES: Fixed and Volatile, as above.
CALCAREOUS EARTHS. A kind of plaster. By mixture when in a caustic state.
METALS. Lead*. Ditto. By folution when the calx of lead is in the state of a calx.

OILS: Essential, Empyreumatic, and Fossil. By mixture but their uses are not much known.

SULPHUR. Balsam of Sulphur. By solution in a boiling heat.

ALCOHOL. After expressed oils are freed from soap or plasters, they are soluble in alcohol; but not in their ordinary state.

EMPYREUMATIC OILS may be combined with the following Substances, viz.

ACIDS: Vitriolic and Nitrous, &c. as above.
ALCALIES: Fixed and Volatile, as above.

OILS: Of all kinds. By mixture.

SULPHUR. A balsam of sulphur. By solution, imperfectly; better by adding essential oils to the solution made by expressed oils or balsam of sulphur.

ALCOHOL. Imperfect mixture. By distillation.

WATER. Distilled water of the shops. By distilling recent vegetable substances with water.

FOSSILE OILS may be combined with the following Substances, viz.

ACIDS: Vitriolic and Nitrous, as above.

OILS: Of all kinds. By mixture.

SULPHUR. With some difficulty, by folution.

ALCOHOL. By folution. By repeated distillations the oils are rendered much more subtile.

SULPHUR may be combined with the following, Substances, viz.

ACIDS: Vitriolic, with the phenomena above described.

ALCALIES: Fixed and Volatile, as above.

SILVER. A mass of red-like colour. By adding sulphur to red-hot silver, and fusing; found also with it in the state of an ore.

LEAD. A sparkling friable mass, hardly fusible. By deflagrating sulphur with lead. This in a native state forms the ore of lead called galena.

COPPER. A black brittle mass, easily fusible. By adding sulphur to red-hot copper, or fusing with sulphur and fusible. Naturally in some yellow pyrites.

A spongy-like droops, easily fusible. By putting sulphur to red-hot iron. This is also found naturally in the common yellow or brown pyrites.

A fulminating compound. By mixing filings of iron with sulphur, moistening them with water, and pressure them hard, they in a few hours burst out into flame. This composition has been employed for imitating earthquakes.

Crocus martis. By deflagrating with iron.

Crocus martis apericnt. By calcining the crocus martis in the fire till it attains a red appearance.

Crocus martis afinitys. By heating the heat still further.

TIN. A dark-coloured mass, resembling antimony. By fusion.

Ethiops natual. By heating flowers of sulphur, and pouring the mercury upon it, and stirring it well. Its natural ore is called cinnabar.

MERCURY. Fallicitus cinnabar. By applying the mercury and sulphur to each other in their pure state, and subliming.

Cinnabar of antimony. By subliming corrosive sublimate and crude antimony; or the residuum, after distilling butter of antimony.
Table.

**CHEMISTRY.**

**SEMIMETALS.**

**ALCOHOL** may be combined with the following Substances, viz.

**ACIDS:** Vitriolic, Nitrous, Muriatic, Vegetable, and of Borax, as above.

**ALKALI:** Volatile, as above.

**METALLIC** eales, in some particular cases.

**OILS:** Exprefsed, Effential, and Fossil, as above.

**WATER.** Gas of fire. By receiving the fumes of burning sulphur in water. This ought rather to be called a union of the volatile vitriolic acid with water.

**ACIDS:** Vitriolic, Nitrous, Muriatic, Vegetable, and of Borax, as above.

**SEMIMETALS.**

**GOLD may be combined with the following Substances, viz.:**

**ACIDS:** Vitriolic*, Nitrous*, and Muriatic*. In the circumstances and with the phenomena above described.

**ALKALIES:** Fixed*, and Volatile*, as above.

**METALS.**

**SILVER may be combined with the following Substances, viz.**

**ACIDS:** Vitriolic*, Nitrous*, Muriatic*, Vegetable*, and Acid of Anis*, as above.

**ALKALIES:** Fixed* and Volatile*, as above.

**CRYSTALLINE** earts and other vitreous matters. A fine yellow opaque glafs. The finest yellow paint for porcelain is procured from glafs mixed with silver.

**SEMIMETALS.**

**SULPHUR, as above.**

**LEAD may be combined with the following Substances, viz.:**

**ACIDS:** Vitriolic, Nitrous, Muriatic, Vegetable, of Urine, of Anis, as above.

**ALKALIES:** Fixed and Volatile, as above.
<table>
<thead>
<tr>
<th>Page</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>612</td>
<td>C H E M I S T R Y. Table.</td>
</tr>
<tr>
<td>CRYSTALLINE EARTHS.</td>
<td>A thin glass. By fusion in a moderate heat.</td>
</tr>
<tr>
<td>METALS.</td>
<td>Gold and Silver, as above.</td>
</tr>
<tr>
<td></td>
<td>Platinum. A leafy or fibrous texture, and purplish or blue colour when exposed to the air. If a large proportion of platinum is used, it separates in the cold.</td>
</tr>
<tr>
<td></td>
<td>Tin. A little harder than either of the metals, and easily fused; hence it is used as a folder for lead; and it forms the principal ingredients of pewter. If the fire is long continued, the tin floats on the surface.</td>
</tr>
<tr>
<td></td>
<td>Copper*. Brittle and granulated, like a tempered iron or steel when broke. By throwing pieces of copper into melted lead. The union here is very slight.</td>
</tr>
<tr>
<td></td>
<td>Iron*. An opaque brownish glass. By a great degree of heat if the iron has been previously reduced to the state of a calx, but never in its metallic state.</td>
</tr>
<tr>
<td>OILS: Essential, and Effsential, as above.</td>
<td></td>
</tr>
<tr>
<td>SULPHUR, as above.</td>
<td></td>
</tr>
</tbody>
</table>

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TIN may be combined with the following Substances, viz.|
| ACIDS: Vitriolic*, Nitrous*, Muriatic, Vegetable*, of Urine, as above. |
| ALKALIES: Fixed and Volatile, as above. |
| CRYSTALLINE EARTHS or other vitreous matters. An opaque white vitreous mass, which forms the basis of white enamels. |
| | Gold, Silver, and Lead, as above. |
| | Platinum. A coarse hard metal which tarnishes in the air. |
| | Copper. A brittle mass. When the copper is in small proportions, it is firmer and harder than pure tin. |
| METALS. | This, in right proportions with a little zinc, forms bell-metal. |
| | Iron. A white brittle compound. By heating filings of iron red-hot, and pouring melted tin upon them, a metal resembling the finest silver is made of iron, tin, and a certain proportion of arsenic. |
| | Mercury. This amalgam forms foils for mirrors; and forms the yellow pigment called aurum molacum. |
| | Zinc. Hard and brittle. When the zinc is in small proportions, it forms a very fine kind of pewter. |
| SEMIMETALS. | Antimony*. Regulus veneris. By elective attraction from copper and crude antimony. |
| | Bismuth. Bright, hard, and sonorous, when a small proportion of bismuth is used. This is very easily fused, and employed as a folder. |
| | Arsenic. A substance in external appearance resembling zinc. |
| | Cobalt. By fusion. |
| | Nickel. A brittle metallic mass. |
| OILS: Essential, as above. |
| SULPHUR, as above. |

COPPER may be combined with the following Substances, viz.|
| ACIDS: Vitriolic, Nitrous, Muriatic, Vegetable, of Urine, of Amber, of Ants, as above. |
| ALKALIES: Fixed, and Volatile, as above. |
| METALS. | Gold, Silver, Lead*, and Tin, as above. |
| | Platinum. A white and hard compound, which does not tarnish so soon as pure copper, and admits of a fine polish. |
| | Iron. Harder and paler than copper. Easily fused. |
| | Mercury*. A curious amalgam. Soft at first, but afterwards brittle. By triturating mercury with verdigris, common salt, vinegar, and water. |
| | Brass. Commonly made by cementation with calamine. The larger the proportion of zinc, the paler, harder, and more brittle is the brass. |
| | Spelter. A native substance, found in Cornwall, consisting of zinc and copper, and used as a folder. |
| SE IMETALS. | Antimony. By fusion. |
| | Bismuth. A pailish brittle mass. Somewhat resembling silver. |
| | Arsenic. White copper. By pouring arsenic, fused with nitre, upon copper in fusion. If too large a proportion of arsenic is used, it makes the compound black and apt to tarnish. |
| | Cobalt. White and brittle. |
| | Nickel. White and brittle, and apt to tarnish. |
| OILS: Essential, as above. |
| SULPHUR, as above. |

IRON
### Table. CHEMISTRY.

IRON may be combined with the following Substances, viz.

| ACIDS: Vitriolic, Nitrous, Muratic, Vegetable, of Urine, of Amber, of Ants, as above. |
| ALKALIES: Fixed*, and Volatile, as above. |
| VITREOUS EARTHS. A transparent glass. In general blackish; but sometimes yellow, green, or blue. The colour is influenced by the degree of heat as well as nature of the ingredients. |

#### METALS.

- **Gold**, Silver*, Lead*, Tin, and Copper, as above.
- **Platina.** A white substance resembling silver.
- **Zinc.** A compound resembling silver.
- **Arsonic.** A white, hard, and brittle compound. By fusing with soap or tartar. A metal resembling fine steel is made by fusing cast iron with a little arsenic and glass.
- **Bismuth.** A silvery for iron. By putting this amalgam upon iron, and evaporating the mercury. It has much the appearance of silver.
- **Cobalt.** By mixing first with nickel, and then adding mercury.

#### SULPHUR, as above.

**MERCURY may be combined with the following Substances, viz.**

| ACIDS: Vitriolic, Nitrous, Muratic, Vegetable*, of Urine, as above. |
| ALKALIES. Fixed*, as above. |
| METALS. |
- **Gold**, Silver*, Lead*, Tin, and Copper, as above.
- **Platina.** The compound resulting from this mixture is not known.
- **Zinc.** An amalgam. Soft or hard, according to the proportions employed.
- **Antimony.** By melting the regulus, and pouring it upon boiling mercury. By frequently distilling from this amalgam, the mercury is rendered much more pure, and then is called animated mercury.
- **Bismuth.** A metal resembling fine steel is made by fusing cast iron with a little arsenic and glass.
- **Cobalt.** By mixing first with nickel, and then adding mercury.

#### SULPHUR, as above.

**ZINC may be combined with the following Substances, viz.**

| ACIDS: Vitriolic, Nitrous, Muratic, Vegetable, of Urine, of Amber, of Ants, as above. |
| METALS. |
- **Gold**, Silver, Lead, Tin, Copper, and Iron, as above.
- **Platina.** A hard substance.
- **Mercury, as above.**
- **Antimony.** This mixture is applied to no particular use.
- **Arsenic.** A black and friable mass.
- **Cobalt.** The particular nature and properties of this mixt is not known.

#### OIL: Expressed*, as above.

**ANTIMONY may be combined with the following Substances, viz.**

| ACIDS: Vitriolic*, Nitrous, Vegetable*, and Urinous. With the phenomena, and by the means above described. |
| ALKALIES: Fixed and Volatile, as above. |
| VITREOUS EARTHS. A thin penetrating glass; which is a powerful flux of metals. |

#### METALS.

- **Gold**, Silver, Lead, Tin*, Copper, and Iron, as above.
- **Platina.** A hard mass.
- **Mercury, and Zinc, as above.**
- **Bismuth.** A mass resembling regulus of Antimony.
- **Arsenic.** The nature and qualities of this mixt are not known.
- **Cobalt.** Nature unknown.
- **Nickel.** Ditto.

#### SULPHUR, as above.

**BISMUTH may be combined with the following Substances, viz.**

| ACIDS: Vitriolic, Nitrous, Muratic, Vegetable, and Urinous; with the phenomena, &c. above described. |
| ALKALIES: Fixed*, and Volatile*, as above. |
| VITREOUS MATTERS. A yellow glass. The ore of Bismuth affords with these a blue glass; but this is probably owing to some mixture of Cobalt with it. |

#### METALS.

- **Gold**, Silver, Lead, Tin, Copper, and Iron, as above.
- **Platina.** This mixture changes its colour much on being exposed to the air.
- **Mercury, as above.**
- **Antimony, as above.**
- **Arsenic.** Nature not known.
- **Cobalt*.** By mixing first with with nickel or regulus of antimony, and then adding cobalt; but it cannot be united by itself.
- **Nickel.** This mixt is not known.

#### SULPHUR, as above.

**ARSENIC may be combined with the following Substances, viz.**

| ACIDS: Vitriolic, Muratic*, Vegetable*, and Urinous; with the phenomena, &c. abovementioned. |
| ALKALIES. |
ALKALIES: Fixed, and Volatile; with the phenomena, and by the means mentioned above.

VITREOUS MATTERS. A glass which greatly promotes the fusion of other substances. The arsenic must first be prepared by diffusing and precipitating from alkali.

METALS: 
{GOLD, Silver, Lead, Tin, Copper, and Iron, as above.
{PLATINA.

SEMIMETALS. 
{ZINC, Antimony, and Bismuth, as above.

NICKEL. The phenomena attending these mixtures have not been as yet particularly observed.

SULPHUR, as above.

**PLATINA may be combined with the following Substances, viz.**

ACIDS: Muriatic; with the phenomena, &c. mentioned above.

ALKALI: Volatile, as above.

METALS: 
{GOLD, Silver, Mercury, Tin, Copper, and Iron, as above.

SEMIMETALS. 
{ZINC, Bismuth, and Arsenic, as above.

NICKEL. The phenomena attending these mixtures not yet observed.

**COBALT may be combined with the following Substances, viz.**

ACIDS: Vitriolic, Nitrous, Muriatic, and Urinous; with the phenomena, &c. as above described.

ALKALI: Volatile, as above.

METALS: 
{GOLD, Platinum, Mercury, Lead, Tin, Copper, and Iron, as above.

SEMIMETALS. 
{ZINC, Antimony, Bismuth*, and Arsenic, as above.

NICKEL. The properties of this compound not known.

**NICKEL may be combined with the following Substances, viz.**

ACIDS: Nitrous, and Muriatic; with the phenomena, &c. as mentioned above.

ALKALI: Volatile, as above.

METALS: Gold, Platinum, Lead, Tin, Copper, and Iron, as above.

SEMIMETALS: Antimony, Bismuth, Arsenic, and Cobalt, as above.

SULPHUR, as above.

**ABSORBENT EARTHS may be combined with the following Substances, viz.**

ACIDS: Vitriolic, Nitrous, Muriatic, and Vegetable; with the phenomena, and by the affinities abovementioned.

ALKALIES: Fixed as above.

EARTHS. 
{CRYSTALLINE. By this mixture they are both much easier melted into a glass than by themselves, but not without the addition of some alkali.

ARGILLACEOUS. This mixture easily runs into a glass without any addition.

WATER. 
{LIME-WATER. By solution. It is sometimes found flowing out of the earth in springs; and as it always quits the water when exposed to the air, it is there deposited on the banks of the streams, forming the fomy incrustations called perrifications; and filtering through the pores of the earth, and dropping through the roofs of subterraneous caves, it forms the curious incrustations found hanging from the roof of such places; sometimes affuming forms stupendously magnificent.

AIR. 
{FLINT. Lime-flint. It is from the quality that quick-lime has of absorbing its air, again with it resuming its fomy confluence, that it is fitted for a cement in building; and the great hardness of the cements in old buildings is owing to the air being more perfectly united with these than in newer works.

**CRYSTALLINE or VITREOUS EARTHS may be combined with the following Substances, viz.**

ACIDS: Vitriolic*, and Nitrous*; with the phenomena, &c. as abovementioned.

ALKALI: Fixed, as above.

ABSORBENT EARTHS: as above.

ARGILLACEOUS EARTHS. A mass running into a glass in a moderate heat.

METALS: Lead, Tin, Copper, and Iron, as above.

WATER. Although this is not soluble in water by any operation that we are acquainted with; yet, from its crystalline form, it is probable that it has once suspended; and certainly it is so at this day in those petrifying springs whose incrustations are of the crystalline sort.

SEMIMETALS: Antimony, Bismuth, Arsenic, and Cobalt, as above.

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About six drachms of water came over first; after which the acid puffemns; the vapours, which condense into a rivulet on the sides of the receiver. It had a pungent and agreeable smell, and tasted empyreumatic. By repeated distillations from pure clay, its smell became mild, and it acquired an apparent increase of acidity. With vegetable alkali, it formed a salt tafing like that of Sulphur, and flowing into needle-like crystals, soluble with difficulty in cold water, but not at all in spirit of wine. It did not delique in the air; but decrепitated in the fire, and did not melt on hot coals. With the mineral alkali yellow crystals were formed resembling Rochelle salt in taste, easily soluable in water, and not deliquing in the air. Volatile alkali a sharp saline liquor, which acidises, and a white saline mass on evaporation; and a saline mineral mass was produced by uniting it with calcareous earth. Magnesia and earth of alum from gumn compounds. When concentrated, it dissolved the calx of gold, and even gold-leaf; but had no effect on filter, mercury, or their calxes. With it, a yellow solution, which shot into aich white crystals of an astrangent taste. A blood-red solution, which shot into green crystals was obtained from iron. Copper was dissolved, into a green liquor, which did not crystallise. Regulus of antimony was also dissolved, and the solution was of a greenish colour. Zinc was partly dissolved into a green liquor, and partly corroded. Solutions of it were red, 1421
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CHEMNITZ,
CHEMNITZ, (Martin) a famous Lutheran divine, the disciple of Melancthon, was born at Britzen in Brandenburg, in 1522. He was employed in several important negotiations by the princes of the same communion; and died in 1589. His principal work is the Examen of the Council of Trent, in Latin.

CHEMOSIS, a disease of the eyes, proceeding from an inflammation; wherein the white of the eye swells above the black, and overtops it to such a degree, that there appears a fort of gap between them. Others define it to be an elevation of the membrane which surrounds the eye, and is called the white; being an affection of the eye, like white-flush.

CHENOPODIUM, Goose-foot, or Wild Crunch: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 20th order Heloraee. The calyx is pentaphyllous and pentagonal; no corolla; one seed lenticular, superior. There are 18 species, 13 of which are natives of Britain. The most remarkable are the following: 1. The bonus hericus, or common English mercury, found growing naturally in shady lanes in many places in Britain. It has large triangular, arrow-pointed, entire leaves; upright, thick, fiddlestalk garnished with triangular leaves, and terminated by clove spikes of spatalous yellowish-green flowers in June and July, which are succeeded by ripe seeds in August. 2. The scoparia, belvidere, or annual mock-cypress, which is of a beautiful pyramidal form resembling a young cypress tree. 3. The botryae, or oak of Jerusalem. 4. The ambroisoides, or oak of Cappadocia. All these are very easily propagated from seeds; and will thrive best in a rich light earth. Most of the species have an aromatic smell. A species which grows near the Mediterranean is used by the Egyptians in fällada, on account of its salty aromatic taste. From the same plant kelp is made in other countries.—The first species, or English mercury, was formerly used as sip-nach; but is now disused, as being greatly inferior to that herb. As an article of the materia medica, it is ranked among the emollient herbs, but rarely made use of in practice. The leaves are applied by the common people for healing flux wounds, cleansing old ulcers, and other like purposes. The roots are given to sheep that have a cough. Goats and sheep are not fond of the herb; cows, hores, and fwine, refuse it. —The second species, or belvidere, is a plant much esteemed in China. The following are the properties attributed to it in the Chinese Herbal. After having said that it is about the end of March or beginning of April that the belvidere springs up from the earth; that its suckers or shoots rise to the height of eight or nine inches, in shape of a child's fist half full; that it afterwards extends itself, and sends forth a number of branches loaded with leaves like thofe of flax; and that, as it grows, its branches arrange themselves naturally in the form of a beautiful pyramid; it adds, that its leaves, yet tender, abound with juice, and have a very agreeable taste; that it may be eaten as a salad with vinegar, to which a little ginger has been added; that being prepared like other leguminous plants, and baked with meat, it gives it an agreeable and pleasing flavour: that, when in its full beauty, its leaves become hard and unfit for the table; but that nourishment is then found in its root, which serves as a resource in times of famine and scarcity. When the belvidere has attained to its natural size, the Chinese separate its principal stalk from the rest, and put it into a ley of ashes, which cleans and fottens it, and frees it from all impurities of the bark. After this bath, it is exposed to the sun; and when dry it is baked and seasoned. With regard to the root, which has something of a violet-colour, they strip off the skin by filaments, which may be boiled and eaten, but what is particularly sought after, is the root itself; of which, when reduced to powder, they collect only what remains in the bottom of the vessel, and form it into small leaves that are baked by being held over the flame of boiling oil. People of a delicate taste will scarcely be tempted to admit this dish at their tables; but it is not useful to point out to the poor peafants, that in cafes of necesfity, they may always have recourse, without danger, to this useful food? In such cases, they will be indebted to the Chinese for having made the attempt, which, for the most part, is dangerous. The Chinese Herbal cites the example of four mountaineers, who having lived on nothing but the leaves, roots, and stalks, of the belvidere, with which their country abounded, had nevertheless enjoyed perfect health to a very great age.

CHEPELIO, an island in the bay of Panama and province of Darien, in South America, situated about one hundred leagues from the city of Panama, which it supplies with provisions. W. Long. 61° 57'. N. Lat. 9°.

CHEPSTOW, a market town of Monmouthshire in England, feated on the river Wye near its mouth, in W. Long. 2° 40'. N. Lat. 51° 40'.

CHEQ., or CHERP., the prince of Mecca, who is, as it were, high priest of the law, and sovereign pontiff of all the Mahometans of whatever sect or country they be. See CALIPH.

The grand signor, sophis, moguls, khan of Tartary, &c. send him yearly presents, especially tapestry to cover Mahomet's tomb withal, together with a magnificent tent for himself, and vast sums of money to provide for all the pilgrims during the 17 days of their devotion.

CHERASCO, a strong and considerable town of Italy, in Piedmont, and capital of a territory of the same name, with a (former) citadel, belonging to the king of Sardinia, where he retired in 1706, during the siege of Turin. It is feated at the confluence of the rivers Sturia and Tanaro, upon a mountain. E. Long. 7° 55'. N. Lat. 44° 35'.

CHERBURG, a fea-port town of France, in Normandy, with a harbour and Augustine Abbey. It is remarkable for the sea-fight between the English and French fleets in 1692, when the latter were beat, and upwards of twenty of their men of war burnt near Cape la Hogue. The British landed here in August 1758, and took the town, with the fhips in the bafon, demolished the fortifications, and ruined the other works which had been long carried on for enlarging the harbour and rendering it more safe and commodious. Within these few years it has been attempted again to improve the harbour, and rebuild the works; but after considerable progress had been made, a great part of them suddenly gave way, and the enterprise is
CHEREM, among the Jews, is used to signify a species of annihilation. See ANNihilation.

The Hebrew word cherem signifies properly to destroy or exterminate, devote, or anathema.

Chermes is like wise sometimes taken for that which is consecrated, vowed, or offered to the Lord, so that it may no longer be employed in common or profane uses. No devoted thing that a man shall devote unto the Lord, of all that he hath of man and beast, and of the field of his possession, shall be sold or redeemed; every devoted thing is most holy to the Lord: none devoted, which shall be devoted of men, shall be redeemed, but shall surely be put to death. There are some who assert that the perfons thus devoted were put to death; whereas Jephtha's daughter is a memorable example. Judges xi. 29.

Chermes is also used for a kind of excommunication in use among the Jews. See NIDDU.

Cherson, or Charrzlu, a town of Turkey in Asia, capital of Curdistan, and the seat of a beglerbeg, E. Long. 45° 15'. N. Lat. 35° 0'.

Cherilus, of Samos, a Greek poet, flourished 479 years before Christ. He sung the victory gained by the Athenians over Xerxes, and was rewarded with a piece of gold for every verse. His poem had afterwards the honour of being rehashed yearly with the works of Homer.

Cherleria, in botany; a genus of the trigynia order, belonging to the decandria class of plants; and in the natural method ranking under the 22d order, Caryophyllaceae. The calyx is pentaphyllous; there are five nectaria, blind, and petal-like; the antheres alternately barren; the capsule is trilocular and three-valved.

Cherlesquior, in Turkish affairs, denotes a lieutenant-general of the grand signior's armies.

Chermes, in zoology, a genus of insects belonging to the order of insecta hemiptera. The rostrum is situated on the breast; the feelers are longer than the thorax; the four wings are deflected; the thorax is gibbous; and the feet are of the jumping kind. There are 17 species; and the trivial names are taken from the plants which they frequent, as the Chermes gra- minus, or graps-bug; the chermes ulmi, or elm-bug, &c. The chermes fleas, or fig-tree bug, one of the largest of the genus, is brown above and greenish beneath. The antennae, likewise brown, are large hairy, and one third longer than the thorax. The feet are yellowish; the wings large, twice the length of the abdomen. They are placed so as to form together an acute roof. The membrane of which they consist is thin and very transparent; but they have brown veins, strongly marked, especially towards the extremity. The rostrum of this chermes is black, and takes its rise from the lower part of the thorax, between the first and second pair of feet. It is an insect to be met with in great numbers upon the fig-tree. The larva has six feet. It is like the insect, when provided with wings, its form is oblong, and its motion slow.

The chrysalis differs from it by two flat buds that spring from the thorax and inclose the wings, afterwards seen in the perfect insect. These chrysalids are frequently met with on plants; and the two places of their thorax give them a broad uncouth appearance and a heavy look. When the little chrysalids are going to be metamorphosed, they remain motionless under some leaves which they fix themselves upon. Their skin then divides upon the head and thorax, and the perfect insect comes forth with his wings, leaving the poul of his chrysalis open and rent anteriorly upon the leaf. These kind of bugs are often found beneath the leaves of the fig-tree. The perfect insect is furnished with four wings, large in proportion to its body, veined, and placed in the form of a roof; and with them it flies. It has, moreover, the faculty of leaping pretty briskly, by means of its hinder-legs, which play like a spring. When it is attempted to catch the chermes, it makes its escape rather by leaping than flying. Some of these insects have a manufaeture worthy of notice. Several species are provided at the extremity of their body with a small sharp-pointed implement; but which lies concealed, and that they draw out in order to deposit their eggs, by making a puncture in the plant that suits them. By this method the fig-tree chermes produces that enormous football, which is found at the summit of the branches of that tree, and which is formed by the extravasation of the juices occasioned by the punctures. The young larvae shelter themselves in cells contained in the tumour. The white down, under which the larva of the pine-chermes is found, seems to be produced much in the same manner.

That of the box-tree chermes produces no tubercula like those; but its punctures make the leaves of that tree bend and grow hollow in the shape of a cup, which by the union of those infected leaves produces at the extremity of the branches a kind of knobs, in which the larvae of that insect find shelter. The box-chermes, as well as some others, has yet another peculiarity, which is, that the larva and its chrysalis eject at the anus a white sweet-tasted matter, that foists under the touch, and is not unlike manna. This subfidence is found in small white grains within the balls formed by the box-leaves, and a stiring of the same matter is often seen depending from the anus of the insect.

Chermes Mineral. See Kerme.

Cherry-Island, an island in the northern ocean, lying between Norway and Greenland, in E. Long. 20° 5'. N. Lat. 75° 0'.

Cherry-Tree, in botany. See Prunus.

Cherso, an island in the gulph of Venice, with a town of the same name near Crete, belonging to the Venetians. The air is good, but the soil rocky; however, it abounds in wine, cattle, oil, and excellent honey. E. Long. 15° 5'. N. Lat. 45° 8'.

Chersonesus, among modern geographers, the same with a peninsula; or a continent almost encompassed round with the sea, only joining to the main land by a narrow neck or isthmus. The words is Greek, χερσονήσις; of χερσός, land, and νήσος, island; which signifies the same. In ancient geography, it was applied to several peninsulas: as the Chersonesus Aurea, Cimbrica, Taurica, and Thracia, now thought to be Malacca, Jutland, Crimea Tartary, and Romania.

Cherit, Petrosilex, Lapis Cornetus, the Hornstone of the Germans; a species of flone clasified by Cronstedt among the siliceous earths. It is of a corf:
fer texture than the common flint, as well as softer; for which reasons it is not capable of such a fine pol- 
lish. It is faintly translucent at the edges, or when broken into very thin pieces. It is found of different 
colours, viz. white, whitish yellow, flesh-coloured, and 
greenish. According to Mr Kirwan, it runs in veins 
through rocks, from whence its name is derived; its 
specific gravity being from 2.59 to 2.700. In the fire 
it whitens and decrepitates like files, but is generally 
sufficient per se. Mineral alkali does not totally dif 
solve it in the dry way, but borax and microcosmic 
foam with effervescence. Its appearance is droller and 
less transparent than flint. The reddish pet 
roflex, used in the court de Lauragais's porcelain 
manufactory, and there called field-jeat, contained 72 
per cent. of files, 20 of argill, and 6 of calcareous earth.

Cromledt observes that there are not as yet any 
certain characters known by which the cherubs and 
jaspers may be distinguished from one another, though 
they can easily be so by touch; the cherubs appearing 
of a fine sparkling texture when broken; but the Jasper 
being grained, dull, and opaque, and having the ap- 
pearance of a dry clay. The cherub is also found form- 
ing larger or smaller veins, or in nodules like kernels 
in rocks; whereas the Jasper, on the contrary, some 
times constitutes the principal part of the highest and 
most extended mountains. The cherub is likewise 
found plentifully in the neighbourhood of stony lime- 
stones, as flints are in the frazis of chalk.

The connection between these bodies is not yet dis 
covered; but it is impollible to establish any essential 
difference between them, from the circumstance of 
flints and agates being generally found in single, loofe, 
and irregular nodules, and hardly in rocks like the 
cherub; for near Conblantimo the agate ftones runs in 
a vein across the rock, of the fame hardness, and as fine 
and transparent, as those agates found in round 
noahules at Deux Ponts.

CHERTZEY, a market town of Surrey in England, 
about seven miles west from Kingston upon Thames. 
W. Long. 50°, N. Lat. 51° 25'.

CHERUB, (plural, CHERUBIM); a celestial spirit, 
which in the hierarchy is placed next to the seraphim. 
See HIERARCHY.

The term cherub, in Hebrew, is sometimes taken for 
a calf or ox. Ezekiel sets down the face of a cherub 
as synonymous to the face of an ox. The word cher- 
ub, in Syriac and Chaldee, signifies-to till or plow, which 
is the proper work of oxen. Cherub also signifies 
strong and powerful. Grotius says, that the Cherubim 
were figures much like that of a calf. Buech显示 likewise, 
that the cherubim were more like to the figure of an ox 
than to any thing besides; and Spener 
is of the same opinion. Lastly, St John, in the 
Revelations, calls cherubim beasts. Josephus says, that the Cherubim 
were extraordinary creatures of a figure un- 
known to mankind. Clemens of Alexandria be- 
lieves, that the Egyptians imitated the cherubim of 
the Hebrews in the representations of their phalxins 
and their hieroglyphical animals. All the several 
discriptions which the scripture gives us of cherubim 
differs from one another; but all agree in representing 
them as a figure composed of various natures, as a 
man, an ox, an eagle, and a lion. Such were the cherubims described by Ezekiel. Those which Isaiah 
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CHESS, an ingenious game performed with different pieces of wood, on a board divided into 64 squares or houses; in which chance has so little a share, that it may be doubted whether a person ever lost a game but by his own fault.

Each gamester has eight dignified pieces, viz. a king, a queen, two bishops, two knights, and two rooks, also eight pawns: all which, for distinction's sake, are painted of two different colours, as white and black.

As to their disposition on the board, the white king is to be placed on the fourth black house from the corner of the board, in the first and lower rank; and the black king is to be placed on the fourth white house on the opposite, or adversary's end of the board. The queens are to be placed next to the kings, on houses of their own colour. Next to the king and queen, on each hand, place the two bishops; next to them, the two knights; and last of all, on the corners of the board, the two rooks. As to the pawns, they are placed, without distinction, on the second rank of the house, one before each of the dignified pieces.

Having thus disposed the men, the onset is commonly begun by the pawns, which march straight forward in their own file, one house at a time, except the first move, when it can advance two houses, but never moves backwards: the manner of their taking the adversary's men is side-ways, in the next house forwards; where having captivated the enemy, they move forward as before. The rook goes forward or crofs-ways through the whole file, and back again. The knight skips backward and forward to the next house, save one, of a different colour, with a sliding march, or a leap, and thus kills his enemies that fall in his way, or guards his friends that may be exposed on that side. The bishop walks always in the same colour of the field that he is placed in at first, forward and backward, alofe, or diagonally, as far as he lifts.

The queen's walk is more universal, as she takes all the steps of the before mentioned pieces, excepting that of the knight; and as to the king's motion, it is one house at a time, and that, either forward, backward, dopping, or side-ways.

As to the value of the different pieces, next to the king is the queen, after her the rooks, then the bishops, and last of the dignified pieces comes the knight. The difference of the worth of pawns, is not so great as that of noblemen; only, it must be observed, that the king's bishop's pawn is the best in the field, and therefore the skilful gamester will be careful of him.

It ought also to be observed, that whereas any man may be taken, when he falls within the reach of any of the adversary's pieces, it is otherwise with the king, who, in such a case, is only to be saluted with the word check, warning him of his danger, out of which it is absolutely necessary that he move; and, if it so happen that he cannot move without exposing himself to the like inconvenience, it is check-mate, and the game is lost. The rules of the game are,

1. In order to begin the game, the players must be seated opposite to each other, and afterwards the pieces must be brought out to support them. The king's, queen's, and bishop's pawns, should be moved first, that the game may be well opened; the pieces must not be played out early in the game, because the player may thereby lose
A. Castling, is to cover the king with a castle; which is done by a certain move which each player has a right to whenever he thinks proper.

B. To queen, is to move a pawn into the adversary's back row, which is the rule at this game when the original one is lost.

c. When the King is blocked up so as to have no move at all.
A player should never cover a check with a piece that a pawn pushed upon it may take, for fear of getting only the pawn in exchange for the piece.

A player should never crowd his adversary up with pieces, for fear of giving a stalemate inadvertently, but always should leave room for his king to move.

By way of corroborating what has been already said with respect to this game, it is necessary to warn a player against playing a timid game. He should never be too much afraid of losing a rook for an inferior piece; because although a rook is a better piece than any other except the queen, it seldom comes into play to be of any great use till at the end of the game; for which reason it is often better to have an inferior piece in play, than a superior one to stand still, or moving to no great purpose. If a piece is moved, and is immediately drove away by a pawn, it may be reckoned a bad move, because the adversary gains a double advantage over the player, in advancing at the same time the other is made to retire; although the first may not seem of consequence between equal players, yet a move or two more left after the first makes the game scarcely to be recovered.

There never wants for a variety at this game, provided the pieces have been brought out regular; but if otherwise, it often happens that a player has no where to play.

Many indifferent players think nothing of the pawns, whereas three pawns together are strong; but four, which constitute a square, with the alinement of other pieces, well managed, make an invincible strength, and in all probability may produce a queen when very much wanted. It is true, that two pawns with a space between are no better than one; and if there should be three over each other in a line, the game cannot be in a worse way. This shows that the pawns are of great consequence, provided they are kept close together.

Some middling players are very apt to risk losing the game in order to recover a piece; this is a mistake; for it is much better to give up a piece and attack the adversary in another quarter; by so doing, the player has a chance of snatching a pawn or two from, or gaining some advantage over, the adversary, whilst his attention is taken up in parrying this piece.

If the queen and another piece are attacked at the same time, and that by removing the queen the piece must be lost; provided two pieces can be gained in exchange for the queen, the queen should be given up, it being the difference of three pieces, and consequently more than the value of the queen. By losing the queen, the game is not thrown into that disorder which it would otherwise have been: in this case it would be judicious to give the queen for even a piece, or a pawn or two; it being well known among good players, that he who begins the attack, and cannot maintain it, being obliged to retire, generally loses the game.

A player should never be fond of changing without reason, because the adversary, if he is a good player, will ruin his situation, and gain a considerable advantage over him. But rather than lose a move, when a player is stronger than the adversary, it is good play to change, for he thereby increases his strength.

When the game is almost drawn to a conclusion, the player should recollect that his king is a capital piece, and consequently should keep him in motion; by so doing he generally gets the move, and often the game.

As the queen, rook, and bishop, operate at a distance, it is not always necessary in the attack to have them near the adversary's king.

If a man can be taken with different pieces, the player should take his time, and consider which of those pieces is the best to take it with.

If a piece can be taken almost at any time, the player should not be in a hurry about it, but try to make a good move elsewhere before he takes it.

A player should be cautious how he takes his adversary's pawn with his king, as it often happens to be a safe-guard to it.

After all that has been said, it is still necessary for us to advise those who would play well at this game, to be very cool and attentive to the matter in question: for it is impossible that any person in the universe can be capable of playing at chess if they think that they are played elsewhere. To learn to play at this game are,

1. If a player touches his man, he must play it, and if he quits it, he cannot recall it.

2. If by mistake or otherwise a false move is played, and the adversary takes no notice of it till he hath played his next move, it cannot be recalled by either of the parties.

3. If a player misplaces the men, and he plays two moves, it is at the option of the adversary to permit him to begin the game or not.

4. If the adversary plays or discovers a check to a player's king, and gives no notice of it, the player may let him stand still till he does.

5. After the king is moved, a player cannot castle.

Sarasin has an express treatise on the different opinions of the original of the Latin schach, whence the French echecs, and our chess, is formed. Menage is also very full on the same head. Lencelavus takes it to come from Ufeches, famous Turkish robbers; P. Sirmond, from the German Scehch, "theft:" and that from calculus. He takes chess to be the same with theadius latrunculorum of the Romans, but mistakenly. This opinion is countenanced by Vollius and Salmasius, who derive the word from calculus, as used for latrunculus. G. Tolosanus derives it from the Hebrew shach, vallavit et mat moritun; whence check and checkmate. Fabricius says, a celebrated Persian astronomer, one Schatrenfcha, invented the game of chess; and gave it his own name, which it still bears in that country. Nicod derives it from shachque, or shaghe, a Moorish word for lord, king, and prince. Bochart adds, that shach is originally Persian; and that shachmat, in that language, signifies the king is dead.—The opinion of Nicod and Bochart, which is likewise that of Scriverius, appears the most probable.

Mr Twiss mentions a small treatise on chess, written, as he supposes, about 400 years ago; at the end of which is a representation of a round chess-board, with directions for placing the men upon it. In this the knight can cover the 64 squares on the board at as many moves. The board is divided into these 64 parts by four concentric circles, having an empty space in the middle; and each of these is divided into 8 parts. Number 1 is placed in the outermost circle; number 2 in the third circle counting inwards, in the division to

4 M 2
Chefs. the right hand of the former; number 3 is placed in the outermost circle, in the division to the right hand of 2; 4 in the third circle counting inwards to the right hand of three; and thus alternately from the first to the third, and from the third to the first circle, till the round is completed by 16 on the third circle to the left hand of 1. Number 17 is then placed on the division of the innermost circle to the right hand of 1; 18 on the second circle counting inwards, to the right hand of 17; and thus alternately from the second to the fourth circles, until the round is completed by 32, directly below number 1. Number 33 then is placed on the third circle directly to the right hand of number 2; 34 on the fourth circle, to the right hand of 4; and thus alternately between the third and fourth circles, until the round is again completed by 48 on the fourth circle, directly below number 33. The numbers are now placed in a retrograde fashion; 50 on the outer circle in that division immediately to the right hand of 1; 51 on the third circle, to the left hand of 2, and directly below number 32; 52 is then placed on the outer circle, immediately on the left hand of 1: 53 on the third circle directly to the left hand of 16; and thus alternately on the first and third circles, until the last round is completed by 64 between the numbers 3 and 5. On this round check-board, supposing the black king to be placed in number 49 on the fourth circle, the queen stands on number 17 at his left hand; the bishops in 32 and 2; the knights 18 and 47; the castles in 3 and 50; the pawns on 19, 4, 49, 64, and 46, 51 32, 1. The white king will then stand in 25, opposite the black queen; the white queen in 40 opposite to the black king, and so on. In playing on a board of this kind, it will be found that the power of the castle is double to that in the common game, and that of the bishop only one half; the former having 16 squares to range in, and the last only four. The king can castle only one way; and it is very difficult to bring the game to a conclusion.

With regard to the origin of the game at chefs, we are much in the dark. Though it came to us from the Saracens, it is by no means probable that they were the original inventors of it. According to some it was invented by the celebrated Grecian hero Diomedes. Others say, that two Grecian brothers, Lcedo and Tyrrenno, were the inventors; and that being much professed with hunger, they fough to alleviate the pain by this amusement. It is certain, however, that it is a game of very ancient standing, and in former ages has been very fashionable in every part of Europe; though in this country it is not very common, probably on account of the intense application of thought required to play at it. It has long been a favourite of the Icelanders and other northern people. There is little difference between their game and ours.

The game of chefs has been generally practised by the greatest warriors and generals; and some have even suppos'd that it was necessary for a military man to be well professed in this game. It is a game which has something in it peculiarly interesting. We read that Tamerlane was a great chefs-player, and was engaged in a game during the very time of the decisive battle with Bajazet the Turkish emperor, who was defeated and taken prisoner. It is also related of Ali Amin the khalif of Bagdad, that he was engaged at chefs with his freedman Kuthar at the time when Ali Amin's forces were carrying on the siege of that city with so much vigour that it was on the point of being carried by assault.

Dr Hyde quotes an Arabic history of the Saracens, in which the khalif is said to have cried out when warned of his danger, Let me alone, for I see check-mate against Kuthar! We are told that Charles I. was at chefs when news were brought of the final intention of the Scots to fell him to the English; but to little was he discomposed by this alarming intelligence, that he continued his game with the utmost composure; so that no person could have known that the letter he received had given him information of any thing remarkable. King John was playing at chefs when the deputies from Rouen came to acquaint him that their city was besieged by Philip Augustus; but he would not hear them until he had finished his game.

The following remarkable anecdote we have from Dr Robertson in his History of Charles V. John Frederic, elector of Saxony, having been taken prisoner by Charles, was condemned to death. The decree was intimated to him while at chefs with Ernst of Brunswick, his fellow-prisoner. After a short pause, and making some reflections on the irregularity and injustice of the emperor's proceedings, he turned to his antagonist, whom he challenged to finish the game. He played with his usual ingenuity and attention; and having beat Ernst, expressed all the satisfaction that is commonly felt on gaining such victories. He was not, however, put to death, but set at liberty after five years confinement.

In the Chronicle of the Moorish kings of Granada we find it related, that in 1396, Mehemed Balbafeizd upon the crown in prejudice of his elder brother, and palled his life in one continual round of difasters. His wars with Castile were invariably unsuccessful; and his death was occasioned by a poisoned veil. Finding his cafe desperate, he dispatched an officer to the fort of Salobrena to put his brother Juzaf to death; but left that prince's adherents shou'd form any obstacle to his son's succession. The alcaide found the prince playing at chefs with an alfiqu*i or priest. Juzaf begged hard for two hours respite, which was denied him; and at last with great reluctance the officer permitted him to finish the game; but before it was finished a messenger arrived with the news of the death of Mehemed, and the unanimous election of Juzaf to the crown.

We have a curious anecdote of Ferrand count of Flanders; who having been accouled to amuse himself at chefs with his wife, and being constantly beaten by her, a mutual hatred took place; which came to such an height, that when the count was taken prisoner at the battle of Bovines, she suffered him to remain a long time in prison though she could easily have procured his releas.

The game of chefs has undergone considerable variations since it was first invented. We have it on good authority, that among the eastern nations, the piece now called the queen was formerly called the vizir or king's minifter, and that the powers of the queen herself were but very small. The chefs-boards used by Tamerlane were larger, and contained many more squares,
CHE [ 645 ]

CHE, squares, than those at present in use. Carrera invented two new pieces to be added to the eight commonly in use. One of these, which he calls campione, is placed between the king's knight and castle, the other, named conture, between the queen's knight and castle, has the move of the bishop and knight united. This invention, however, did not favor its author. In another of this kind, the two additional pieces are called the centurion and decurion: the former, situated between the king and his bishop, in its move the same with that of the queen, but only for two squares; the latter moves as the bishop, but only one square at a time. This, like the former, died with its inventor. The chefs-board of Tamerlane was a parallelogram, having eleven squares one way and twelve the other. In the Memoirs of the late Marshal Keith, we find it related, that he invented an amusement something similar to that of chefs, with which the king of Prussia was highly entertained. Several thousand small statues were call by a founder; and these were ranged opposite to each other as if they had been drawn up in an army; many of the different movements with them as in real service in the field.

A very complicated kind of game at chefs was invented by the late duke of Rutland. At this the board has 14 squares in breadth and 10 in height, which make in all 140 houses: and there are 14 pawns on each side, which may move either one, two, or three squares the first time. The other pieces were the king, queen, two bishops, two knights, a crowned castle uniting the move of the king and castle, and a common castle. On the other side of the king was a concubine, whose common move united that of the castle and knight, two bishops, a single knight, a crowned castle, and a common castle. On the other side of the king was a concubine, whose common move united that of the castle and knight, two bishops, a single knight, a crowned castle, and a common castle. In this game the pawns are of very little use; and by the extent of the board, the knights lose much of their value, which consequently renders the game more defective and less interesting than the common one.

There is an amusing variety at the game of chefs, in which the king with eight pawns engages the whole set, by being allowed to make two moves for every one of his adversary. In this he is almost certain of coming off victorious; as he can make his first move into check, and the second out of it. Thus he can take the queen when she stands immediately before her king, and then retreat; for he cannot remain in check. He cannot be check-mated unless his adversary has preserved his queen and both castles.

Chess-Trees, taquetis d'anuere; two pieces of wood bolted perpendicularly, one on the starboard, and another on the larboard, side of the ship. They are used to confine the claeu, or lower corners of the main-sail; for which purpose there is a hole in the upper part, through which the rope passes that usually extends the claeu of the sail to windward. See Tack.

The chefs-trees are commonly placed as far before the main-mast as the length of the main-beam.

CHEST, in commerce, a kind of measure, containing an uncertain quantity of several commodities.

A chef of sugar, e. g. contains from ten to fifteen hundred pounds; a chef of glass, from two hundred to three hundred feet; a chef of coffee, from two and an half to three hundred weight; of indigo, from one and an half to two hundred weight, five score to the hundred.

CHEST, or Thorax. See Anatomy, Part IV.

CHESTER, commonly called West-Chester, to distinguish it from many other Chester, in the kingdom; the capital of Cheshire, in England. It is a very ancient city, supposed to have been founded by the Romans; and plainly appears to have been a Roman station by the many antiquities which have been and are still discovered in, and about the town. It was among the last places the Romans quitted; and here the Britons maintained their liberty long after the Saxons had got possession of the rest of their country. At present it is a large well-built wealthy city, and carries on a considerable trade. Mr Pennant calls it a city without parallel, on account of the singular structure of the four principal streets. They are as if excavated out of the earth, and sunk many feet beneath the surface; the carriages drive far beneath the level of the kitchens on a line with ranges of shops. The houses are mostly of wood, with galleries pendants, and covered walls before them; by which not only the shops, but those who are walking about the town, are hid, that one would imagine there were scarce any inhabitants in it, though it is very populous. But though by this contrivance such as walk the streets are screened from rain, &c., yet the shops are thereby rendered dark and inconvenient. The back courts of all the houses are on a level with the ground; but to go into any of the four principal streets, it is necessary to descend a flight of several steps.

Chester is a bishop's see. It was anciently part of the diocese of Litchfield; one of whose bishops removing the seat of his see hither in the year 1075, occasioned his successors to be frequently styled bishops of Chester. But it was not erected into a distinct bishopric until the general dissolution of monasteries, when king Henry VIII. in the year 1541, raised it to this dignity, and allotted the church of the abbey of St Werburgh for the cathedral, styling it the cathedral church of Christ and the blessed Virgin; adding the bishopric to the province of Canterbury: but soon after he disjoined it from Canterbury, and added it to the province of York. When this abbey was dissolved, its revenues were valued at L. 1005: 3: 11. This diocese contains the entire counties of Chester and Lancaster, part of the counties of Welfmoreland, Cumberland, and Yorkshire, two chapellies in Denbyshire, and five parishes in Flintshire; amounting in all to 256 parishes, of which 101 are impropriations. This bishopric is valued in the king's books at L 420: 1: 8, and is computed to be worth annually L.2700; the clergy's tenths amounting to L.435: 12: 6. To this cathedral belong a dean, two archdeacons, a chancellor, a treasurer, six prebendaries, and other inferior officers and servants. W. Long, 3. o. N. Lat. 53. 12.

Chester-le-Street, the Cunusacre of the Saxons: a small thoroughfare town between Newcastle and Durham, with a good church and fine spire. In the Saxon times this place was greatly respected on account of the relics of St Cuthbert, deposited here by bishop Eardulf, for fear of the Danes, who at that time (about 884) ravaged the country. His shrine became.
became afterwards an object of great devotion. King Athelstan, on his expedition to Scotland, paid it a visit, to obtain, by intercession of the saint, success on his arms; beloowed a multitude of gifts on the church; and directed, in case he died in his enterprise, that his body should be entered there. At the time that this place was honoured with the remains of one of great privileges, and always thought themselves exempt from all military duty, except that of defending the body of their saint. Chester-le-Frreet may be considered as the parent of the fee of Durham; for when the relics were removed there, the fee in 995 followed them. Tanner says, that probably a chapter of monks, or rather secular canons, attended the body at this place from its first arrival; but bishop Beke, in 1286, in honour of the saint, made the church collegiate, and established here a dean and suitable ecclesiastics; and, among other privileges, gives the dean a right of fishing on the Were, and the rythe of fish.

New Chester, a town in the flate of Pennsylvania, and capital of a county of that name. It is seated on the Delaware, and has a fine capacious harbour, admitting vessels of any burden. W. Long. 74. 7. N. Lat. 40. 15.

CHESTERFIELD, a market town of Derbyshire in England, pleasantly situated on a hill between two small rivers. It has the title of an earldom; and a considerable market for corn, lead, and other country commodities. The houses are, for the most part, built of rough stone, and covered with slate. W. Long. 1. 25. N. Lat. 53. 20.

CHESTERFIELD (Earl of). See STANHOPE.

CHEVAL de FRIZE, a large piece of timber pierced, and traversed with wooden spikes, armed or pointed with iron, five or six feet long. See Plate CXXXVI.

The term is French and properly signifies a Frizeland horse; as having been first invented in that country. It is also called a Turnpike or Turniquet.

Its use is to defend a paillage, keep a breach, or make a rethrenchment to stop the cavalry. It is sometimes also mounted on wheels, with artificial fires, to roll down in an assault. Errard observes, that the prince of Orange used to inclose his camp with chevaux de Frise, placing them one over another.

CHÉVALER, in the manage, is said of a horse, when, in paillage upon a walk or trot, his off foreleg croixes or overlaps the near fore-leg every second motion.

CHÉVALIER, a French term, ordinarily signifying a Knight. The word is formed of the French cheval, "horse;" and the barbarous Latin cavallus.

It is used, in heraldry, to signify any cavalier, or horsemann armed at all points; by the Romans called cataphractus equus: now out of use, and only to be seen in coat-armour.

CHEVAUX de FRIZE. See CHEVAL de FRIZE.

CHEVIN, a name used in some parts of England for the CHUB.

CHEVIOT (or TIVIO) HILLS, run from north to south through Cumberland; and were formerly the borders or boundaries between England and Scotland, where many a bloody battle has been fought between the two nations; one of which is recorded in the ballad of Chevy-chase. These hills are the first land discovered by sailors in coming from the east into Scotland.

CHEVISANCE, in law, denotes an agreement or composition, as an end or order set down between a creditor and his debtor, &c. In the statutes, this word is most commonly used for an unlawful bargain or contract.

CHEVREAU (Urban), a learned writer, born at Lundun in 1613. He distinguished himself in his youth by his knowledge of the belles lettres; and became secretary of state to queen Christina of Sweden. Several German princes invited him to their courts; and Charles-Lewis, the elector palatine, retained him under the title of counsellor. After the death of that prince, he returned to France, and became preceptor to the duke of Maine. At length retiring to Lundun, he died there in 1701, aged 88. He was the author of several books; and amongst others, of an Universal History, which has been often reprinted.

CHÉVRON, or CHEVERON, in heraldry. See HERALDRY.

CHEWING-BALLS, a kind of balls made of aloe-tidea, liver of antimony, bay-wood, juniper-wood, and pellitory of Spain; which being dried in the sun, and wrapped in a linen cloth, are tied to the bit of the horse to chew; they create an appetite; and it is said, that balls of Venice-cracle may be used in the same manner with good success.

CHEYKS. See BENGAL, No 17.

CHEYNE (Dr George), a physician of great learning and abilities, born in Scotland in 1671, and educated at Edinburgh under the great Dr Pitcairn. He parted his youth in close study, and with great perseverance: but coming to settle at London, when about 30, and finding the younger gentry and free-livers to be the most easy of access and most susceptible of friendship, he changed on a sudden his former manner of living in order to force a trade, having observed this method to succeed with some others. The consequence was, that he grew daily in bulk, and in intimacy with his gay acquaintance; swelling to such an enormous size, that he exceeded 32 stone weight; and he was forced to have the whole side of his chariot made open to receive him into it; he grew short-breathed, lethargic, nervous, and feborheic; so that his life became an insufferable burden. In this deplorable condition, after having tried all the power of medicine in vain, he resolved to try a milk and vegetable diet; the good effects of which quickly appeared. His size was reduced almost a third; and he recovered his strength, activity, and cheerfulnes, with the perfect use of all his faculties. In short, by a regular adherence to this regimen, he lived to a mature period, dying at Bath in 1742, aged 72. He wrote several treatises that were well received; particularly, "An Essay on Health and Long Life;" and "The English Malady, or a Treatise of Nervous Diseases," both the result of his own experience. In short, he had the greatest reputation in his own time, both as a practitioner and as a writer; and most of his pieces passed thro several editions. He is to be ranked among those physicians
Some physicians who have accounted for the operations of medicines and the morbid alterations which take place in the human body upon mechanial principles. A spirit of piety and of benevolence, and an ardent zeal for the interests of virtue, are predominant throughout his writings. An amiable candour and ingenuousness are also discernible, and which led him to retract with readiness whatever appeared to him to be confiderable in what he had formerly advanced. Some of the metaphysical notions which he has introduced into his books, may, perhaps, justly be thought fanciful and ill-grounded; but there is an agreeable vivacity in his productions, together with much openness and frankness, and in general great perspicuity.

CHIABRERA (Gabriel), esteemed the Pindar of Italy, was born at Savona in 1552, and went to study at Rome. The Italian princes, and Urban VIII. gave him public marks of their esteem. He wrote a great number of poems; but his lyric verses are most admired. He died at Savona in 1638, aged 86.

CHIAN EARTH, in pharmacy, one of the medicinal earths of the ancients, the name of which is preferred in the catalogues of the materia medica, but of which nothing more than the name has been known for many ages in the shops.

It is a very dense and compact earth; and is sent hither in small flat pieces from the island of Chios, in which it is found in great plenty at this time. It stands recommended to us as an astringent. They tell us, it is the greatest of all cosmetics; and that it gives a whiteness and smoothness to the skin, and prevents wrinkles, beyond any of the other substances that have been celebrated for the same purposes.

CHIAOUS, a word in the original Turkish, signifying "envoys," are officers to the number of five or six hundred in the grand signior's court, under the command of a chaisoos bashi. They frequently meet in the grand vizir's palace, that they may be in readiness to execute his orders, and carry his dispatches into all the provinces of the empire. The chaisoos bashi assists the divan, and introduces those who have business there.

CHIAPA, a capital of a province of the same name in Mexico, situated about 300 miles east of Acapulco. W. Long. 98° 6'. N. Lat. 16° 30'.

CHIAPA DE LOS INDIOS, a large and rich town of North America, in Mexico, and in a province of the same name. The governor and most of the inhabitants are originally Americans. W. Long. 98° 35'. N. Lat. 16° 20'.

CHIAPAS, a town of Mexico, in a province of the same name, with a bishop's see. Its principal trade consists in chocolate-nuts, cotton, and sugar. W. Long. 98° 35'. N. Lat. 16° 20'.

CHIARA (Joseph), a celebrated Italian painter, was the disciple of Carlo Maratti; and adorned the churches and palaces of Rome with a great number of fine paintings. He died of an apoplexy in 1727, aged 73.

CHIARI, a town of Italy, in the province of Brescia, and territory of Venice, 7 miles west of Brescia, and 27 miles from Milan. Here the Imperialists gained a victory over the French in 1701. E. Long. 18° 18'. N. Lat. 45° 50'.

CHIARO-SCURO. See Claro-Obscur.

CHIAVENNA, a handsome, populous, and large town of Switzerland, in the country of the Grisons. It is a trading place, especially in wine and delicate fruits. The governor's palace and the churches are very magnificent, and the inhabitants are Roman Catholics. It is fleated near the lake Como. E. Long. 9° 29'. N. Lat. 46° 15'.

CHIAUSI, among the Turks, officers employed in executing the vizirs, bailawks, and other great men: the orders for doing this, the grand vizir sends them wrapped up in a black cloth; on the reception of which, they immediately perform their office.

CHICANE, or CHICANERY, in law, an abuse of judiciaty proceeding, tending to delay the cause, to puzzle the judge, or impose upon the parties.

CHICANE, in the schools, is applied to vain philosophies, distinctions, and subtleties, which protract disputes, and obscure the truth.

CHICHESTER, the capital city of the county of Sussex in England, was built by Ceila, the 2d king of the South Saxons, and by him called Cijian Caefter. It is surrounded with a wall, which has four gates, answering to the four cardinal points; from which run two streets, that cross one another in the middle and form a square, where the market is kept, and where there is a fine stone piazza built by bishop Read. The space between the west and south gates is taken up with the cathedral church and the bishop's palace. It has five parish-churches; and is seated on the little river Lavant, which washes it on all sides except the north. This city would have been in a much more flourishing condition if it had been built by the sea-side; however, the inhabitants have endeavored to supply this defect in some measure, by cutting a canal from the city down into the bay. The principal manufactures of the town are malt and needles. The market of Chichester is noted for fish, wheat, barley, malt, and oats; the finest lobster in England are bred in the Lavant; and it is observable, that this river, unlike most others, is very low in winter, but in summer often overflowing its banks. Chichester is a city and county of itself; it is governed by a mayor, recorder, aldermen, commoncouncil without limitation, and four justices of the peace chosen out of the aldermen; and it sends two members to parliament. It is a bishop's see. The cathedral church was anciently dedicated to St Peter. It was new built by Radulph, the twenty-fifth bishop; but being destroyed by fire, it was again built by Sessidius the twenty-ninth bishop. This see hath yielded to the church two sants, and to the nation three lord chancellors, two almoners, and one chancellor to the university of Oxford. Anciently the bishops of Chichester were confessors to the queens of England. This diocese contains the whole of the county of Sussex (excepting 22 parishes, peculiarities of the archbishop of Canterbury), wherein are 250 parishes, whereof 172 are appropriated. It hath two archdeaconesses, viz. of Chichester and Lewes: is valued in the king's books at L.677:1:5, and is computed to be worth annually L.2600. The tenth of the whole clergy is L.257:2:03. To the cathedral belong a bishop, a dean, two archdeaconesses, a treasurer, a chancellor, thirty-two prebendaries, a chanter, twelve vicars-coral, and other officers. W. Long. 50° N. Lat. 50° 50'.

CHICK, or CHICKEN, in zoology, denotes the young
young of the gallinaceous order of birds, especially the common hen. See \textit{Phasianus}.

\textit{Chick-wed}, in botany. See \textit{Alpine}.  
\textit{Chick-en-fox}. See (Index subjoined to) \textit{Medicine}.  
\textit{Chickling-pea}, in botany, a name given to the \textit{Lathyrus}.

\textit{Chicuítos}, a province of South America, in the government of Santo-Cruz de la Sierra. The chief riches consist of honey and wax; and the original inhabitants are very voluptuous, yet very warlike. They maintained bloody wars with the Spaniards till 1690; since which, some of them have become Christians. It is bounded by la Plata on the N. E. and by Chili on the W.

\textit{Chidley}, or \textit{Chimley}, a market-town of Devonshire, situated in W. Long. 4. 0. N. Lat. 51. 0.  
\textit{Chief}, a term signifying the head or principal part of a thing or person. Thus we say, the chief of a party, the chief of a family, &c. The word is formed of the French \textit{chef}, "head;" of the Greek \textit{kephalē}, "head;" though Menage derives it from the Italian \textit{capo}, formed of the Latin \textit{caput}.

\textit{Chief}, in heraldry, is that which takes up all the upper part of the escutcheon from side to side, and represents a man's head. In \textit{chief}, imports something borne in the chief part or top of the escutcheon.

\textit{Chief-tain}, denotes the captain or chief of any class, family, or body of men. Thus the chiefs or chieftains of the Highland clans, were the principal noblemen or gentlemen of their respective clans. See \textit{Clans}.

\textit{Chicles}, a strong town of Turkey in Europe, in the Morea. It was taken by the Venetians in 1685; but after that the Turks retook it, with all the Morea. E. Long. 22. 21. N. Lat. 26. 50.

\textit{Chigi} (Fabio), or Pope Alexander VII. was born at Siena in 1599. His family finding him a hopeful youth, sent him early to Rome, where he soon engaged in a friendship with the marquis Pallavicini, who recommended him so effectually to Pope Urban VIII. that he procured him the post of Inquisitor at Malta. He was sent vice-legate to Ferrara, and afterward nuncio into Germany; there he had an opportunity of displaying his intriguing genius; for he was mediator at Munster, in the long conference held to conclude a peace with Spain. Cardinal Mazarin had some resentment against Chigi, who was soon after made a cardinal and secretary of state by Innocent X. but his resentment was sacrificed to political views. In 1655, when a pope was to be chosen, Cardinal Sacchetti, Mazarin's great friend, finding it impossible for him to be raised into St Peter's chair because of the powerful opposition made by the Spanish faction, desired Cardinal Mazarin to content to Chigi's exaltation. His request was granted, and he was elected pope by the votes of all the 64 cardinals who were in the conclave: an unanimity of which there are but few instances in the election of popes. He showed uncommon humility at his election, and at first forbade all his relations to come to Rome without his leave; but he soon became more favourable to his nephews, and loaded them with favours. It is affirmed that he had once a mind to turn Protestant. The news-papers in Holland bestowed great encouragements upon him; and acquainted the world, that he did not approve of the cruel persecutions of the Wal-
Children. In the genealogical history of Tuscany, wrote by Gamarini, mention is made of a nobleman of Sienna, named Pichi, who of three wives had 150 children; and that, being sent ambassador to the pope and the emperor, he had 48 of his sons in his retinue. In a monument in the church yard of St. Innocent, at Paris, erected to a woman who died at 88 years of age, it is recorded, that she might have seen 288 children directly issued from her. This exceeds what Hakewell relates of Mrs Honeywood, a gentlewoman of Kent, in England born in the year 1527, and married at 16 to her only husband R. Honeywood, of Charing, Esq; and died in her 93d year. She had 16 children of her own body; of which three died young, and a fourth had no issue: yet her grandchildren, in the second generation, amounted to 114; in the third, to 228; though in the fourth, they fell to 9. The whole number the might have seen in her life-time, being 367. 

\[16 + 114 + 228 + 9 = 367\]

So that she could say the same as the ditto does of one of the Dalburg's family at Basil:

\[1 + 2 + 3 + 4 + 5 + 6\]

\[Ut moment, natce, plangere, filiolam.\]

Management of Children See Infant.

Overlaying of Children is a misfortune that frequently happens; to prevent which, the Florentines have contrived an instrument called arreceto. See Arrecesso.

Children are, in law, a man's issue begotten on his wife. As to illegitimate children, see Bastard.

For the legal duties of parents to their children, see the articles Parent and Bastard.

As to the duties of children to their parents, they arise from a principle of natural justice and retribution. For to those who gave us existence, we naturally owe subjection and obedience during our minority, and honour and reverence ever after: they who protected the weakness of our infancy, are entitled to our protection in the infirmity of their age; they who by sublimity and education have enabled their offspring to prosper, ought, in return, to be supported by that offspring, in case they find in need of assistance. Upon this principle proceed all the duties of children to their parents, which are enjoined by positive laws. And the Athenian laws carried this principle into practice with a scrupulous kind of nicety: obliging all children to provide for their father when fallen into poverty; with an exception to spurious children, to whose whole chastity had been prostituted with consent of their father, and to whom he had not put in any way of gaining a livelihood. The legislature, says baron Montesquieu, considered, that, in the first case, the father, being uncertain, had rendered the natural obligation precarious; that in the second case, he had fulfilled the life he had given, and done his children the greatest of injuries, in depriving them of their provision; and that, in the third case, he had rendered their life (so far as in him lay) an insupportable burden, by furnishing them with no means of subsistence.

Our laws agree with those of Athens, with regard to the first only of these particulars, the cafe of spurious issue. In the other cases, the law does not hold the tie of nature to be dissolved by any misbehavior of the parent; and therefore a child is equally justifiable in defending the person, or maintaining the cause of the father, as of a bad parent; and is equally compulsable, if of sufficient ability, to maintain and provide for a wicked and unnatural progenitor, as for one who has shown the greatest tenderness and paternal piety. See further the article Filial Affection.

CHILI, a province of South America, bounded by Peru on the north, by the province of La Plata on the east, by Patagonia on the south, and by the Pacific ocean on the west, lying between 75 and 85 degrees of west longitude, and between 25 and 45 degrees of south latitude; though some comprehend in this province Patagonia and Terra del Fuego.

The first attempt of the Spaniards upon this country was made by Almagro in the year 1535, after he and Pizarro had completed the conquest of Peru. He set out on his expedition to Chili with a considerable body of Spaniards and auxiliary Indians. For 200 leagues he was well accommodated with every necessity by the Indians, who had been subjects of the emperors of Peru: but reaching the barren country of Charcas, his troops became discontented through the hardships they suffered; which determined Almagro to climb the mountains called Cordilleras, in order to get the fonder into Chili; being ignorant of the invaluable mines of Potosi, contained in the province of Charcas where he then was. At that time the Cordilleras were covered with snow, the depth of which obliged him to dig his way through it. The cold made such an impression on his naked Indians, that it is computed no less than 10,000 of them perished on these dreadful mountains, 150 of the Spaniards sharing the same fate; while many of the survivors lost their fingers and toes through the excess of cold. At last, after encountering incredible difficulties, Almagro reached a fine, temperate, and fertile plain on the opposite side of the Cordilleras, where he was received with the greatest kindness by the natives. These poor savages, taking the Spaniards for deputies of their god Viracocha, immediately collected for them an offering of gold and silver worth 200,000 ducats: and soon after brought a present to Almagro worth 300,000 more. Their offerings only determined him to conquer the whole country as soon as possible. The Indians among whom he now was, had acknowledged the authority of the Peruvian incaes, or emperors, and consequently gave Almagro no trouble. He therefore marched immediately against those who had never been conquered by the Peruvians, and inhabited the southern parts of Chili. These savages fought with great resolution, and disputed every inch of ground: but in five months time the Spaniards had made such progress, that they must infallibly have reduced the whole province in a very little time, had not Almagro returned to Peru, in consequence of a commission sent him from Spain.

In 1540, Pizarro having overcome and put Almagro to death, sent into Chili, Baldio, or Valdivia, who had learned the rudiments of war in Italy, and was reckoned one of the best officers in the Spanish service. As he penetrated southwards, however, he met with much opposition; the confederated caciques frequently gave him battle, and displayed great con-
rage and resolution; but could not prevent him from penetrating to the valley of Maipocho, which he found incredibly fertile and populous. Here he found the city of St Jago; and finding gold mines in the neighbourhood, forced the Indians to work in them; at the same time building a castle for the safety and protection of his new colony. The natives, exasperated at this slavery, immediately took arms; attacked the fort; and, though defeated and repulsed, set fire to the outworks, which contained all the provisions of the Spaniards. Nor were they discouraged by this and many other defeats, but still continued to carry on the war with vigour. At last, Valdivia, having overcome them in many battles, forced the inhabitants of the vale to submit; upon which he immediately set them to work in the mines of Quilotta. This indignity offered to their countrymen redoubled the fury of those who remained at liberty. Their utmost efforts, however, were as yet unable to stop Valdivia's progress. Having crossed the large rivers Maullie and Hata, he traversed a vast tract of country, and founded the city of La Concepcion on the South-sea-coast. He erected fortresses in several parts of the country, in order to keep the natives in awe; and built the city called Imperial, about 40 leagues to the southward of Concepcion.

The Spanish writers say that the neighbouring valley contained 80,000 inhabitants of a peaceable disposition; and who were even so tame as to suffer Valdivia to parcel out their lands among his followers, while they themselves remained in a state of inactivity. About 16 leagues to the eastward of Imperial, the Spanish general laid the foundations of the city Villa Rica, so called on account of the rich gold mines he found there. But his ambition and avarice had now involved him in difficulties from which he could never be extricated: He had extended his conquests beyond what his strength was capable of maintaining. The Chileans were still as fierce as ever of recovering their liberties. The horses, fire-arms, and armour of the Spaniards, indeed, appeared dreadful to them; but thoughts of endless slavery were still more so. In the course of the war they had discovered that the Spaniards were vulnerable and mortal men like themselves; they hoped, therefore, by dint of their superiority in numbers, to be able to expel the tyrannical usurpers. All these nations joined in this resolution, the Spaniards had certainly been exterminated; but some of them were of a pacific and fearful disposition, while others considered servitude as the greatest of all possible calamities. Of this last opinion were the Araccans, the most intrepid people in Chili, and who had given Valdivia the greatest trouble. They all rofe to a man, and chose Capañican, a renowned hero among them, for their leader. Valdivia, however, received notice of their revolt sooner than they intended he should, and returned with all expedition to the vale of Aracca; but before he arrived, 14,000 of the Chileans were there assembled under the conduct of Capañican. He attacked them with his cavalry, and forced them to retreat into the woods; but could not obtain a complete victory, as they kept continually falling out and harrying his men. At last Capañican, having observed that fighting with such a number of undisciplined troops only served to contribute to the defeat and confusion of the whole, divided his forces into bodies of 1000 each. Thefe he directed to attack the enemy by turns; and, though he did not expect that a single thousand would put them to flight, he directed them to make as long a stand as they could; when they were to be relieved and supported by another body; and thus the Spaniards would be at last wearied out and overcome. The event fully answered his expectations. The Chileans maintained a fight for seven or eight hours, until the Spaniards, growing faint for want of refreshment, retired precipitately. Valdivia ordered them to police a pafs at some distance from the field, to stop the pursuit; but this design being discovered to the Chileans by the treachery of his page, who was a native of that country, the Spaniards were surrounded on all sides, and cut in pieces by the Indians. The general was taken and put to death; some say with the tortures usually inflicted by thole savages on their prisoners; others, that he had melted gold poured down his throat; but all agree, that the Indians made flutes and other instruments of his bones, and preferred his skull as a monument of their victory, which they celebrated by an annual festival. After this victory the Chileans had another engagement with their enemies; in which also they proved victorious, defeating the Spaniards with the loss of near 3000 men; and upon this they bent their whole force against the colonies. The city of Concepcion, being abandoned by the Spaniards, was taken and destroyed: but the Indians were forced to raise the siege of Imperial; and their progres was at last stopped by Garcia de Mendoza, who defeated Capañican, took him prisoner, and put him to death. No defeat, however, could dierip the Chileans. They continued the war for 50 years; and to this day they remain unconquered, and give the Spaniards more trouble than any other American nation. Their most irreconcilable enemies are the inhabitants or Aracceans and Tucapel, those to the south of the river Bobio, or whose country extends towards the Cordilleras —

The manners of these people greatly resemble those of North America, which we have already desribed under the article America; but seem to have a more warlike disposition. It is a constant rule with the Chileans never to sue for peace. The Spaniards are obliged not only to ask the first combatants, but to purchase it by presents. They have at last been obliged to abandon all thoughts of extending their conquests, and reduced to cover their frontiers by erecting forts at proper distances.

The Spanish colonies in Chili are dispersed on the borders of the South-sea. They are parted from Peru by a defart 80 leagues in breadth; and bounded by the island of Chiloe, at the extremity next the straits of Magellan. There are no settlements on the coasts except that of Baldavia, Concepcion Island, Valparaiso, and Coquimbo or La Serena, which are all sea-ports. In the inland country is St Jago, the capital of the colony. There is no culture nor habitation at any distance from these towns. The buildings in the whole province are low, made of unburnt brick, and modestly thatched. This practice is observed on account of the frequent earthquakes; and is properly adapted to the nature of the climate, as well as the indolence of the inhabitants.

The climate of Chili is one of the most wholesome
in the whole world. The vicinity of the Cordilleras
may be resolved into as many triangles as it has sides. Chiliarcha
The author of l'Art de Venerer, p. 44, has brought this
instance to show the distinction between imagination
and conceiving.

CHILIACHRA, or CHILIARCHUS, an officer in
the armies of the ancients, who had the command of
the fleet. May 1st.

CHILIARCHUS, in church-history. See MILLENA-
Rians.

CHILLINGWORTH (William), an eminent di-
vine of the church of England, was born at Oxford
in 1602, and bred there. He made early great pro-
minence in his studies, being of a very quick genius.
He was an expert mathematician, as well as an able
divine, and a very good poet. Study and conver-
sation at the university turning upon the controver-
sy between the church of England and that of Rome,
on account of the king's marriage with Henrietta daugh-
ter to Henry IV. king of France, Mr Chillingworth
forsook the church of England, and embraced the
Roman religion. Dr Laud, then bishop of London,
hearing of this, and being greatly concerned at it,
wrote Mr Chillingworth; who expressing a great deal
of candour and impartiality, that prelate continued to
correspond with him. This set Mr Chillingworth on
a new inquiry; and at last determined him to return
to his former religion. In 1634 he wrote a confu-
sation of the arguments which had induced him to go
over to the church of Rome. He spoke freely to his
friends of all the difficulties that occurred to him;
which gave occasion to a groundless report, that he
had turned Papist a second time, and then Protestant
again. His return to the communion of the church
of England made a great noise, and engaged him in
several disputes with those of the Roman persuasion.
But in 1635 he engaged in a work which gave him
a far greater opportunity to confute the principles of
the church of Rome, and to vindicate the Protestant
religion, under the title of 'The Religion of Protes-
tants a safe way to Salvation.' Sir Thomas Covent-
ry, lord keeper of the great seal, offering him pre-
ferment, Mr Chillingworth refused to accept it on ac-
count of his scruples with regard to the subscription
of the 39 articles. However, he at last surmounted these
scruples; and being promoted to the chancellorship
of the church of Sarum, with the prebend of Brix-
worth in Northamptonshire annexed to it, he there
remained with the usual subscription. Mr Chillingworth
was zealously attached to the royal party; and, in
August 1643, was present in king Charles I.'s army
at the siege of Gloucester, where he advised and di-
rected the making certain engines for assaulting the
town. Soon after, having accompanied the Lord
Hopton, general of the king's forces in the west, to
Arundel castle in Sussex, he was there taken prisoner
by the parliamentary forces under the command of Sir
William Waller, who obliged the castle to surrender.
But his ill health increasing, he obtained leave to be
conveyed to Chichester, where he was lodged at the bish-
op's palace; and, after a short illness, died in 1644.
He hath left several excellent works behind him.

CHILMINAR. See PERSERPOLIS.

CHILO, one of the seven sages of Greece, and
of the ephori of Sparta the place of his birth, flourished
about 556 years before Christ. He was accustomed
Chiloé, an island lying near the coast of Chili, in South America, under the 43rd degree of south latitude. It is the chief of an archipelago of 40 islands, and its principal town is Cañete. It rains here almost all the year, in some places covering the earth with snow, which has rendered it of late years fruitful, was covered with snow, and rendered it habitable.

CHIL TENHAM, a town in Gloucestershire, England, situated at the entrance of the Vale of the Chiltern Hundreds. The air on these heights is extremely salutary, and is deemed excellent in scurvy complaints.

CHILTERN, a chain of chalky hills forming the southern part of Buckinghamshire, England, the northern part of the county being distinguished by the name of the Vale. The air on these heights is extremely healthful: The soil, though stony, produces good crops of wheat and barley; and in many places it is covered with thick woods, among which are great quantities of beach. Chiltern is also applied to the hilly parts of Berkshire, and it is believed has the same meaning in some other counties. Hence the Hundreds lying in those parts are called the Chiltern Hundreds.

Chiltern Hundreds (Stewards of.) Of the Hundreds into which many of the English counties were divided by King Alfred, for the better government, the jurisdiction was originally vested in peculiar courts, but came afterwards to be devolved to the county courts; and so remains at present, excepting with regard to some, as the exchequer, which have been by privilege annexed to the crown.

Chimaera, a port-town of Turkey in Europe, situated at the entrance of the gulf of Venice, in the province of Epirus, about 32 miles north of the city Corfu, near which are the mountains of Chimaera, which divide Epirus from Thessaly. E. Long. 20. 40. N. Lat. 40. 40.

Chimera, a fabulous history, a celebrated monster, springing from Echidna and Typhon. It had three heads; one of a lion, and a goat, and a dragon; and continually vomited flames. The foreparts of its body were those of a lion, the middle was that of a goat, and the hinder parts were those of a dragon. It generally lived in Lydia, about the reign of Jobates, by whose orders Belerophon mounted on the horse Pegasus, overcame it. This fabulous tradition is explained by the recollection that there was a burning mountain in Lydia, whose top was the rest of lions on account of its desert wilderness; the middle, which was fruitful, was covered with goats; and at the bottom the marshy ground abounded with serpents. Belerophon is said to have conquered the Chimæra, because he destroyed the wild beasts on that mountain, and rendered it habitable. Plutarch says that it was the captain of some pirates who adorned their ship with the images of a lion, a goat, and a dragon.

By a chimæra, among the philosophers, is understood a mere creature of the imagination, composed of such contradictions and absurdities as cannot possibly any where exist but in thought.

Chimes of a Clock, a kind of periodical music, produced at equal intervals of time, by means of a particular apparatus added to a clock.

In order to calculate numbers for the chimes, and adapt the chime-barrel, it must be observed, that the barrel must turn round in the same time as the tune; it is to play requires in finging. As for the chime-barrel, it may be made up of certain bars that run athwart it, with a convenient number of holes punched in them to put in the pins that are to draw each hammer: and these pins, in order, to play the time of the tune rightly, must stand upright, or hang down from the bar, some more, some less. To place the pins rightly, you may proceed by the way of changes on bells, viz. 1. 2. 3. 4; or rather make use of the musical notes. Observe what is the compass of your tune, and divide the barrel accordingly from end to end. Thus, in the examples on Plate CXXXVII. each of the tunes is eight notes in compass; and accordingly the barrel is divided into eight parts. These divisions are struck round the barrel; opposite to which are the hammer-tails.

We speak here as if there were only one hammer to each bell, that it may be more clearly apprehended; but when two notes of the same sound come together in a tune, there must be two hammers to the bell to strike it: so that if in all the tunes you intend to chime of eight notes compass, there should happen to be such double notes on every bell, instead of eight you must have sixteen hammers; and accordingly you must divide the barrel, and strike sixteen strokes round it, opposite to each hammer-tail: then you are to divide it round about into as many divisions as there are musical bars, semibreves, minims, &c. in the tune.

Thus the hundredth-palm tune has 20 semibreves, and each division of it is a semibreve: the first note of it also is a semibreve; and, therefore, on the chime-barrel must be a whole division, from five to five, as your may understand plainly, if you conceive the surface of a chime-barrel to be represented by the above figures, as if the cylindrical superficies of the barrel were stretched out at length, or extended on a plane: and then such a table, so divided, if it were to be wrapped round the barrel, would show the places where all the pins are to stand in the barrel; for the dots running about the table are the places of the pins that play the tune.

Indeed, if the chimes are to be complete, you ought to have a set of bells to the gamut notes; so as that each bell having the true sound of fol, la, mi, fa, you may play any tune with its flats and sharps: nay, you may by this means play both the bass and treble with one barrel: and by setting the names of your bells at the
Chimney

the head of any tune, that tune may easily be transferred to the chime-barrel, without any skill in music; but it must be observed, that each line in the music is three notes distant; that is, there is a note between each line, as well as upon it.

CHIMNEY, in architecture, a particular part of a house, where the fire is made, having a tube or tunnel to carry off the smoke. The word chimney comes from the French cheminée, and that from the Latin camina, a chamber wherein is a chimney; "caminata, again, comes from caminius; and that from the Greek σιματος, "a chimney," if σαυρ, are "I burn."

Chimneys are usually supposed a modern invention; but in Italy, and that of Appian, who says, "That of those persons prostrated by the triumvirate, some hid themselves in wells and common ewers, and some on the tops of houses and chimneys;" for he understands "Camnas urbicums, simaria sub teglo posta." Add, that Aristophanes, in one of his comedies, introduces the tops of houses and chimneys; together with the obscurity of the rules of Vitruvius on this head, make us rather conclude the use of chimneys, because of the ancient houses, where the chimneys had entire apartments, induced them to neglect this part of building which the coldness of our climates obliges us to have a principal regard to.

Method of Building CHIMNEYS that will not smoke. Workmen have different methods of drawing up the funnels of chimneys, generally according to their own fancies and judgments, and sometimes according to the customs of places. They are seldom directed by found and rational principles. It will be found for the most part, that the smoking of chimneys is owing to their being carried up narrower near the top than below, or zig-zag, all in angles; in some cases, indeed, it is owing to accidental causes, but for the most part, to those above mentioned. Where they are carried up in pyramid or tapering form, especially if the house be of a considerable height, it is ten to one but they sometimes smoke. The air in the rooms, being rarified, is forced into the funnel of the chimney, and receives from the fire an additional force to carry up the smoke. Now, it is evident, that the further up the smoke flies, the less is the force that drives it, the flower it must move, and consequently the more room in proportion it should have to move in; whereas in the usual way it has less, by the sides of the chimney being gathered closer and closer together.

The method here proposed of carrying up chimneys will be objected to by some thus: The wider a chimney is at the top, the more air the smoke puff out below. This method has proved effectual after all others had failed; and that in a house placed in the worst situation possible, namely, under a high mountain to the southward, from which strong blaits blow down upon it. A vent was carried up without angles, as perpendicular as possible; and was made about three or four inches wider at top than at the bottom: the funnel was gathered in a throat directly above the fire-place, and so widening upwards. Since that time the house has not only ceased to smoke, but when the doors stand open, the draught is so strong that it will carry a piece of paper out at the chimney-head. See more on this subject under the article SMOKE.

CHIMNE-Y-Money, otherwise called Hearth-money, a duty in England on houses. By Stat. 14. Char. II. cap. 2. every fire-hearth, and floor of every dwelling or other house, within England and Wales (except such as pay not to church and poor), was chargeable with 2 s. per annum, payable at Michaelmas and Lady-day to the king and his heirs and successors &c.; which payment was commonly called chimney-money. This tax, being more complained of as burdenome to the people, has been since taken off, and others imposed in its stead; among which that on windows has by some been esteemed almost equally grievous.

CHIMPANZEE, in natural history. See SIMIA.

CHINA, a country of Asia, situated on the most easterly part of that continent. It is bounded on the north by Tartary; from which it is divided, partly by a prodigious wall of 1500 miles in length, and partly by high, croppay, and inaccessible mountains. On the east, it is bounded by the ocean; on the west, by part of the Mogul's empire, and India beyond the Ganges, from which it is parted by other ridges of high mountains and sandy deserts. On the south, it is bounded partly by the kingdoms of Lao, Tonquin, Ava, and Cochín-China, and partly by the southern or Indian sea, which flows between it and the Philippine Islands. There are several ways of computing its length and breadth. According to some of these, it is reckoned 1268, 1600, or 1800 miles in length, and as much in breadth; however, by the best and latest accounts, this vast country is somewhat of an oval form, the breadth being less than the length by little more than a fourth-part. It contains 15 provinces, exclusive of that of Lyam-tong, which is situated without the provisions of the great wall, though under the same dominion. Their names are, 1. Shen-fi; 2. Shan-fi; 3. Pechehi; which are situated on the north side, along the wall. 4. Shan-tong; 5. Kyan-nang; 6. Che-Kyang; 7. Foo-keyn; which are situated along the eastern ocean. 8. Quang-tong; 9. Quang-fii; 10. Yu-nan; 11. Se-chin; which stretch themselves towards the south and south-west. And, 12. Ho-nan; 13. Hu-quand; 14. Quey-chew; 15 Kyang-fii; which take up the middle part. For a particular description of all these, see their proper articles.

The origin of all nations is involved in obscurity and fable; but that of the Chinese is much more so than any other. Every nation is inclined to assume to itself an antiquity to itself, but the Chinese carry theirs beyond all bounds. Indeed, though no people on earth are more exact in keeping records of every memorable
morable transaction, yet such is the genius of the Chinefe for superflition and table, that the first part of their history is utterly concealed by every rational person. What contributes more to the uncertainty of the Chinefe history is, that neither we, nor they themselves, have anything but fragments of their ancient historical books; for about 213 years before Christ, the reigning emperor of Si-wang-ti caused all the books in the empire to be burned, except those written by layyers and physicians. Nay, the more effectually to destroy the memory of every thing contained in them, he commanded a great number of learned men to be buried alive, from their memories, they should commit to writing something of the true memoirs of the empire. The inaccuracy of the Chinefe annals is complained of even by their most respected author, Confucius himself; who also affirms, that before his time, many of the oldest materials for writing such annals had been destroyed.

According to the Chinefe histories, the first monarch of the whole universe (that is, of China), was called Puon-ku, or Puon-kuwa. This, according to some, was the first man; but according to Baycr and Menzelius, two of the greatest critics in Chinefe literature, that have hitherto appeared, the word signifies the highest antiquity. Puon-ku was succeeded by Tien-hoang, which signifies the emperor of heaven. They call him also the intelligent heaven, the supreme king of the middle heaven, &c. According to some of their historians, he was the inventor of letters, and of the Cylic characters by which they determine the place of the year, &c. Tien-hoang was succeeded by Ti-hoang (the emperor of the earth), who divided the day and night, appointing 30 days to make one moon, and fixed the winter solstice to the 21th moon. Ti-hoang was succeeded by Gine-hoang (sovereign of men), who with his nine brothers shared the government among them. They built cities, and surrounded them with walls; made a distinction between the sove reign and subjests; instituted marriage, &c.

The reigns of these four emperors make up one of what the Chinefe called $ki$, "ages," or "periods," of which there were nine before Fo-hi, whom their most sensible people acknowledge as the founder of their empire.

The history of the second $ki$ contradicts almost every thing said of the first; for though we have but just now been told that Gine-hoang and his brethren built cities surrounded with walls; yet, in the succeeding age, the people dwelt in caves, or perched upon trees as it were in nests. Of the third $ki$ we hear nothing; and in the fourth, it seems matters had been still worse, as we are told that men were then only taught to retire into the hollows of rocks. Of the fifth and sixth we have no account. These six periods, according to some writers, contained 90,000 years; according to others, 1,100,730.

In the seventh and eighth $ki$, they tell us over again what they had said of the first; namely, that men began to leave their caves and dwell in houses, and were taught to prepare clothes, &c. Chine-fang, the first monarch of the eighth $ki$, taught his subjects to take off the hair from skins with rollers of wood, and cover themselves with the skins so prepared. He taught them also to make a kind of web of their hair, to serve as a covering to their heads against rain. They obeyed his orders with joy, and he called his subjects people dressed with skins.

His reign lasted 350 years; that of one of his successors, also, named Tien-soo-chih, lasted more than 300; and his family continued for 12 or 18,000 years. But what is most surprising, all these thousands and millions of years had elapsed without mankind's having any knowledge of fire. This was not discovered till towards the close of this period, by one Sougine. After so useful a discovery, he taught the people to dress their viscous; whereas before, they had devoured the flesh of animals quite raw, drank their blood, and swallowed even hair and feathers. He is also said to have been the inventor of fishing, letters, &c.

In the ninth period we find the invention, or at least the origin of letters, attributed to one Tien-hie, who received them from a divine tortoise that carried them on his shell, and delivered them into the hands of Tfan-hie. During this period also, music, money, carriages, merchandise, and commerce, &c were invented. There are various calculations of the length of these $ki$ or periods. Some make the time from Puon-ku to Confucius, who flourished about 479 years before Christ, to contain 279,000 years; others, 2,275,000; some, 2,735,860; others, 3,276,000; and some no less than 96,601,740 years.

These extravagant accounts are by some thought Fabulous to contain obscure and imperfect hints concerning the history ecomomony and creation of the world, &c. Puon-ku, plaines, the first emperor, they think, represents eternity preceding the duration of the world. The succeeding ones, Tien-hoang, Ti-hoang, and Gine-hoang, they imagine, signify the creation of the heavens and earth, and the formation of man. The ten $ki$, or ages, nine of which preceded Fo-hi, mean the ten generations preceding Noah. This may very possibly be the case; for about 300 years before Christ, some Jews travelled into China, who might have made the Mosaic writings known there.

What we have now related, contains the substance of that part of the Chinefe history which is entirely fabulous. After the nine $ki$, or "ages" already taken notice of, the tenth commenced with Fo-hi; and the history, though still very dark, becomes more and more confused and intelligible. Fo-hi was born in the province of Shen-ho.

Reign of His mother walking upon the banks of a lake in that Fo-hi, province, saw a very large print of a man's foot in the sand there; and, being surrounded by an iris or rainbow, became impregnated. The child was named Fo-hi; and, when he grew up, was by his countrymen elected king on account of his superior merit, and styled Yen-iff, that is "the fon of heaven." Fo invented the eight gna, or symbols, confining of three lines each, which, differently combined, formed 64 characters that were made use of to express every thing. To give thes the greater credit, he pretended that he had seen them inscribed on the back of a dragon and a bird. He gave to the form of a dragon, which arose from the bottom of a lake. Having gained great reputation among his countrymen by this prodigy, he is said to have created
Hence we may assign a reason why the emperors of
China always carry a dragon in their banners. He also
inaugurated marriage, invented music, &c. Having es-
tablished a prime minister, he divided the government
of his dominions among four mandarins, and died af-
after a reign of 115 years.

After Fo-hi followed a succession of emperors, of
whom nothing remarkable is recorded, except that in
the reign of Taou, the seventh after Fo-hi, the fun did
not set for ten days, so that the Chinese were afraid of
a general conflagration. This event the compilers of
China supposed to be the fame with that mentioned in
the book of Joshua, when the sun and moon stood still
for about the space of a day. Fo-hi, they
will have to be the same with Noah. They imagine,
that after the deluge, this patriarch remained some time
with his descendants; but on their wicked combina-
tion to build the tower of Babel, he separated himself
from them with as many as he could persuade to go
along with him; and that, still travelling eastward,
he at last entered the fertile country of China, and
laid the foundation of that vast empire—But, leav-
ing these fabulous and conjectured times, we shall pro-
cceed to give some account of that part of the Chinese
history, which may be more certainly depended on.

As the Chinese, contrary to the practice of al-
most all nations, have never sought to conquer other
countries, but rather to improve and content
themselves with their own, their history for many ages
furnishes nothing remarkable. The whole of their
emperors, abstracting from those who are said to have
reigned in the fabulous times, are comprehend-
ed in 22 dynasties, mentioned in the following table.

<table>
<thead>
<tr>
<th>Dynasty</th>
<th>Emperors</th>
<th>Before Christ</th>
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<tbody>
<tr>
<td>1. Hya, containing</td>
<td>16</td>
<td>2207</td>
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<tr>
<td>2. Shang, or Ling</td>
<td>28</td>
<td>1756</td>
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<td>3. Chou</td>
<td>35</td>
<td>1122</td>
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<td>4. Tî,</td>
<td>4</td>
<td>248</td>
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<td>5. Han</td>
<td>25</td>
<td>206</td>
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<tr>
<td>After Christ</td>
<td></td>
<td></td>
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<tr>
<td>6. Hew-han</td>
<td>2</td>
<td>220</td>
</tr>
<tr>
<td>7. Tîn</td>
<td>15</td>
<td>455</td>
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<td>8. Song</td>
<td>8</td>
<td>220</td>
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<td>9. Tî</td>
<td>5</td>
<td>479</td>
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<td>10. Lyang</td>
<td>4</td>
<td>502</td>
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<td>11. Chin</td>
<td>4</td>
<td>543</td>
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<td>12. Sui</td>
<td>3</td>
<td>157</td>
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<td>13. Tawand</td>
<td>20</td>
<td>618</td>
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<td>14. Hew-iyang</td>
<td>2</td>
<td>907</td>
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<td>15. Hew-tang</td>
<td>4</td>
<td>903</td>
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<td>16. Hew-fen</td>
<td>2</td>
<td>936</td>
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<td>17. Hew-han</td>
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<td>947</td>
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<td>18. Hew-chew</td>
<td>2</td>
<td>951</td>
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<td>19. Song</td>
<td>18</td>
<td>968</td>
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<td>20. Wang</td>
<td>9</td>
<td>1380</td>
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<tr>
<td>21. Ming</td>
<td>16</td>
<td>1368</td>
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<tr>
<td>22. Tîng</td>
<td>16</td>
<td>1645</td>
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</tbody>
</table>

This table is formed according to the account of
the Jesuit Du Halde, and is commonly reckoned to be
the most authentic; but according to the abovemention-
ed hypothesis of the compilers of the Universal
History, who make Taou contemporary with Joshua, the
dynasty of Hya did not commence till the year before
Christ 1057; and to accommodate the history to their
hypothesis, great alterations must be made in the dura-
tion of the dynasties.

The most interesting particulars of the Chinese hi-

tory relate only to the incursions of the Tartars, who
at last conquered the whole empire, and who still con-

tinue to hold the sovereignty; though by transferring
the seat of the empire to Peking, and adopting the
Chinese language, manners, &c. Tartary would
seem rather to have been conquered by China, than
China by Tartary. These incursions are said to have
taken place very early; even in the time of the emperor
Shun, successor to Taou abovementioned, in whose
reign the miraculous salsifics happened. At this
time, the Tartars were repulsed, and obliged to re-
tire into their own territories. From time to time,
however, they continued to threaten the empire with
invasions, and the northern provinces were often ac-
tually ravaged by the Tartars in the neighbourhood.

About the year before Christ 213, Shi-whang-ti ha-

d the Chinese empire, and is commonly reckoned to be
the first Chinese emperor that ever sat on the throne.

For this purpose, he ordered all the histori-

cal writings to be burnt, and caused many of the
learned to be put to death, as already men-
tioned. What effect the great wall had in pre-
venting the invasions of the Tartars, we are not
told; but in the tenth century of the Christian era,
the chief of Kiton or Lyau got a footing in China. The
Kitan Tartars were a people of eastern Tartary, who dwelt on the
north and north-east of the province of Pecheli in
China, particularly in that of Layu-tong lying without
the great wall. These people having subjugated the
country between Korea and Kafgar, became much
more troublesome to the Chinese than all the other
Tartars. Their empire commenced about the year
915, in the fourth year of Mo-ti-kyan-tî, second empe-
or of the 14th Chinese dynasty called Hew-iyang. In
946, Mingt-fong, second emperor of the 15th dyna-
sty, being dead, Sheking-tang, his son-in-law, rebelled
against Mingt-fong, his son and successor, whom he de-
prived of his crown and life. This he accomplished
by means of an army of 50,000 men furnished by the
Kitan. Fi-tî, the son of Mingt-Song, being unable to
reclaim the usurper, fled to the city of Ghey-chew; where
shutting himself up with his family and all his valuable
effects, he set fire to the palace, and was burnt to
ashes. On his death, Sheking-tang assumed the title
of emperor; founded the 16th dynasty; and changed his name to that of Kant-fu. But the Kitan general
refusing to acknowledge him, he was obliged to pur-

chase
In 959, they broke the treaty when the traitor became emperor of all China, and, changing his name to Kau-tfu, founded the 17th dynasty. The Tartars, in the meantime, ravaged all the northern provinces without opposition, and then marched into the southern. But being here stopped by some bodies of Chinese troops, the general thought proper to retire with his booty into Tartary. In 962, Kaut-fu, dying, was succeeded by his son In-ti. The youth of this prince gave an opportunity to the eunuchs to raise commotions; especially as to lay siege to a city in the province of Pecheli, besides a yearly present of 300,000 pieces of silk.

This submission served only to inflame the avarice and ambition of the Kitan. In 959, they broke the treaty when least expected, and invaded the empire. Ting-vang, the emperor at that time, opposed them with a formidable army; but through the treachery of his general Lyew-chi-ywen, the Tartars were allowed to take him prisoner. On this, Ting-vang was glad to recover his liberty by accepting of a small tribute. But through the generosity of his general Lyew-chi-ywen, the Tartars were ready to the eunuchs to raise commotions; especially as to lay siege to a city in the province of Pecheli, besides a yearly present of 300,000 pieces of silk.

From this time the Kitan remained in peaceable Kitan dominions till the year 1117, when they invaded the emperor by his grandson, who, being able neither to bear their ravages, nor by himself to put a stop to them, resolved upon a remedy which at last proved worse than the disease. This was to call in the Sung, Nyu-che, or Eastern Tartars, to destroy the kingdom of the Kitan. From this he was dissuaded by the king of Korea, and most of his own ministers; but, disregarding their falutary advice, he joined his forces to those of the Sung. The Kitan were then everywhere defeated; and at last reduced to such extremity, that those who remained were forced to leave their country, and fly to the mountains of the west.

Thus the empire of the Kitan was totally destroyed. Who after nothing to the advantage of the Chinese; for the name of Kim, and invade China. Then began to think of aggrandizing himself and enlarging his empire. For this purpose, he immediately broke the treaties concluded with the Chinese emperor; and invading the provinces of Pecheli and Shen-fi, made himself master of the greater part of them. Whey-tsong, finding himself in danger of losing his dominions, made several advantageous proposals to the Tartar; who, seeming to comply with them, invited him to come and settle matters by a personal conference. The Chinese monarch complied; but, on his return, the terms agreed on seemed intolerable to his ministers; so that they told him the treaty could not be fulfilled, and that the most cruel war was preferable to such an ignominious peace. The Kim monarch, being informed of all that passed, had recourse to arms, and took several cities. Wheytong was weak enough to go in person to hold a second conference; but, on his arrival, was immediately feized by the Tartar. He was kept prisoner until they took a strong guard during the remaining part of his life, and ended his days in 1126, in the defeat of his son, Shamo, having nominated his eldest son Kin-tsong to succeed him.

In 1125 began his reign with putting to death six ministers of state, who had betrayed his father into the hands of the Kim Tartars. The barbarians in the mean time pursued their conquests without opposition. They crossed the Wang-ho, or Yellow River, which a handful of troops might have prevented; and marching directly towards the imperial city, took and plundered it. Then feizing the emperor and his consort, they carried them away captives; but many of their emperors, the principal lords, and several of the minions, preferred to ring death to such an ignominious bondage; killed themselves. The Kin being informed of the empress Meng that she had been divorced, she left her behind. This proved the means of saving the empire: for
China.

for her wisdom and prudence she got the crown placed on the head of Kaut-tong, ninth son of the emperor Wchy-tong; by his divorced empress. Kaut-tong fixed his court at Nanking the capital of Kyang-nan; but soon after was obliged to remove it to Kang-chew in Che-chiang. He made several efforts to recover some of his provinces from the kin, but without effect. He fixed the kin monarch, in the mean time, endeavored to gain the affection of his Chinese-subjects by paying a regard to their learning and learned men, and honouring the memory of Confucius. Some time after, he advanced to Nanking, from whence Kaut-tong had retired, and took it; but, receiving advice that Yol, general of the Song, or Southern Chins, was preparing by long marches to the relief of that city, they left fire to the palace, and retired northward. However, Yol arrived time enough to fall upon their rear-guard, which saddled very much; and from this time the kin never dared to cross the river Kyang. In a few years afterwards the Chinesse emperor submitted to become tributary to the Kin, and concluded a peace with them upon very honourable terms. This submission, however, was of short duration; for, in 1162, the Tartars broke the peace; and, invading the southern province with a formidable army, took the city of Yang-chew. The king, having approached the river Kyang, near its mouth, where it is widest as well as most rapid, commanded his troops to cross it, threatening with his drawn sword to kill those who refused. On receiving such an unreasonable command, the whole army mutinied; and the king being killed in the beginning of the tumult, the army immediately retired.

17 Progrcefs the Kin checked.

From this time to the year 1210, nothing remarkable occurs in the Chinesse history; but this year, Jenghiz-khan, chief of the western Tartars, Moguls, or Mongols, quarrelling with Yol-khan emperor of the Kin; and at the same time the king of Hya, disgraced at being refuse of affiance against Jenghiz-khan, threatened him with an invasion on the west side. Yong-shi prepared for his defence; but in 1211, receiving news that Jenghiz-khan was advancing southward with his whole army, he was seized with fear, and made proposals of peace, which were rejected. In 1212, the Mogul generals forced the great wall; or, according to some writers, had one of the gates treacherously opened to them, to the north of Shanti; and made incursions as far as Peking the capital of the Kin empire. At the same time the province of Lyao-tong was almost totally reduced by several Kitan lords who had joined Jenghiz-khan; several strong places were taken, and an army of 200,000 Kin defeated by the Moguls. In autumn they laid siege to the city of Tay-tong-fu; where, although the governor Hujaku fled, yet Jenghiz-khan met with a considerable resistance. Having lost a vast number of men, and being himself wounded by an arrow, he was obliged to raise the siege and retire into Tartary; after which the Kin retook several cities. The next year, Jenghiz-khan re-entered China; retook the cities which the Kin had reduced the year before; and overthrew their armies in two bloody battles, in one of which the ground was fired with dead bodies for upwards of four leagues.

19 Great wall forced by Jenghiz-khan.

The same year Yong-shi was slain by his general Hojaku; and Sun, a prince of the blood, advanced in his room. After this the Moguls, attacking the empire with four armies at once, laid waste the provinces of Shanhs, Honan, Pechei, and Shantong. In 1214 Jenghiz-khan fat down before Peking; but instead of assaulting the city, offered terms of peace, which were accepted, and the Moguls retired into Tartary. After this departure, the emperor, having his son at Peking, removed his court to P}-en-ling near Kay-tong-fu, the capital of Honan. At this Jenghiz-khan being offended, immediately sent troops to besiege Peking. The city held out to the fifth month of the year Peking ta-1215, and then surrendered. At the same time the Kin.

20 Southern Chins, New attack by the Song.

Jenghiz-khan returned to pursue his conquests in the west of Asia, where he had seven years' during which time his general Muhuli made great progress in China against the Kin emperor. He was greatly afflicted by the motions of Nihong-khan emperor of the Song, or Southern China; who, incensed by the frequent perjuries of the Kin, had declared war against them, and would hearken to no terms of peace, though very advantageous proposals were made. Notwithstanding this, however, in 1220, the Kin, exerting themselves raised two great armies, one in Shenfu, and the other in Shang-ton. The former baffled the attempts of the Song and king of Hya, who had united against them; but the latter, though no fewer than 200,000, were entirely defeated by Muhuli. In 1221, this officer passed the Whang-ho, and died after conquering several cities.

22 Jenghiz-khan deposed by his son Shew. In 1224, the Kin emperor died; and was succeeded by Jenghiz-khan's son Shew, who made peace with the king of Hya; but next year, that kingdom was entirely destroyed by Jenghiz-khan. In 1226, Oktay son to Jenghiz-khan marched into Honan, and beliged Kay-Song-fu, capital of the Kin empire; but was obliged to withdraw into Shensi, where he took several cities, and cut in pieces an army of 30,000 men. In 1227 Jenghis-khan died, after having defied his sons to demand a passage for their army through the dominions of the Song, without which he said they could not safely vanquish the Kin.

After the death of that great conqueror, the war was carried on with various successes; but though the Moguls took above 60 important places in the province of Shensi, they found it impossible to force Tung-quan, which it believed them to do in order to penetrate efficaciously into Honan. In April 1231 they took the capital of Shensi, and defeated the Kin army which came to its relief. Here one of the officers desired prince Toley to demand a passage from the Song through the country of Han-chung-fu. This proposal Toley communicated to his brother Oktay, who approved of it as being conformable to the dying advice of Jenghis-khan. Hereupon Toley, having assembled all his forces, sent a messenger to the Song generals to demand passage through their territoy. This, however, they not only refused, but put the messenger to quarter death; which so enraged Toley that he swore to make them repent of it, and was soon as good as his word. He decamped in August 1231; and having forced the passages, put to the sword the inhabitants of

Wha.
which Toley had obstructed with trees, they were attacked by that prince at a disadvantage, and, after a faint resistance, defeated with great slaughter, and the loss of both their generals, one killed and the other taken. The emperor now ordered the army at Tong-quan and other fortified places to march to the relief of Kay-fong-fu. They assembled accordingly, to the number of 110,000 foot and 15,000 horse; and were followed by vast numbers of people who expected by their means to be protected from the enemy. But many of these troops having deferted, and the rest being encumbered by the fatigues of their march, they diffipated on the approach of their pursuers, who killed all they found in the highways. After this the Moguls took Tong-quan and some other considerable posts; but were obliged to raise the siege of Quey-te-fu and Loyang, by the bravery of the governors.

27

Oktay, at last, notwithstanding his successes, resolved to return to Tartary; and offered the Kin emperor the behest of peace, provided he became tributary, and delivered up to him 27 families which he named. These offers were very agreeable to the emperor; but Suputay, taking no notice of the treaty, pushed on the siege of the capital with more vigour than ever. By the help of the Chinese slaves in his army, the Mogul general soon filled the ditch; but all his efforts seemed only to inspire the besieged with new vigour. The Moguls at that time made use of the frightful and mortality, by which they expected to make the least impression upon the city walls. They raised walls round those they besieged, which they fortified with ditches, towers, and battlements. They proceeded also to tap the walls of the city; but were very much annoyed by the artillery of the besieged, especially by their bombs, which sinking into the galleries, and bursting under ground, made great havoc among the miners. For 16 days and nights the attack continued without intermission; during which time an incredible number of men perished on both sides: at length, Suputay, finding that he could not take the city, withdrew his troops, under pretence of peace conference, being on foot. Soon after, the plague clad them in Kay-fong-fu; and raged with such violence, that in 50 days, 900,000 biers were carried out, besides a vast multitude of the poorer sort who could not afford any.

28

In a short time, two unlucky accidents occurred: a renewal of the war; which now put an end to the empire of the Kin. Gan-yong, a young Mogul lord, having ascertained the government of some cities in Kyang-nan, and killed the officer sent to take possession...
The empire of China was now to be shared between the Song, or Southern Chinese, and the Monguls. It had been agreed upon, that the province of Honan should be delivered up to the Song as soon as the war was finished. But they, without waiting for the expiration of the term, or giving Oktay notice of their proceedings, introduced their troops into Kay-fong-fu, Lo-yang, and other considerable cities. On this the War between the Moguls general resolved to attack them; and repassing the Whang-ho, cut in pieces part of the garrison of Song and Lo-yang, while they were out in search of provisions.

The garrison of Kay-fong-fu likewise abandoned that place; and the Song emperor degraded the officers who had been guilty of those irregularities, sending ambassadors to Oktay, at the same time, to desire a continuance of the peace. What Oktay's answer was we are not told, but the event showed that he was not well pleased; for, in 1235, he ordered his second son prince Kotovan, and his general Chahay, to attack the Song in Se-chwen, while others marched towards the borders of Kyang-nan.

In 1236, the Monguls made great progress in the province of Hu-quant, where they took several cities, and put vast numbers to the sword. This year they introduced paper or silk money, which had formerly been used by Chang-tong sixth emperor of the Kin. Prince Kotovan forced the passages of the district of Hang-chong-fu in the province of Sheni, which he entered with an army of 500,000 men. Here a terrible battle was fought between the vast army of the Monguls and the Chinese troops, who had been driven from the passages they defended. The latter consisted only of 10,000 horse and foot, who were almost entirely cut off; and the Monguls lost such a number of men, that the blood is said to have run for two leagues in a day. After this victory the Monguls marched to Sechwen, which they almost entirely reduced, committing such barbarities, that, in one city, 40,000 people chose rather to put an end to their own lives than submit to such cruel conquerors.

In 1237, the Monguls received a considerable check before the city of Gan-tong in Kyang-nan, the siege of which they were obliged to raise with loss. In 1238 they besieged Lu-chew, another city in the same province. They surrounded it with a rampart of earth and a double ditch; but the Chinese general ordered their intrenchments to be filled with immense quantities of herbs steeped in oil, and then set fire, while the fire flamed upon the top a tower seven stories high. At the same time a furious sally was made; and the Mongul army being thrown into the utmost disorder, were obliged finally to abandon the siege and retire northwards.

In 1239, these barbarians were opposed by a general called Meng-kong, with great success. Who, this and the following year, gained great honour by his exploits. While he lived, the Monguls were never able to make any considerable progress; but his death, in 1246, proved of the greatest detriment to the Chinese affairs; and soon after, the Tartars renewed the war with more vigour and success than ever. In
1825, they re-entered the province of Se-chwen; but still met with vigorous opposition in this quarter, because the Chinese took care to have Se-chwen furnished with good troops and generals. Though they were always beaten, being greatly inferior in number to their enemies, yet they generally retook the cities the Moguls had reduced, as the latter were commonly obliged to withdraw for want of provisions and forage. In 1259, they undertook the siege of Ho-chew, a strong city to the west of Peking, defended by Vang-kyen, a very able officer, who commanded a numerous garrison. The siege continued from the month of February till August; during which time the Moguls lost an immense number of men. On the 10th of August they made a general assault in the night. They mounted the walls before the governor had intelligence; but were soon attacked by him with the utmost fury. The Mogul emperor, Meng-ko, himself came to the salade; but his presence was not sufficient to overcome the valour of Vang-kyen. At the same time the scaling-ladders of the Moguls were blown down by a storm; upon which a terrible slaughter ensued, and among the rest fell the emperor himself. Upon this disaster the Mogul generals agreed to raise the siege, and retire towards Shen-ch. On the death of Meng-ko, Hupilay, or Kublay Khan, who succeeded him, laid siege to Vu-chang-fu, a city not far distant from the capital of the Song empire.

At this the emperor being greatly alarmed, distributed immense sums among his troops; and, having raised a formidable army, marched to the relief of Vu-chang-fu. Unfortunately the command of this army was committed to the care of Kya-te-tau, a man without either courage or experience in war. He was besides very vain and vindictive in his temper; often using the best officers ill, and entirely overlooking their merit, which caused many of them to go over to the Moguls. The siege of Vu-chang-fu was commenced, and had continued a considerable time, when Kya-te-tau, afraid of its being lost, and at the same time not daring to take any effectual step for its relief, made proposals of peace. A treaty was accordingly concluded, by which Kya-te-tau engaged to pay an annual tribute of about 50,000 in silver, and as much in silk; acknowledging likewise the sovereignty of the Moguls over the Song empire. In consequence of this treaty, the Moguls retired after the boundaries of the two empires had been fixed, and repulsed the Yang; but 170 of them having flaid on the other side of the river, were put to death by Kya-te-tau.

This blood that minister totally concealed from the emperor his having made such a shameful treaty with the Moguls; and the 170 soldiers murdered by his order, gave occasion to report that the enemy had been defeated, so that the Song court believed that they had been compelled to retreat by the superior valour and wisdom of Kya-te-tau. This proved the ruin of the empire; for, in 1258, the Mogul emperor sent Hupilay to the Chinese court to execute the terms agreed on with Kya-te-tau. The minister, dreading the arrival of this envoy, imprisoned him near Nanking; and took all possible care that neither Hupilay, nor Li-tung the Chinese emperor, should ever hear anything of him. It was impossible such unparalleled conduct could fail to produce a new war. Hupilay's courtiers immediately prevailed to have Hupilay assassinated in the Song for their treacherous behaviour; and he soon published a manifesto against them, which was followed by a renewal of hostilities in 1263. The Mogul army amounted to 300,000 men; but notwithstanding their numbers, little progress was made till the year 1271.

Syan-yang and Fan-ching, cities in the province of Se-chew, which had been besieged for a long time ineffectually; but this year, an Igur lord advised Hupilay to send for several of those officers out of the west, who knew how to cast stones of 150 pounds weight out of their engines, which made holes of seven or eight feet wide in the strongest walls. Two of these engineers were accordingly sent for; and after giving a specimen of their art before Hupilay, were sent to the army in 1272. In the beginning of 1273 they planted their engines against the city of Fan-ching, and presently made a breach in the walls. After a bloody conflict the suburbs were taken, and soon after the Moguls made themselves masters of the walls and gates of the city. Nevertheless, a Chinese officer, with only 100 soldiers, resolved to fight from street to street. This he did for a long time with the greatest obstinacy, killing vast numbers of the Moguls; and both parties are said to have been led so much overcome with thirst, that they drank human blood to quench it. The Chinese set fire to the houses, that the great beams, falling down, might embarrass the way of their partners; but at last being quite wearied out, and filled with despair, they put an end to their own lives. After the taking of Fan-ching, all the materials which had served at the siege were transported to Seyen-yang. The two engineers posted themselves against a wooden entrenchment raised on the ramparts. This they quickly demolished; and the besieged were so intimidated by the noise and havoc made by the stones cast from these terrible engines, that they immediately surrendered.

In 1274, Pe-yen, an officer of great valour, and endowed with many other good qualities, was promoted to the command of the Mogul army. His first exploits were the taking of two strong cities; after which he passed the great river Kyang, defeated the Song army, and laid siege to Vu-chang-fu. This city was soon intimidated into a surrender; and Pe-yen, by restraining the barbarity of his soldiers, whom he would not allow to hurt any body, soon gained the hearts of the Chinese so much, that several cities surrendered to him on the first summons. In the mean time the treacherous Kya-te-tau, who was sent to oppose Pe-yen, was not allowed to propose peace on the terms he had formerly concluded with Hupilay; but thence being rejected, he was obliged at length to come to an engagement. In this he was defeated, and Pe-yen continued his conquests with great rapidity. Having taken the city of Nanking, and some others, he marched towards Hang-chew-fu, the capital of the Song empire. Peace was now again proposed, but rejected by the Mogul general; and at last the emperors of the Song empire was constrained to put herself, with her son, then an infant, into the hands of Pe-yen, who immediately sent them to Hupilay.

The submission of the empress did not yet put an end to the war. Many of the chief officers swore to
do their utmost to rescue her from the hands of her enemies. In consequence of this resolution they distributed their money among the soldiers, and soon got together an army of 40,000 men. This army attacked the city where the young emperor Dong-fong was lodget, but without success; after which, and several other vain attempts, they roused one of his brothers to the throne, who then took upon him the name of T'ung-tong. He was but nine years of age when he was raised to the imperial dignity, and enjoyed it but a very short time. In 1277 he was in great danger of perishing, by reason of the ship on board which he then was being cast away. The poor prince fell into the water, and was taken up half dead with the fright. A great part of his troops perished at that time, and he soon after made others of submission to Huplay. These, however, were not accepted; for, in 1278, the unhappy T'ung-tong was obliged to retire into a little desert. In 1281, being informed that the barks, which brought to court the tribute of the southern provinces, or carried on the trade of the empire, were obliged to come by sea, and often suffered shipwreck, he cau ted that celebrated canal to be made, which is at present one of the wonders of the Chinese empire, being 300 leagues in length. By this canal above 9,000 imperial barks transport with ease, and at small expense, the tribute of grain, rice, silk, &c. which is annually paid to the court. In the third year of his reign Shih-tu formed a design of reducing the islands of Japan, and the kingdoms of Tonquin and Cochin-china. Both these enterprises ended in failure, but the first remarkably so; for of 100,000 persons embarked in it, only four or five escaped with the melancholy news of the destruction of the fleet, all perished by shipwreck. Shih-tu reigned 14 years, died in the 80th year of his age, and was succeeded by his grandson. The Moguls, having defeated the Chinese in the Ywen family till the year 1367, driven out. when Shun-ti, the last of that dynasty, was driven out by a Chinese named Chu. During this period the Tartars had become encrusted by long prosperity; and the Chineses had been routed into value by their subjection. Shun-ti, the reigning prince, was quite sunk in sloth and debauchery; and the empire, besides, was oppressed by a wicked minister named Ama. In the month of June 1355, Chu, a Chinese of mean extraction, and head of a small party, left out from Huchow, passed the Yang, and took Ta-ping. He then associated himself with some other malcontents, at the head of whom he reduced the town of Tu-chew, in Kiang-nan. Soon after he made himself master of Nanking, having defeated the Moguls who came to its relief. In December 1356, he was able to raise 100,000 men, at the head of whom he took the city of U-chew, in the east borders of Quang-si; and here, assembling his generals, it was resolved neither to commit slaughters nor to plunder. The most formidable enemy he had to deal with was Shen-yew-lang, styled “emperor of the Han.” This man being grieved at the progress made by Chu, equipped a fleet, and raised a formidable army, in order to reduce Nan-chang-fu, a city of Kiang-si, which his antagonist had made himself master of. The governor, however, found means to inform Chu of his danger; upon which that chief cau sed a fleet to be fitted out at Nanking, in which he embarked 200,000 soldiers. As soon as Chen-yew-ling was informed of his enemy’s approach, he raised the siege of Nan-chang-fu, and gave orders for attacking Chu’s naval force. An engagement ensued between a part of the fleets, in which Chu proved victorious; and next day, all the squadrons having joined in order to come to a general engagement, Chu gained a second victory, and burned a part of the enemy’s vessels. A third and fourth engagement happened, in both which Chu gained the victory; and the
the last, Chen-yew-lyang himself was killed, his son taken prisoner, and his generals obliged to surrender themselves, with all their forces and vessels.

In January 1364, Chu's generals proposed to have him proclaimed emperor; but this he declined, and at first contented himself with the title of king of U. In February he made himself master of Vu-chang-fu, capital of Hu-quant; where, with his usual humanity, he relieved those in distress, encouraged the literati, and would allow his troops neither plunder nor destruction. This wife conduct procured him an easy conquest both of Kyang-fu and Ho-quant. The Chinese submitted to him in crowds, and professed the greatest veneration and respect for his person and government.

All this time Shun-ti, with an unaccountable negligence, never thought of exerting himself against Chu, but continued to employ his forces against the rebels who had taken up arms in various parts of the empire; so that Chu found himself in a condition to assume the title of emperor. This he chose to do at Nanking on the first day of the year 1368. After this his troops entered the province of Honan, which they presently reduced. In the third month, Chu, who had now taken the title of Hong-ou, or T'ay-sif, reduced the fortresses of Tong-quan; after which his troops entered Pecheli from Honan on the one side, and Shun-tong on the other. Here his generals defeated and killed one of Shun-ti's officers; after which they took the city of Tong-chew, and then prepared to attack the capital, from which they were now but 12 miles distant. On their approach the emperor fled with all his family beyond the great wall, and thus put an end to the dynasty of Ywen. In 1370 he died, and was succeeded by his son, whom the successor of Hong-ou drove beyond the Kobol or Great Desert, which separates China from Tartary. They continued their incursions, however, for many years; nor did they cease their attempts till 1382, when vast numbers of them were cut down in the Chinese troops.

The 21st dynasty of Chinese emperors, founded in 1368 by Chu, continued till the year 1644, when they were again expelled by the Tartars. The last Chinese emperor was named Whay-tiong, and ascended the throne in 1628. He was a great lover of the sciences, and a favourite of the Christians; though much addicted to the superstitions of the Bonzes. He found himself engaged in a war with the Tartars, and a number of rebels in different provinces. That he might more effectually suppress the latter, he resolved to make peace with the former; and for that end sent one of his generals, named Ywen, into Tartary, at the head of an army, with full power to negotiate a peace; but that traitor made one upon such shameful terms, that the emperor refused to ratify it. Ywen, in order to oblige his master to comply with the terms made by himself, poisoned his host and most faithful general, named Mau-en-long; and then desired the Tartars to march directly to Peking, by a road different from that which he took with his army. This they accordingly did, and laid siege to the capital. Ywen was ordered to come to its relief; but, on his arrival, was put to the torture and strangled; of which the Tartars were no sooner informed, than they raised the siege, and returned to their own country. In 1536, the rebels abovementioned composed four great armies, commanded by as many generals; which, however, were soon reduced to two, commanded by Li and Chang. These agreed to divide the empire between them; Chang taking the western provinces, and Li the eastern ones. The latter seized on part of Shen-ji, and then of Honan, whose capital, named Kay-fung-fu, he laid siege to, but was repulsed with loss. He renewed it six months after, but without success; the besieged choosing rather to feed on human flesh than surrender. The imperial forces coming soon after to its assistance, the general made no doubt of being able to destroy the rebels at once, by breaking down the banks of the Yellow River; but unfortunately the rebels escaped to the mountains, while the city was quite overflowed, and 300,000 of the inhabitants perished.

After this disaster, Li marched into the provinces of Shen-ji and Honan; where he put to death all the mandarins, exacted great sums from the officers in place, and showed no favour to any but the populace, whom he freed from all taxes; by which means he drew so many to his interest, that he thought himself strong enough to assume the title of emperor. He next advanced towards the capital, which, though well garnished, was divided into factions. Li had taken care to introduce before-hand a number of his men in disguise; and by these the gates were opened to him the third day after his arrival. He entered the city in triumph at the head of 300,000 men; whilst the emperor kept himself shut up in his palace, busied only in his perjuries. It was not long, however, before he found himself betrayed; and, under the greatest confusion, made an effort to get out of the palace, attended by about 600 of his guards. He was more surprized to see himself treacherously abandoned by them, and deprived of all hopes of escaping the inflicts of his subjects. Upon this, preferring death to the disgrace of falling alive into their hands, he immediately retired with his empress, whom he tenderly loved, and the princess her daughter, into a private part of the garden. His grief was so great that he was not able to utter a word; but the soon understood his meaning, and, after a few silent embraces, hanged herself on a tree in a silent firing. Her husband flied only to write these words on the border of his vest: "I have been basely deserted by my subjects; do what you will with me, but spare my people." He then cut off the young prince's head with one stroke of his scimitar, and hanged himself on another tree, in the 17th year of his reign, and 36th of his age. His prime minister, queens, and eunuchs, followed his example; and thus ended the Chinese monarchy, to give place to that of the Tartars, which hath continued ever since.

It was some time before the body of the unfortunate monarch was found. At last it was brought before the rebel Li, and by him used with the utmost indignity; after which he caused two of Whay-tiong's sons, and all his ministers, to be beheaded; but his eldest son happily escaped by flight. The whole empire submitted peaceably to the usurper, ex:cc:pt prince U-fan-ghey, who commanded the imperial forces in the province of Lyau-tong. This brave prince, finding himself unable to cope with the usurper, invaded the Tartars...
China.

Tartars to his assistance, and Tiong-te their king immediately joined him with an army of 80,000 men. Upon this the usurper marched directly to Peking; but not thinking himself safe there, plundered and burnt the palace, and then fled with the immense treasure he had got. What became of him afterwards we are not told; but the young Tartar monarch was immediately declared emperor of China, his father Tiong-te having died almost as soon as he set his foot in that empire.

The new emperor, named Shun-chi, or Hsu-chi, began his reign with rewarding U-fan-ghey, by conferring upon him the title of King; and aligned him the city of Si-gnan-fu, capital of Shien-fu, for his residence. This, however, did not hinder U-fan-ghey from repenting of his error in calling in the Tartars, or, as he himself used to phrase it, in sending for lions to drive away dogs." In 1674, he formed a very strong alliance against them, and had probably prevailed if his allies had been faithful; but they treacherously deserted him one after another; which so affected him, that he died soon after. In 1681 Hong-wa, son to U-fan-ghey, who continued his efforts against the Tartars, was reduced to such straits that he put an end to his own life.

During this space, there had been some resistance made to the Tartars in many of the provinces. Two princes of Chinese extraction had at different times been proclaimed emperors; but both of them were overcome and put to death. In 1682, the whole 15 provinces were for a while subdued, that the emperor Kaow-bi, successor to Shun-bi, determined to visit his native dominions of Tartary. He was accompanied by an army of 70,000 men, and continued for some months taking the diversion of hunting. This he continued to do for some years; and in his journeys took father Verbeilt along with him; by which means we have a better description of these countries than could possibly have been otherwise obtained.

This prince was a great encourager of learning and of the Christian religion; in favour of which last he published a decree, dated in 1692. In 1710, however, he revived some obsolete laws against the Christians; nor could the Jesuits with all their art persuade, that the emperor should not put them in China. The causes of this alteration in his resolution are, by the missionaries, said to have been the flanders of the mandarins: but, from the known character of the Jesuits, it will be readily believed, that there was something more at bottom. This emperor died in 1722, and was succeeded by his son Yen-ching; who not only gave no encouragement to the missionaries, but persecuted all Christians of whatever denomination, not excepting even those of the imperial race. At the beginning of his reign he banished all the Jesuits into the city of Canton, and in 1712 they were banished thence into Ma-kau, a little island inhabited by the Portuguese, but subject to China. He died in 1736; but although the Jesuits entertained great hopes from his successor, we have not heard that they have yet met with any success.

Thus we have given an account of the most memorable transactions recorded in the Chinese history. It now remains to describe the present state of the empire and its inhabitants, according to the best and latest accounts.

The climate as well as the soil of this extensive empire is very different in different parts; severe cold being often felt in the northern provinces, while the inhabitants of the southern ones are scarce able to bear the heat. In general, however, the air is accounted wholesome, and the inhabitants live to a great age.

The climate is cold, and the air produces few miasmas. The northern and western provinces have many mountains, which in the latter are cultivated, but in the north are barren, rocky, and incapable of improvement. On the mountains of Chenfi, Honan, Canton, and Fokien, are many forests, abounding with tall, straight trees, of different kinds, fit for building, and particularly adapted for masts and ship-timber. These are used by the emperor in his private buildings; and from these forests enormous trunks are sometimes transported to the distance of more than 300 leagues. Other mountains contain quicksilver, iron, tin, copper, gold, and silver. Formerly these last were not allowed to be opened, lest the people should thereby be induced to neglect the natural riches of the soil; and it is certain, that in the 15th century, the emperor caused a mine of precious stones to be shut, which had been opened by a private person. Of late, however, the Chinese are less scrupulous, and a great trade in gold is carried on by them. Many extravagant fables are told by the Chinese of their mountains, particularly of one in Chen-fi which throws out flames, and produces violent tempests, whenever any one beats a drum or plays on a musical instrument near it. In the province of Fokien is a mountain, the whole of which is an idol, or statue of the god Po. This natural colossus, for it appears not to have been the work of art, is of such an enormous size, that each of its eyes is several miles in circumference, and its nose extends several leagues.

China has several large lakes; the principal one is Lakes and that named Poyang-hou, in the province of Kiang-fi. It is formed by the confluence of four large rivers, extends nearly 100 leagues in length; and, like the sea, its waters are raised into tempestuous waves. The empire is watered by an immense number of rivers of different sizes, of which two are particularly celebrated, viz. the Yang-tze kiang, or son of the sea, and Hoang-ho, the Yellow river. The former rises in the province of Tun-nan, and falls through Hon-guang and Kiang-nan, falls into the sea of China. The latter is of 1200 miles, opposite to the island of Tiong-ming, which is formed by the sand accumulated at its mouth. This river is of immense size, being half a league broad at Nanking, which is near 100 miles from its mouth. The navigation is dangerous, so that great numbers of vessels are lost on it. It runs with a rapid current, forming several islands in its course, which are again carried off and new ones formed in different places, when the river is swelled by the torrents from the mountains. These islands, while they remain, are very useful; producing great quantities of reeds ten or twelve feet high, which are used in all the toneshipping countries for fuel. The Hoang-ho, or yellow river, has its name from the yellow dye it is given by the clay and sand washed down in the time of rain. It rises in the mountains which border the province of Te-tschuen on the west, and after a course of near 600 leagues, discharges itself into the eastern sea not far from the mouth of the Kiang. It is very broad and rapid, but so shallow that it is scarcely navigable.
The Chinese have been at great pains to turn their lakes and rivers to the advantage of commerce, by promoting an inland navigation. One of their principal works for this purpose, is the celebrated canal reaching from Canton to Peking, and forming a communication between the southern and northern provinces. This canal extends through no less a space than 600 leagues; but its navigation is interrupted in one place by a mountain, where passengers are obliged to travel 10 or 12 leagues over land. A number of other canals are met with in this and other provinces, most of which have been executed by the industry of the inhabitants of different cities and towns, in order to promote their communication with the various parts of the empire.

M. Grosler remarks, that, in these works, the Chinese have "surmounted obstacles that perhaps would have discouraged any other people; such, for example, is a part of a canal which conducts from Chao-king to Ning-po." Near these cities there are two canals, the waters of which do not communicate, and which differ ten or twelve feet in their level. To render this place passable for boats, the Chinese have constructed a double glocke of large stones, or rather two inclined planes of stones in an acute angle at their upper extremity, and extend on each side to the surface of the water. If the bark is in the lower canal, they pull it up the plane of the first glocke by means of several capstans, until it is raised to the angle, when by its own weight it glides down the second glocke, and precipitates itself into the water of the higher canal with the velocity of an arrow. It is astonishing that these barks, which are generally very long and heavily laden, never burst asunder when they are raised on this acute angle; however, we never hear of any accident of this kind happening in the passage. It is true, they take the precaution of using for their keels a kind of wood which is exceedingly hard, and proper for resisting the violence of such an effort.

The following remarkable phenomenon in a Chinese river is related by Father Le Couteux, a French missionary. "Some leagues above the village Che-pai (says he), the river becomes considerably smaller, although none of its waters flow into any other channel; and, eight or nine leagues below, it resumes its former breadth, without receiving any additional supply, excepting what it gets from a few small rivulets, which are almost dry during the greater part of the year. Opposite to Che-pai it is so much diminished, that, excepting one channel, which is not very broad, I have passed and repassed it several times by the help of a common pole. I was always surprised to find this river so narrow and shallow in that place; but I never thought of inquiring into the cause of it, until the loss of a bark belonging to a Christian family afforded me an opportunity. In that place where the river diminishes almost of a sudden, it flows with great impetuosity; and where it resumes its former breadth it is equally rapid. At the sixth moon, when the water was high and the wind strong, the bark I have mentioned arriving above Che-pai, was driven on a sand-bank; for between these two places the river is full of moveable sands, which are continually shifting their situation. The master of the boat dropped his anchor until the wind should abate, and permit him to continue his voyage; but a violent vortex of moveable sand, which was cast up from the bottom of the river, laid the bark on its side; a second vortex succeeded; then a third; and afterwards a fourth, which shattered the bark to pieces. When I arrived at the place where this bark had been lost, the weather was mild and serene; I perceived eddies in the current every where around; which absorbed, and carried to the bottom of the river whatever floated on the surface; and I observed, at the same time, that the sand was thrown violently up with a vortical motion. Above these eddies the water was rapid, but without any fall; and in the place below, where the river resumes its usual course, no eddies are to be seen, but the sand is thrown up in the same violent manner; and in some places there are water-falls, and a kind of small islands scattered at some distance from one another. These islands which appear above the surface of the water, are not solid earth, but consist of branches of trees, roots, and herbs collected together. I was told that these boughs rose up from the water, and that no one knew the place whence they came. I was informed, that these mallees, which were 40 or 50 feet in extent on that side on which we passed, were immovable, and fixed in the bottom of the river; that it was dangerous to approach them, because the water formed whirlpools every where around them; that, however, when the river was very low, the fishermen sometimes ventured to collect the boughs that floated on its surface, and which they used for fuel. I am of opinion, that, at the place of the river which is above Che-pai, the water falls into deep pits, from whence it forces up the sand with that vortical motion; and that it flows underground to the other place, eight or nine leagues below, where it carries with it all the boughs, weeds, and roots, which it washes down in its course, and thus forms those islands which appear above its surface. We know there are some rivers that lose themselves entirely, or in part, in the bowels of the earth, and which afterwards arise in some other place; but I believe there never was one known to lose part of its water below its own channel, and again to recover it at the distance of some leagues."
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11. public , politories, that peror md into the fourth year, when rice was exceedingly scarce there, the foreign merchants. Form of a lies opposite to the Canton with rice until the supply he had ordered it be, that the Japanese have nothing to spare, or on account of the scarcity of grain in Canton is also bounded by the sea, and has nothing cause of the scarcity of grain in other countries.

This has at all times been a principal city of the empire of Kiang-nan and Che-kyang, to China; and, therefore, the emperor of all offices, nor is he more unlimited in his authority than any other potentate on earth; no sentence of death, pronounced by any of the tribunals can be executed without his consent, and every verdict in civil affairs is subject to be revised by him; nor can any determination be of force until it has been confirmed by the emperor: and, on the contrary, whatever sentence he passes is executed without delay; his edicts are respected throughout the empire as if they came from a divinity; he alone has the disposal of all offices, nor is there any such thing as the purchase of places in China; merit, real or supposed, raifes to an office, and rank is attached to it on ly. Even the succession to the throne is nother hereditary. The emperor of China has a power of choosing his own successor without consulting any

The government of China, according to the Abbe Grolier, is purely patriarchal. The emperor is more unlimited in his authority than any other potentate on earth; no sentence of death, pronounced by any of the tribunals can be executed without his consent, and every verdict in civil affairs is subject to be revised by him; nor can any determination be of force until it has been confirmed by the emperor: and, on the contrary, whatever sentence he passes is executed without delay; his edicts are respected throughout the empire as if they came from a divinity; he alone has the disposal of all offices, nor is there any such thing as the purchase of places in China; merit, real or supposed, raifes to an office, and rank is attached to it on ly. Even the succession to the throne is nother hereditary. The emperor of China has a power of choosing his own successor without consulting any

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China. of his nobility; and can select one not only from among his own children, but even from the body of his people; and there have been several instances of his making use of this right: and he has even a power of altering the succession after it has once been fixed, in case the person pitched upon does not behave towards him with proper respect. The emperor can also prevent the princes of the blood from exercising the title, with which, according to the constitution of the empire, they are invested. They may indeed, notwithstanding this poffesses their hereditary dignity; in which case they are allowed a revenue proportioned to their rank. But they have neither influence nor power, and their assistant is lower than that of the meanest mandarin.

60

Mandarins

The mandarins are of two classes, viz. those of letters, and the inferior fort, styled mandarins of arms. The latter by no means enjoy the fame consideration with the former fort; indeed in China the literati are highly honoured, and to their influence M. Grolier supposes that we may in a great measure attribute the mildness and equity of the government; though he thinks that the balance may incline rather too much in their favour. Several degress, anwering to those of bachelor, licentiate, and doctor, must be passed through before one can attain the dignity of a mandarin of letters; though sometimes, by the favour of the emperor, it is conferred on those who have attained only the two first degrees: but even the persons who have gone through all the three, enjoy at first only the government of a city of the second or third class. When several vacancies happen in the government of cities, the emperor invites to court a corresponding number of the literati, whose names are written down in a list. The names of the vacant governments are then put into a box, raffed so high that the candidates are able only to reach it with their hands; after which they draw in their turns, and each is appointed governor of the city whose name he has drawn.

There are eight orders of those mandarins in China.

1. The chin-tao, from whom are chosen the ministers of state, the presidents of the supreme courts, and all the superior officers among the militia. The chief of this order presides also in the emperor's council, and enjoys a great share of his confidence. 2. The te-hiofe, or man of acknowledged ability, is a title bestowed upon every mandarin of the second rank; and from these are selected the viceroys and presidents of the supreme council in the different provinces. 3. The te-hong-tchou, or school of mandarins, act as secretaries to the emperor. 4. T-chou, or taos. These keep in repair the harbours, royal lodging-houses, and barracks, which belong to the emperor, unless particularly engaged in some other office by his order. 5. The ping-piaou have the inspection of the troops. 6. The tsu-tien-tao have the care of the high-ways. 7. The boa-tao superintend the rivers. 8. The hai-tao inspect the sea-coasts.

Thus the whole administration of the Chinese empire is intrusted to the mandarins of letters; and the homage paid by the common people to every mandarin in office, almost equals that paid to the emperor himself. This indeed flows from the nature of their government. In China it is a received opinion that the emperor is the father of the whole empire; that the governor of a province is the father of that province; and that the mandarin who is governor of a city is also the father of that city. This idea is productive of the highest respect and submission, which is not at all leffened by their great number; for though the mandarins of letters amount to more than 14,000, the same respect is paid to every one of them.

The mandarins of arms are never indulged with any share in the government of the state; however, to attain to this dignity, it is also necessary to pass through the degrees of bachelor, licentiate, and doctor of arms. The accomplishments necessary for a mandarin of arms are, strength of body, with ability and readines in performing the various military exercises, and comprehending the orders requisite for the protection of arms: an examination on these subjects must be undergone before the candidate can obtain the wished for dignity.

The mandarins of arms have tribunals, the members of which are selected from among their chiefs; and among these they reckon princes, counts, and dukes; for these dignities, or something equivalent to them, are met with in China. The principal of these tribunals is held at Peking, and consists of five classes.

1. The mandarins of the rear-guard, called taou-tao. 2. Of the left wing, or fa-tao. 3. Of the right wing, or yeo-tao. 4. Of the advanced main-guard, or te-hong-tao. 5. Of the advanced guard, or tsien-tao. These five tribunals are subordinate to one named tung-tching-tao; the president of which is one of the great lords of the empire, whose authority extends over all the military men in the empire. By his high dignity he could render himself formidable even to the emperor; but to prevent this inconvenience, he has for his affiliate a mandarin of letters, who enjoys the title and exerices the function of superintendant of arms. He must also take the advice of two inspectors who are named by the emperor; and when these have agreed upon the measure, their resolution must be submitted to the revial of an higher court named Ping-pou, which is entirely of a civil nature. The chief of these mandarins is a general of course, whose powers are equivalent to those of our commanders in chief; and below him are other mandarins who act as subordinate officers.

These two classes of mandarins compose what is called the nobility of China; but as we have already hinted, their office is not hereditary; the emperor alone continues or confers it. They have the privilege of remonstrating to the emperor, either as individuals or in a body, upon any part of his conduct which appears contrary to the interests of the empire. These remonstrances are seldom ill received, though the foreign-complies with them only when he himfelf thinks proper. The number of literary mandarins in China is computed at upwards of 14,000; and those of arms at 18,000; the former, however, are considered as the principal body in the empire; and this preference is thought to damp the military ardour of the nation in general, and to be one cause of that weakness in war for which the Chinese are remarkable.

The armies of this empire are proportioned to its vast extent and population; being computed in time military force.
ofi peace at more than 700,000. Their pay amounts to about twopence halfpenny and a measure of rice per day, though some of them have double pay, and the pay of a horsemans is double that of a foot-soldier; the emperor furnishes a horse, and the horsemans receives two measures of small beans for his daily subsistence; the arrears of the army being punctually paid up every three months.

The arms of a horsemans are, a helmet, cuirasses, lance, and fafere; those of a foot-soldier are a pike and fahere; some have fusíces, and others bows and arrows. All these are carefully inspected at every review; and if any of them are found in the least faulty, or otherwise in bad condition, the polifher is instantly punished; if a Chinese, with 30 or 40 blows of a fliick; or, if a Tartar, with as many lashes.

Though the use of gun-power is certainly very old in China, it appears to have been afterwards totally lost, at least fire-arms seem to have been almost entirely unknown some centuries ago. Three or four cannon were to be seen at that time about the gates of Nanking; but not a single person in China knew how to make use of them; fo that, in 1621, when the city of Macao made a present of three pieces of artillery to the emperor, it was found necessary also to fend three men to load them. The utility of these weapons was quickly perceived by the execution which the three cannon did against the Tartars, at that time advanced as far as the great wall. When the invaders threatened to return, the mandarins of arms gave it as their opinion, that cannons were the best arms they could make use of against them. They were then taught the art of caffing cannon by F. Adam Schaal and Verbien, two Jesuit missionaries, and their artillery was increased to the number of 320 pieces; at the same time that they were instructed in the method of fortifying towns, and constructing forteresses and other buildings according to the rules of modern architecture.

The best soldiers in China are procured from the three northern provinces, the others being seldom called forth, but allowed to remain at peace with their families: indeed there is not often occasion for exerting their military talents, unless it be in the quelling of an infurrection, when a mandarin or governor usually accompanies them. They march in a very tumultuous manner, but want neither skill nor agility in performing their different evolutions. They, in general, handle a fafere well, and shoot very dexterously with bows and arrows. There are in China mfr than 2000 places of arms; and through the different provinces there are dispersed 5000 towers or caftles, all of them defended by garrisons. Soldiers continually mount guard there; and on the first appearance of tumult, the nearest sentinel makes a signal from the top of the tower, by hoifting a fflag in the day time, or lighting a torch in the night; when the neighbouring garrisons immediately repair to the place where their presence is necessary.

The principal defence of the empire against a foreign enemy is the great wall which separates China from Tartary, extending more than 1500 miles in length, and of such thickness, that fixed horsemans may easily ride abreast upon it. It is flanked with towers two bow-shots distant from one another; and it is said that a third of the able-bodied men in the empire were employed in constructing it. The workmen were ordered, under pain of death, to place the materials so closely, that not the least entrance might be afforded for any instrument of iron; and thus the work was constructed with such solidity, that it is still almost entire, though 2000 years have elapsed since it was constructed. This extraordinary work is carried on not only through the low lands and valleys, but over hills and mountains; the height of one of which was computed by F. Verbien at 1236 feet above the level of the spot where he stood. According to F. Martini it begins at the gulf of Lea-tong, and reaches to the mountains near the city of Kin on the yellow river; between which places it meets with no interruption except to the north of the city of Suen in the province of Pechell, where it is interrupted by a ridge of houfous and inaccessible mountains, to which it is closely united. It is likewise interrupted by the river Hoang-lo; but for others of an inferior size, arches have been constructed, through which the water itself flows freely. Mr. Bell informs us, that the carriage and carriages are chiefly constructed in the dry climate in which it stands, may remain in the state of nature for many ages. When carried over steep rocks, where no horse can pass, it is about 15 or 20 feet high: but when running through a valley, or crossing a river, it is about 30 feet high, with square towers and embrasures at equal distances. The top is flat, and paved with cut stone; and where it rises over a rock or eminence, there is an arched made by an easy stone-flair. "This wall (our author adds) was begun and completed finished in the short space of five years; and it is reported, that the labourers fford(flag) to clofe for many miles, that they could hand the materials from one to another. This seems the more probable, as the rugged rocks among which it is built must have prevented all use of carriages; and neither clay for making bricks, nor any kind of cement, are to be found among them."

The whole civil government of China is managed by the following courts. 1. The emperor's grand council, composed of all the ministers of state, presidents and auditors of the fix sovereign courts, and of three others, to be afterwards mentioned. This is never assembled but on affairs of the greatest importance; the emperor's private council being substituted to it in all cases of smaller moment. 2. The chief of the other courts furnishes mandarins for the different provinces, watches over their conduct, and keeps a journal of their transactions, and informs the emperor of them, who rewards or punishes according to the report he gets. This second tribunal, which may be called a kind of civil inquisition, is subdivided into four others; the first entrusted with the care of selecting those who, on account of their learning or other good properties, are capable of filling the offices of government; the second

Account of the great wall.
The principal sovereign court to which these four last are subordinate is called Li-pou.

2. Hou-pou, or the grand treasurer, superintends all the finances of the state; is the guardian and protector of the treasuries and dominions of the emperor, keeping an account of his revenues, &c., superintending the management and coining of money; the public magazines, custom-houses; and, lastly, keeping an exact register of all the families in the empire. To adjudge this court, 14 others are appointed throughout the different provinces of the empire.

3. Li-pou, or the court of ceremonies. "It is an undoubted fact (says M. Grolier), that ceremonies form, in part, the bafe of the Chinefe government. This tribunal therefore takes care to support them, and enforce their observance; it inspects also the arts and sciences. It is confulted by the emperor when he design to confer particular honours; takes care of the annual sacrifices offered up by him, and even regulates the entertainments which he gives either to strangers or his own subjects. It also receives and examines foreign embassadors, and keeps in repair the emperor's palaces, as well as those of the princes and viceroyes, and the buildings where the tribunals are held, with the temples, tombs of the sovereigns, and all public monuments. It has besides the superintendence of the streets, public highways, bridges, lakes, rivers, and every thing relating either to internal or foreign navigation. Four inferior tribunals assist in the discharge of these duties; the first drawing the plans of public works: the second, while the sixth has the care of the arms, tents, chariots, barks, and stores necessary for military operations; so that nothing relative to these can be put in execution without the concurrence of all the three tribunals.

To prevent any lawful combination among the tribunals, each has its cenfor appointed. This is an officer whose duty is merely to watch over the proceedings of the court, without deciding upon any thing himself. He affists therefore at all assemblies, reviles all their acts, and without acquainting the court in the least with either his sentiments or intentions, immediately informs the emperor of what he judges to be amifs. He likewise gives information of the behaviour of the mandarins, either in the public administration of affairs, or in their private conduct: nay, sometimes he will not scruple to reprimand the emperor for what he supposes to be erroneous in his conduct.

These censors are never removed from their places but in order to be promoted; and thus, holding their offices for life, they have the greater courage to speak out when they obferve any impropriety or abuse. Their accusation is sufficient to let on foot an inquiry, which generally leads to a proof; in which case the accused is discharged from his office, and never held in any estimation afterwards. The complaints of the censors, however, are generally unites to the importance of their office incorruptible probity and invincible courage. The sovereign may, if he proceeds to rigour, take away their lives; but many of them have patiently suffered death, rather than betray the caufe of truth, or wink at abuses. It is not sufficient therefore to have got rid of one, they must all be treated in the fame manner; the last that might be spared would tread in the fame steps with no lefs resolution than those who went before him. In the annals of no nation do we find an example of such a tribunal, yet it appears to be necessary in all, without exception. We must not, however, imagine, that the privileges of a cenfor gave him a right to forgie his duty to his sovereign, or to communicate to the public the remarks which he takes the liberty of making to him: were he only to give the leaf hint of them to his colleagues, he would be punished with death; and he would share the fame fate did he, in any of his representations, suffer a single word, inconsistent with moderation or respect, to escape him."
Filial piety. The basis of all the civil laws of the Chinese is filial piety. Every mandarin, who is a governor either of a province or city, must instruct the people assembled round him twice a month, and recommend to them the observance of certain salutary rules, which are summed up in a few short sentences, and such as no person can ever be supped of forgetting.

The Chinese are allowed only to have one wife, whose rank and age must be nearly equal to that of their husbands; but they are allowed to have several concubines, whom they may admit into their houses without any formality, after paying the parents a sum of money, and entering into a written engagement to use their daughters well. These concubines, however, are all in subjection to the lawful wife; their children are considered as heirs; they address her as mother, and can give this title to her only. A person that has once been married, whether man or woman, may lawfully marry again, but it is then no longer necessary to study equality of age or condition. A man may choose his second wife from among his concubines; and, in all cases, this new marriage requires very few formalities. A widow is absolute mistress of herself, and can neither be compelled by her parents to marry again, nor to continue in a state of widowhood, contrary to her own inclination. Thole of moderate rank, however, who have no children, do not enjoy the same privilege, as the parents of the former husband can dispose of her in marriage, not only without her consent, but without her knowledge. The law authorizes the disposal of them in this manner, in order to indemnify the relations of the deceased husband for the money they may have cost him. If the wife is left big with child, this cannot take place, until she is delivered; nor can it be done at all if she brings forth a son. There are likewise two exceptions: 1. when the parents of the widow assign her a proper maintenance; and, 2. if the widow embraces a religious life, and becomes a nun.

Divorces, unlawful marriages.

Divorces are allowed in China in cases of adultery, mutual dislike, incompatibility of temper, jealousy, &c. No husband, however, can put away or sell his wife until a divorce is legally obtained; and if this regulation be not strictly observed, the buyer and seller become equally culpable. If a wife, lawfully married, privately withdraws herself from her husband, he may immediately commence an action at law; by the sentence of which she becomes his slave, and he is at liberty to sell her to whom he pleases. On the other hand, if an husband leaves his wife for three years, she is at liberty, after laying her complaint before the mandarins, to take another husband; but if she were to anticipate their consent, she would be liable to a severe punishment.

Marriage is deemed illegal in China in the following cases: 1. If a young woman has been betrothed to a young man, and presents have been given and received by the parents of the intended husband and wife. 2. If in the room of a beautiful young woman another be substituted of a disagreeable figure, or if the daughter of a free man marry his slave; or if any one give his slave to a free woman, pretending to her parents that he is his son or relation. In all these cases the marriage is null and void; and all those who have had any share in making up the match are severely punished.

3. Any mandarin of letters is forbidden to form an alliance with any family residing in the province or city of which he is governor.

No Chinese youth can enter into a state of marriage during the time of mourning for his father or mother; and if promisses have been made before, they cease immediately on that event taking place. After the usual time of mourning is expired, however, the parents of the intended bride are obliged to write to those of the young man, putting him in mind of his engagement.

5. Marriage is also suspended when a family experiences any severe misfortune, and even if a near relation were thrown into prison; though this may be let aside, provided the unfortunate person give his consent.

6. Two brothers cannot marry two sisters; nor is a widower at liberty to marry his son to the daughter of a widow whom he choos for his own wife. A man is also forbidden to marry any of his own relations, however distant the degree of consanguinity may be between them.

In China every father of a family is responsible for the conduct of his children, and even of his domestics; all those faults being imputed to him which it was his duty to have prevented. Every father has the power of selling his son, "provided (says the law) the son has a right of selling himself." This custom, however, is barely tolerated among the middling and inferior ranks; and all are forbidden to sell them to comedians, or people of infamous character, or very mean stations.

In China a son remains a minor during the whole lifetime, and is even liable for the debts contracted by his father, those from gaming only excepted. Adoption is authorized by law, and the adopted child immediately enters into all the rights of a lawful son; only the law gives a right to the father of making a few dispositions in favour of his real children. The children, however, whether adopted or not, cannot succeed to the dignity or titles of their father, though they may to his estate. The emperor alone can confer honours; and even then they must be resigned when the person attains the age of 70; though this renunciation is considered as an advice rather than a law.
Criminal law in China.

The will of a father cannot be set aside in China on account of any informality; nor can any mother in this empire make a will.

Though the Chinese laws authorize slavery, yet the power of the matter extends only to those matters which concern his own service; and he would be punished with death for taking advantage of his power to debauch the wife of his slave.

By the laws of China husbandmen are exempt from the payment of taxes after they have begun to till the earth to the beginning of harvest.

In criminal matters every person accused must be examined before five or six tribunals; and whole enquiries are directed not only against him, but against his accuser, and the witnesses that appear in the cause.

He is, however, obliged to remain in prison during the process; but (says M. Grolier) the Chinese prisons are not horrible dungeons like those of so many other nations; they are spacious, and have even a degree of convenience. One of the mandarins is obliged to inspect them frequently; and this he does with the greatest punctuality, as he must answer for those who are sick. He is obliged to feed them properly treated, to fend for physicians, and to supply them with medicines at the emperor's expense. If any of them die, he must inform the emperor, who perhaps will order one of the higher mandarins to examine whether the former has discharged his duty faithfully or not.

The slightest punishment in China is the bastinado; and the number of blows is to be determined by the degree of the offender's guilt. Twenty is the lowest number; and in this case the punishment is considered as having nothing infamous in it, but being only a simple paternal correction. In this way the emperor sometimes orders it to be inflicted on his courtiers, which does not prevent them from being afterwards received into favour, and as much respected as before. Every mandarin may inflict the bastinado when any one forgets to salute him, or when he acts in judgment in public. The instrument of correction is called pan-tsee, and is a piece of bamboo a little flattened, broad at the bottom, and polished at the upper extremity, in order to manage it more easily with the hand. When the punishment is to be inflicted, the magistrate sits gravely behind a table, having on it a bag filled with small stitches, while a number of petty officers stand around him, each furnished with these pan-tsee, and waiting only for his signal to make use of them. The mandarin then takes out one of the little stitches contained in the bag, and throws it into the hall of audience. On this the culprit is feized and stretched out with his belly towards the ground, his breeches are pulled down to his knees, and an athletic domestick applies five smart blows with his pan-tsee. If the judge draws another small stitch from the bag, another officer succeeds, and befalls more blows; and so on until the judge makes no more signals. When the punishment is over, the criminal must throw himself on his knees, incline his body three times to the earth, and thank the judge for the care he takes of his education.

For faults of a higher nature, the carrying of a wooden collar, called by the Portuguese the canus, is inflicted. This machine is composed of two pieces of wood hollowed out in the middle, which, when put together, leave sufficient room for the neck. These are laid upon the shoulders of the criminal, and joined together in such a manner, that he can neither see his feet nor put his hands to his mouth; so that he is incapable of eating without the assistance of another. This disagreeable burden he is obliged to carry day and night; its weight is from 50 to 200 pounds, according to the enormity of the crime, to which the time of carrying it is also proportioned. For robbery, breaking the peace, or disturbing a family, or being a notorious gambler, it is generally carried three months. During all this time the criminal is not allowed to take shelter in his own house, but is stationed for a certain space of time, either in some public square, the gate of a city or temple, or perhaps even of the tribunal where he was condemned. On the expiration of his term of punishment, he is again brought before the judge, who exhorts him in a friendly manner to amend; and after giving him 20 found blows discharges him.

Bannishment is infliction for crimes of a nature inferior to homicide, and the duration is often for life, if the ment. &c. criminals be sent into Tartary. Some culprits are condemned to drag the royal barks for three years, or to be branded in the cheeks with a hot iron, indicating the nature of their transgressions. But there is no crime between relations more severely punished than any other; and that is accounted the most atrocious where younger brothers or nephews appropriate to themselves beforehand any part of the succession in which they have a right to share with their elder brothers or nephews.

Information against a father or mother, grandfather, or grandmother, uncle or eldest brother, even though mere, of the accusation be just, is punished with 100 blows of informers pan-te, and three years banishment. If the accusation be false, it is punished with death. Deficiency in reward, respect to father, mother, grandfather, or grandmother, is punished with 100 blows of the pan-te; abusive language to these relations is death by strangling; to strike them is punished by beheading; and if any one pretends to hurt or maim them, his flesh is torn from his bones with red hot pincers, and he is cut into 1000 pieces. Abusing an elder brother is punished with 100 blows of the pan-te; striking him, with the punishment of exile.

Homicide, even though accidental, is punished with Capital punishment in China. A rope about six or seven feet in length, with a running noose, is thrown over the criminal's head; and a couple of domesticks belonging to the tribunal pull it strongly in different directions. They then suddenly quit it, and in a few moments give a second pull; a third is seldom necessary, to finish the business. Beheading is accounted in China the most dishonourable of all punishments, and is reserved only for desperate assassins, or those who commit some crime equally atrocious with murder. To be cut in a thousand pieces is a punishment inflicted only upon those criminals or rebellious subjects. It is performed by tying the criminal to a post, scalping the skin from the head, and pulling it over the eyes. The executioner then tears the flesh from different parts of the
China.

unhappy wretch's body; and never quits this horrible employment till mere fatigue obliges him to give over: the remains of the body are then left to the barbarous spectators, who finish what he has begun. Though this punishment, however, has been inflicted by some emperors with all the dreadful circumstances just mentioned, the law orders only the criminal's belly to be opened, his body to be cut into several pieces, and then thrown into a ditch or into the river.

The torture, both ordinary and extraordinary, is used in China. The former is applied to the hands or feet: for the hands, small pieces of wood are applied diagonally between the fingers of the criminal; his fingers are then tied close with cords, and he is left for some time in that painful situation. The torture for the feet is still worse. An instrument, consisting of three or four pieces of wood, is provided, that in the midst being fixed, the others movable. The feet of the criminal are then put into this machine, which, by squeezing them so close that the ankle bones become flat. The extraordinary torture consists in making small gashes in the body, and then tearing off the skin like sheets. It is however not applied to some great crimes, such as treason, or where the criminal's guilt has been clearly proved, and its necessary to make him discover his accomplices.

Notwithstanding those dreadful punishments, M. Grosier is at great pains to prove that the laws of the Chinese, with regard to criminal matters, are extremely mild. "One law (says he) will no doubt appear exceedingly severe and rigorous; it inflicts the punishment of death on those who use pearls. Those who read the history of China will be apt to fall into certain mistakes respecting the penal laws of that nation. Some of its sovereigns have indulged themselves in gratifying sanguinary caprices which were not authorized by the laws, and which have often been confounded with them: but these princes are even yet ranked among the number of tyrants, and their names are still abhorred and detested throughout the whole empire. The Chinese, in their criminal procedure, have a great advantage over all other nations: it is almost impossible that an innocent man should ever become a victim to a false accusation: in such cases the accuser and witnesses are exposed to too much danger. The slowness of the process, and the number of its revisions it undergoes, are another safeguard for the accused. In short, no sentence of death is ever carried into execution until it has been approved and confirmed by the emperor. A fair copy of the whole process is laid before him; a number of other copies are also made out, both in the Chinese and Tartar languages, which the emperor submits to the examination of a like number of doctors, either Tartars or Chinese. When the crime is of great enormity, and clearly proved, the emperor writes with his own hand at the bottom of the sentence, "When you receive this order, let it be executed without delay." In cases where the crime, though punishable by death according to law, is ranked in the ordinary cases, the emperor writes at the bottom of the sentence, "Let the criminal be detained in prison, and executed in autumn," that being the season in which they are generally executed, and all on the same day. The emperor of China never signs an order for the execution of a criminal till he has prepared himself by fasting. Like other monarchs he has the power of giving pardons; but in this respect it is much more limited than any other. The only cases in which the Chinese monarch can remit the punishment inflicted by law, are: 1. To the son of a widow who has not may be married again; 2. To the heir of an ancient family; 3. The dependents of great men or citizens who have done well of their country; and, lastly, the sons, or grandsons of a mandarin, who has become illustrious, and distinguished himself by faithfully discharging the duties of his office. Neither a child, nor a man of very advanced age, can be cited before a tribunal. The son of a very aged father and mother is pardoned, if private property or the public peace be not hurt by giving him a pardon; and if the sons of such a father and mother be all guilty, or accomplices in the same crime, the youngest is pardoned in order to comfort his parents.

In China the accused are always treated with tenderness and lenity, being accounted innocent until their guilt be clearly proved; and even then, liberty is often granted them. A jailor is engaged to behave rigorously towards his prisoners; and the judges must likewise answer at their peril for any additions to the severity of the law: deposition being the slightest punishment inflicted upon them.

Substitution is sometimes allowed by the laws of China; so that the near relation of a guilty person may put himself into the criminal's place, provided, however, that the chastisement be flight, and the accused his ancient friend. The sons, grandsons, wife, and brothers of a banished Chinese, are allowed to follow him into exile; and the relations of all persons are permitted to visit them in prison, and to give them every assistance in their power; to do which good offices they are even encouraged, instead of being prevented.

Every city in China is divided into different quarters, each of which is subjected to the inspection of spies and a certain officer, who is answerable for whatever passes in the place under his jurisdiction. Fathers of families, as we have already observed, are answerable for the conduct of their children and domestics. Neighbours are even obliged to answer for one another, and are bound to give every help and assistance in cases of robbery, fire, or any accident, especially in the night-time. All the cities are furnished with gates, which are barricaded on the commencement of night. Centinels are also posted at certain distances throughout the streets, who keep all who walk in the night, and a number of horsemen go round the ramparts for the same purpose; so that it is almost impossible to elude their vigilance by favour of the darkness. A strict watch is also kept during the day time; and all those who give any suspicion by their looks, accent, or behaviour, are immediately carried before a mandarin, and sometimes even detained until the pleasure of the governor be known.

Private quarrels do not often happen in China, and it is rare that they are attended with a fatal issue. The champions sometimes decide the quarrel with their fists, but most frequently refer the case to a mandarin, who very often orders them both a sound drubbing.

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In all the Chinese cities, and even in some of their ordinary towns, there is an office where money may be borrowed upon pledges at the common rate of interest, which, however, is no less than 30 per cent. Every pledge is marked with a number when left at the office, and must be produced when demanded; but it becomes the property of the office if left there a single day longer than the term agreed upon for the payment of the money. The whole transaction remains an inviolable secret; not even the name of the person who leaves the pledge being inquired for.

In the Chinese roads, great attention is paid by the administration of China to the convenience of travellers. The roads are generally very broad, all of them paved in the southern provinces, and some in the northern; but neither horses nor carriages are allowed to pass along them. In many places valleys have been filled up, and rocks and mountains cut through, for the purpose of making commodious highways, and to prepare them as nearly as possible on a level. They are generally bordered with very lofty trees, and in some places with walls eight or ten feet high, to prevent travellers from going into the fields; but openings are left in proper places, which give a passage into crofs roads that lead to different villages. Covered feats are erected on all the great roads, where travellers may rest themselves from the inclemency of the weather; temples and pagods are also frequent, into which travellers are admitted without payment of the money. When porters are wanted, he furnishes as many as may be necessary, and gives the same number of tickets to the traveller; who returns one to each porter when they have conveyed their loads to an appointed place. These tickets are carried back to the chief, who immediately pays them from the money he received in advance. On all the great roads in China there are several offices of this kind, which have a settled correspondence with others; the travellers therefore have only to carry to one of these offices a list of such things as they wish to have transported: this is immediately written down in a book; and though there should be occasion for two, three, or four hundred porters, they are instantly furnished. Every thing is weighed before the eyes of their chief, and the hire is five pence per hundred weight for one day's carriage. An exact register of every thing is kept in the office; the traveller pays the money in advance, after which he has no occasion to give himself any further trouble: on his arrival at the city he designs, his baggage is found at the corresponding office, and every thing is delivered to him with the most scrupulous exactness.

The custom-houses are here regulated by the general police of the country; and according to M. Grouard, of the viceroys' account, these custom-house officers are the most civil in the world. They have no concern with any delays of people but the merchants, whom they take care not to detain by any rigorous exactions; neither, though they have authority to do so, do they stop travellers till their baggage is examined, nor do they ever require the smallest fee from them. Duties are paid either by the piece or the load; and in the former case credit is given to the merchant's book without asking any questions. A mandarin is appointed by the viceroys of each province to inspect the custom-houses of the whole district; and the mandarins have also the care of the post-offices.

In former times the only money used in China was made of small shells, but now both silver and copper the empire coin are met with. The latter consists of round pieces about nine-tenths of an inch (a) in diameter, with a small square hole in the middle, inscribed with two Chinese words on one side, and two Tartar ones on the other. The silver pieces are valued only by their weight. For the convenience of commerce, the metal is therefore cast into plates of different sizes; and for want of small coin, a Chinese always carries about very large bells of cast iron. According to law these towers should be only five feet, about half a French league, distant from one another.

There is no public post-office in China, though several private ones have been established; but the carriers and offices charged with despatches for the empire have only a right to make use of them. This inconvenience, however excepted, travellers find convenience very easy from one part of China to another. Great numbers of porters are employed in every city, all of whom are distributed under the conduct of a chief, who regulates all their engagements, fixes the price of their labour, receives their hire, and is responsible for every thing they carry. When porters are wanted, he furnishes as many as may be necessary, and gives the same number of tickets to the traveller; who returns one to each porter when they have conveyed their loads to an appointed place. These tickets are carried back to the chief, who immediately pays them from the money he received in advance. On all the great roads in China there are several offices of this kind, which have a settled correspondence with others; the travellers therefore have only to carry to one of these offices a list of such things as they wish to have transported: this is immediately written down in a book; and though there should be occasion for two, three, or four hundred porters, they are instantly furnished. Every thing is weighed before the eyes of their chief, and the hire is five pence per hundred weight for one day's carriage. An exact register of every thing is kept in the office; the traveller pays the money in advance, after which he has no occasion to give himself any farther trouble: on his arrival at the city he designs, his baggage is found at the corresponding office, and every thing is delivered to him with the most scrupulous exactness.

(a) The Chinefe foot is longer by one hundredth part than the French, and the inch is divided into ten parts.
Chinese money is gold or silver, the latter being used in the southern provinces, and the former in the northern. The Chinese value silver by the numerical price of the metal. If the price of silver has not fallen below 2000 per piece, the money is employed to buy copper coin; but if the price of silver is more than 1000 per piece, only copper coin is used. This regulates the value of the coin, as well for commerce as for the use of the poor. Copper money is often employed as plain copper. It is forbidden to employ it in manufactures or as currency for daily transactions.

The Chinese government is attentive to preserve an equilibrium between the proportional value of gold and silver; so that the intrinsic value of each may affect the price of copper, and thus regulate the relative value of the coins. The method used is to forbid the exchange of copper for silver, which makes the copper valuable. The same is done for silver.

To keep up a constant circulation of all the coin in the empire, the Chinese government is attentive to preserve an equilibrium between the proportional value of gold and silver; so that the intrinsic value of each may affect the price of copper, and thus regulate the relative value of the coins. The method used is to forbid the exchange of copper for silver, which makes the copper valuable. The same is done for silver.

Commerce in China is under the supervision of the Imperial Treasury. It is regulated by the intrinsic value of metal, and by the value of the metal as currency.

The Chinese government does not enrich a kingdom by commerce alone. It is prejudicial to the empire, as it only furnishes luxury, the high-priced balbbles that accompany it, and the gratification of pride, luxury, and the gratification of vanity.

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The satisfaction of both parties. The reconciliation, was of no long duration; for the Russians having soon renewed their disorderly behaviour, an order for their expulsion was issued in 1722, and all intercourse between the two nations forbidden. The differences were once more made up in 1729, and a caravan allowed to go to Peking once in three years, provided it consisted of no more than 100 persons; and that during their stay their expenses should not, as formerly, be defrayed by the emperor of China. The Russians at the same time obtained permission to build a church within the precincts of the caravanary; and that four priests were allowed to reside at Peking for the celebration of divine service; the same indulgence being granted to some Russian scholars, for the purpose of learning the Chinese language, and qualifying themselves for being interpreters between the two nations. This intercourse continued till the year 1755; since which time no more caravans have been sent to China. It was first interrupted by a misunderstanding between the two courts; and though that difference was afterwards made up, no caravans have been sent ever since. The empress of Russia, sensible that the monopoly of the fur trade (which was entirely confined to the caravans belonging to the crown, and prohibited to individuals) was prejudicial to commerce, gave it up in favour of her subjects in 1762; and the centre of commerce between the two nations is now at Kiatoa. Here the trade is entirely carried on by barter. The Russians are prohibited from exporting their own coin; finding it more advantageous to take goods in exchange than to receive bullion at the Chinese standard. The principal exports from Russia are furs of different kinds; the most valuable of which are those of sea-otters, beavers, wolves, foxes, martins, fables, and ermines; the greater part of which are brought from Siberia and the newly discovered islands; but as they cannot supply the demand, there is a necessity for importing foreign furs to Petersburg, which are afterwards sent to Kiatoa. Various kinds of cloth are likewise sent to China, as well as hardware, and live cattle, such as horses, camels, &c. The exports from China are, raw and manufactured silk, cotton, porcelain, rhubarb, musk, &c. The government of Russia likewise reserves to itself the exclusive privilege of purchasing rhubarb. It is brought to Kiatoa by some Bakharian merchants, who have entered into a contract to supply the crown with it in exchange for furs: the exportation of the best rhubarb is forbidden under severe penalties, but yet is procured in sufficient quantities, sometimes by clandestinely mixing it with inferior roots, and sometimes by smuggling it directly. Great part of Europe is supplied with rhubarb from Russia.

The revenue of the emperor of China amounts to more than 47 millions sterling; and might easily be increased, did the sovereign incline to burden his subjects with new impositions. The annual expenses of government are indeed immense, but they are regulated in such a manner as never to be augmented but in cases of the utmost necessity; it even happens very often that administration makes greater savings every year. When this happens to be the case, the surplus serves to increase the general treasure of the empire, and prevents the necessity of new impositions in time of war, or other public calamities. The greater part of the taxes are paid in kind; those, for instance, who breed silk worms, pay their taxes in silk; the husbandmen in grain, the gardeners in fruits, &c. This method, at the same time that it is exceedingly convenient for the subject, is no way detrimental to the public interest. There are numbers of people every where in the service of government, who are thus furnished with food and clothing; so that the commodities collected as taxes are almost consumed in the provinces where they are levied; what remains is sold for the benefit of the emperor, and the money deposited in the imperial treasury. The taxes paid in money arise principally from the customs and sale of salt (which belongs entirely to the emperor), from the duties paid by vessels entering any port, and from other imposts on various branches of manufactures. Excepting these, the trader scarcely contributes any thing to the exigencies of the state, and the mechanic nothing at all; the whole burden of taxation thus falling upon the husbandman. This burden is regulated in proportion to the extent and fertility of his lands; and the greatest care has been taken to manage matters so, that he may neither be overcharged in the imposition nor harassed in the levying of the duties. "The registering of lands (says M. Grodzer), "is often and to no purpose projected in France, but has been long practiced in this empire, notwithstanding its prodigious extent." The levying of taxes in China is as simple as the nature of the thing will admit of. The duties levied from towns and villages are carried to cities of the third class; then they are conducted to those of the second; then to those of the first; and at last to the capital. The levying and imposition of taxes is submitted to the tribunal of finances; and matters are so managed, that besides the consumption in each district for discharging the ordinary expenses of government, something is left by way of reserve for answering accidental demands, and to be ready in cases of necessity. This fund becomes gradually less from the capital to cities of the first, second, and third class. A proper statement of what is paid in the provinces, of what is reserved in the different cities, or contained in the different treasuries of the empire, is subjected to the examination of the grand tribunal of finances. This revives the whole, and keeps an exact account of what is consumed, and of whatever surplus may be left.

Lending money upon interest has been in use in China for about 2000 years. It has often been abolished, and as often established. The interest, as has been already hinted, is no less than 20 per cent, and the year is only lunar. A tenth part of this interest is paid monthly; and concerning neglects of payment, the following laws have been enacted. "However much the debt may have accumulated by months or years, the principal and interest shall remain always the same. Whoever infringes this law shall receive 40 blows of a pan-tpee; or an hundred, if he uses any artifice to add the principal and interest together." This law is explained by the following. "Whoever shall be convicted before a mandarin of not having paid a month's interest, shall receive ten blows, twenty for two months, thirty for three; and in this manner, as far as sixty; that is to say, to the sixth month. The
Many Chinese writers have endeavoured unsuccessfully to show why government should allow such exorbitant interest to be taken for money; but the most satisfactory and rational account seems to be, that the great interest of money prevents the rich from purchasing much land; as landed estates would only embarras and impoverish them, their produce being so much inferior to that of money. The patrimony of a family in China is seldom divided; and it never happens there, as in almost every other country, that wealth and riches are engrossed by one part of the nation, while the other polesce nothing.

Agriculture is by the Chinese considered as the first and most honourable of all professions; so that in this empire the husbandman enjoys many and great privileges, while the merchant and mechanic are much less encouraged. Part of the crop is allowed to be used in distillation; but if the harvest happens to be bad, this operation is prohibited. In China, the tillage of the earth is not only encouraged by law, but also by the example of the emperor, who annually tills the earth with his own hands. The beginning of spring in China is always reckoned to be in the month of February; but it belongs to the tribunal of mathematics to determine the precise day. The tribunal of ceremonies announces it to the emperor by a memorial; in which every thing requisite to be done by him is mentioned with the most scrupulous exactness. The sovereign then names 12 of the most illustrious persons in his court to accompany him, and to hold the plough after he has performed his part of the ceremony. Among these there are always three princes of the blood, and nine presidents of supreme courts; and if any of them are too old and infirm to undergo the fatigue, the substitutes must be authorized by the emperor. The festival is preceded by a sacrifice, which the emperor offers up to Chang-ti (the supreme God); after which he and his attendants prepare themselves by three days fasting and continence. Others are appointed by the emperor, on the evening before the ceremony, to go and prostrate themselves at the sepulchre of his ancestors, and to acquaint them, that, on the day following, he intends to celebrate a grand sacrifice. This is offered up on a small mount a few furlongs distant from the city, which, by the indispensible rules of the ceremony, must be 50 feet in height. The Chang-ti is invoked by the emperor, who sacrifices under the title of sovereign pontiff, and prays for an abundant harvest in favour of his people. He then descends, accompanied by the three princes and nine presidents who are to put their hands to the plough along with him; the field set apart for this purpose being at a small distance from the mount. Forty labourers are selected to yoke the oxen, and to prepare the feed which the emperor is to sow; and which are of five different kinds, viz. wheat, rice, two kinds of millet, and beans. They are brought to the spot in magnificent boxes, carried by persons of the most distinguished rank. The emperor then lays hold of the plough, and turns up several furrows; the princes of the blood do the same, and then the presidents; after which the emperor throws into the furrows the five kinds of feeds already mentioned: lastly, four pieces of cotton-cloth, proper for making drecles, are distributed to each of the labourers, who affit in yoking the oxen and preparing the feeds; and the same presents are made to 40 other persons who have only been spectators of the ceremony.

"We must not (says M. Grolier) judge of the Chinese peasants from those of Europe, especially in what relates to the lights acquired by education. Free schools are very numerous in every province of China, and even some of the villages are not destitute of this advantage. The sons of the poor are there received as readily as those of the rich; their duties and their studies are the same; the attention of the masters is equally divided between them; and from this obscure source talents often spring, which afterwards make a conspicuous figure on the grand stage of life. Nothing is more common in China than to see the son of a peasant governor of that province in which his father had long toiled in cultivating only a few acres. The father himself, if taken from his plough, and elevated to a superior sphere, might, by reviving the instruction he received in his youth, and especially if he be endowed with genius, find himself fully competent for his new employment."

The Chinese have been greatly reproached with the inhuman practice of murdering their children; but although our author cannot deny that they are guilty of this practice, he excuses them by saying, that "the crime when committed in China is commonly owing to the fanaticism of idolatry; a fanaticism which prevails only among the lowest of the people. It is either their infatuated wretches precipitate their children into the river; they imagine that, by doing so, they make an expiatory sacrifice to the spirit of the river. All nations of antiquity almost have disgraced themselves by the like horrid practices; but the Chinese are far from condescending this barbarity on that account. Besides, those criminal sacrifices are never practised but in certain cantons of China, where the people, blinded by idolatry, are the dupes of prejudice, fanaticism, and superstition."

It often happens also, that the bodies of those children which are seen floating on the water have not been thrown into it till after their death; and this is likewise the case with those which are found in the streets, or lying near the public roads. The poverty of the parents suggests this dismal resource, because their children are then buried at the expense of the public. Exploiting of children in public places is a custom tolerated in China; and government employs as much vigilance to have them carried away in the morning, as it bestows care on their education. This is certainly giving people intimation to expose their children in the night-time, and no doubt encourages the practice; but the dictates of humanity are here united to those of found policy. No law in China authorizes mutilation: there are indeed eunuchs in the empire, but their number is much less than what it is generally supposed to be by Europeans. The greater part of the eunuchs belonging to the emperor and empresses have no higher employment than that of sweeping the courts of justice."
Like the capital cities of European kingdoms, Peking, the metropolis of the Chinese empire, is furnished with a gazette, which circulates into the remotest provinces, and which is even considered by administration as an essential part of the political constitution. It is printed daily at Peking, and contains an account of all those objects to which the attention of administration is directed. In this gazette may be seen the names of all those mandarins who are stripped of their employments, and the causes of their disgrace; it mentions also the names of all those delinquents who are punished with death; of the officers appointed to fill the places of the disgraced mandarins; the calamities which have afflicted any of the provinces; the relief given by government; and the expenses incurred by administration for the subsistence of the troops, supplying the wants of the people, repairing or erecting public works; and, lastly, the remonstrances made to the sovereign by the superior tribunals, either with regard to his public decisions or private conduct, and sometimes even with regard to both. Nothing, however, is contained in this gazette that has not immediately come from the emperor, or been submitted to his inspection; and immediate death would be the consequence of inferring a falsehood in this ministerial paper.

No law or sentence, as has already been said, is of any force, until the emperor's seal has been affixed to it. This is about 8 inches square, and is made of fine Jasper, a kind of precious stone much esteemed in China; of which only the emperor is allowed to have a seal. Those given to princes as marks of honour are composed of gold; the seals of the vicerovys and great mandarins, of silver; while those of inferior mandarins and magistrates are made only of lead or copper. The size of these seals is greater or smaller according to the rank their possessors hold in the tribunals or as mandarins; and when any of them happens to be worn out, intimation must be sent to the next superior tribunal; on which a new seal is to be sent into the provinces. The commission of every inspector sent into the provinces must also be confirmed by the emperor's seal. The duty of these officers is to examine into the conduct of governors, magistrates, and private individuals; and instances are recorded of emperors themselves affixing the office of inspectors in some of the provinces. These officers are not only superior to all the magistrates, but even to the vicerovys of the provinces themselves. When a superior magistrate behaves ill to an inferior one, the former instantly becomes the prisoner of the inspector, and is suspended from his office until he has cleared himself from every imputation laid to his charge. The viceroy, however, is allowed to enjoy his office until the report of the inspector has been transmitted to the emperor.

These vicerovys are distinguished by the title of Tông-tou, and are always mandarins of the first class, possessing an almost unlimited power within their districts. They march abroad with all the pomp of royal magnificence, never quitting their palaces, on the most trifling occasion, without a guard of 100 men. A viceroy is the receiver-general of all the taxes collected in the province, transmitting them to the capital, after having reserved what he judges necessary for the demands of his district. All law-suits must be brought before his tribunal; and he has the power of holding sentence of death, but it cannot be put in execution without being first carried to the emperor. Every three years he sends to court a report of the conduct of the mandarins subordinate to him; and according to the informed, those they are either continued or disgraced. Those of whom he makes an unfavourable report are punished in proportion to their delinquency; while, on the other hand, those who have the good fortune to be well reported, are rewarded in a similar proportion.

The principal mandarins are sometimes broke and dismissed from all their employments, while others are only removed some degrees lower. Those who have been degraded ten steps, run a great risk of never being employed again. These degraded mandarins are kept in perpetual remembrance of their misfortune, by being obliged to mention it in every public order they issue forth in their inferior station; thus, "I, such a mandarin, degraded one, two, three, &c. steps, command and order," &c. Over these inferior mandarins the inspector of the province has a very unlimited authority, and can, by his own power, deprive them of their employments for a great offence; nor does he confult the court, excepting where the immediate punishment of the criminal is not necessary. Every one of the mandarins, of whatever rank or denomination, is obliged, once in three years, to give in writing an exact account of the faults he has committed in the execution of his office. If he is a mandarin belonging to any of the four first classes, this confession is examined at court; but if it is made by any of the inferior ones, it must be laid before the provincial tribunal of the governor. Government, however, is not satisfied even with this confession; inquiry is made into the truth of it, and the conduct of the mandarin is scrutinized with the utmost severity, the informations being subjected to the tribunal of mandarins; where they are carefully examined, the merits and demerits of those subject to this political inquisition carefully weighed, and their names are recorded in one of the three classes. The first consists of those for whom rewards and preferment are intended; the second, for whom gentle reproof and admonition are thought necessary; and the third, of those who are to be suspended for some time, or removed altogether, from their offices. Of these last some are allowed to continue; but they receive no salary, and are not only deprived of all their emoluments, but even of their honours. If they have been guilty of any action tending to oppress the people, or to occasion a famine or scarcity among the lower ranks, their punishment is not confined to disfravishment from their offices, but they are also criminally impeached. The family burying-place of every Chinese is sacred; none dares cut down the trees with which it is overshadowed until they become decayed with age; and even then, not until their condition has been attested by a mandarin: but for certain crimes against government or the people, the burying-place of a mandarin is raised to the foundation. No kind of punishment, however, inflicted on a father, is supposed in the least to affect the character of his son; and therefore, when the latter is affected by the emperor concerning his family, he will perhaps coolly
cooly answer, "My father was disgraced for such a crime, my grandfather was beheaded for another," without the acknowledgement being in the least detrimental. On the contrary, by great and important services, it is possible for him to wipe out these stains from the memory of his ancestors.

Though the empire of China is governed by Tartar princes, the latter seem to bellow more much care and attention on the Chinese than their own natural subjects. Should any dispute arise between a Chinese and a Tartar, the former must have greatly deviated from the rules of justice, if he is not acquitted even by those tribunals which are composed of half Chinese and half Tartars. The slightest fault committed by a Tartar mandarin is always severely punished; but the punishment of the greatest is often mitigated if the delinquent be a Chinese; and the same severity is exercised towards those of the military department. Those faults, however, are punished with the greatest severity which hurt the interests of the people: for which reason they seldom fall a sacrifice to that class of petty tyrants who in other countries prey upon and devour them. Every superior mandarin is obliged to inform himself of the faults of his inferiors, and expose them; nay, he would be punished for them himself if he did not.

Very little regard, as we have already had occasion to observe, is paid to hereditary right in China. Even the princes of the blood enjoy no other privilege by birth but that of wearing a yellow girdle; and the names of their children, with the exact time of their birth, are inscribed in a yellow book appropriated to that purpose. Collateral princes are distinguished by an orange girdle, and their children are marked in a book of a red colour. The surnames of the princes of the reigning family are determined by the emperor alone; the rest not being allowed to assume any name that too much resembles those of the Moguls or Chinese. The rank even of the emperor's sons diminishes one degree every generation: so that, at the seventh, only the eldest branch has a title to wear the yellow girdle, the rest being sunk into the rank of plain citizens. An hereditary sovereignty, however, pales from one eldest son to another; and this title cannot be forfeited, unless the possessor be guilty of some crime. In this case the emperor appoints to the succession either one of his younger brothers or a cousin: but these must be always chosen from the same branch, as the lawful branch cannot be deprived of its right without the condemnation of all who compose it. The only hereditary authority of the other princes exists among those troops called the Tartar bands. There they enjoy, without opposition, that rank which they derive from their birth, but in every thing else are on a level with others. They are subjected to a military examination at stated periods, and are always promoted or degraded according to the degree of skill they exhibit. The fame trial is undergone by the heir apparent and his sons; the only indulgence shown them being, that schools are appointed for their particular use. The princes are likewise indulged with a tribunal appropriated for purpose for them, and before which alone they can be tried. An infat offered to a prince decorated with the yellow girdle is punished with death; but if he has omitted to put it on, the aggresor escapes with a basting. A prince may be put to death by the emperor's consent; but he escapes every lighter corporal punishment by paying a fine. Untitled princes have very few privileges superior to those of common citizens; and are generally very poor, unless possessed of some lucrative office. Thus they are sometimes reduced to the necessity of accepting the highest pay of a common soldier in the Tartar bands. When they, or any of their children, however, enter into the marriage state, the emperor usually makes them a present of 100 ounces of silver. He will also relieve them on other occasions, stilt their widows and orphans, &c., but in all this never departs from the most exact rules of economy; so that the mandarins in this respect are much better than the relations of the sovereign himself.

With regard to the ancient religion of China, F. A. F. Avicar informs us, that, after making every possible research, comparing and reasoning upon his observations, he at last concluded, that "the Chinese are a distinct people, who have still preserved the characteristic marks of their origin: a people whose primitive doctrine will be found, by those who take the trouble of investigating it thoroughly, to agree in its essential parts with the doctrine of the chosen people, before Moses, by the command of God himself, had composed the explanation of it to the sacred records: a people, in a word, whose traditional knowledge, when freed from whatever the ignorance or superstitition of later ages has added to it, may be traced back from age to age, and from epoch to epoch, without interruption, for the space of 4000 years, even to the removal of the human race by the grandon of Noah." The king, or canonical books of the Chinese, every where inculcate the belief of a Supreme Being, the author and preserver of all things. Under him they mention the names of Tien, or Heaven; Chang-tien, or Supreme Heaven; Chang-ti, or Supreme Lord; and of Houng-chi, or Sovereign and Supreme Lord: "Names (says M. Grosier) corresponding to those which we use when we speak of God, the Lord, the Almighty, the Most High."

According to the Chinese books, the Supreme Being is the principle of every thing that exists, and the father of all living; he is eternal, immovable, and independent; his power knowes no bounds; his sight equally comprehends the past, present, and the future, penetrating even into the inmost recesses of the heart. Heaven and earth are under his government; all events, all revolutions, are the conquences of his will; he is pure, holy, and impartial; wickedness offends his sight; but he beholds with an eye of complacency the virtuous actions of men. Severe, yet just, he punishes vice in a striking manner even on the throne, and often precipitates from thence the guilty, to place upon it the man who walks after his own heart, whom he hath raised from obscurity. Good, merciful, and full of pity, he relents on the repentance of the wicked; public calamities, and the irregularities of the seafsons, are only salutary warnings, which his fatherly goodness gives to men to induce them to reform and amend.

The performance of religious worship at the proper and appointed times, has given occasion to the great exact-
The facrifices of the Chinese were first offered up in the open fields, or on some mountain, upon what they call the T'ao, which signifies a quantity of flowers thrown together in a round form, or simply a round heap of earth. A double fence, called Kiao, composed of turf and branches of trees, was raised around this; and, in the space left between the two fences, two lesser altars were erected on the right and left; upon which, immediately after the sacrificers offered up the Tien, they sacrificed also to the Chang, or good spirits of every rank, and to their virtuous ancestors. The sovereign alone had a right of sacrificing upon this T'ao; and the custom of sacrificing to inferior spirits, according to the Chinese commentators, may be traced even to the days of Fu-hi himself. The same writers add, that, in addressing themselves to the Chang-ti, they considered him as the sovereign lord of the universe, clothed with all that power which was necessary to satisfy them with regard to the different objects of their requests; but that, in offering up their prayers to the inferior objects of worship, they only implored their protection and mediation with the Chang-ti.

While the empire was confined within narrow bounds, one mountain was sufficient for the sacrifices; but in processes of time it became necessary to consecrate four others. These were situated at the extremities of the empire, and were supposed to correspond with the four quarters of the world; and the prince went successively every year to one of these mountains to offer up sacrifices; taking occasion at the same time to show himself to his people, and to inform himself of their wants. This custom subsisted for a long time; but at length it was found convenient to add a fifth mountain in the centre of the empire; and ever since these have been called the five Yo, or the five mountains of sacrifice. This method of subjecting the emperor to regular annual journeys could not but be attended with many inconveniences. It was found necessary on this account to consecrate some spot in the neighbourhood of his palace, which might be substituted for the Yo upon all occasions when the emperor could not repair to them. An edifice was therefore erected, which at once represented the Kiao, T'ao, and the Hall of Ancestors. This last was a new invention of the edifice, because it was incumbent upon those who offered up sacrifices, first to repair to this hall, and acquaint their ancestors with what they were about to perform; and thither also they returned after sacrificing, to thank the same ancestors for the protection they had received from the Chang-ti; after which they offered up a sacrifice of thanksgiving in honour of them, and performed certain other ceremonies to show their respect. The building contained five separate halls, appropriated to different purposes: originally it had neither paintings nor ornaments of any kind, and a plain arch of nine steps conducted to the principal entrance. Afterwards, however, it was much more richly ornamented, each of the five halls being decorated with columns, over which others were placed that supported the second roof. In succeeding times it was stripped of all its ornaments, with a view to bring back religion to its primitive simplicity. Its four gates were covered with fine moss, representing the branches of which the double fence of the ancient Kiao were formed. The ridge of the roof was covered with the same, and the whole was accompanied by a canal filled with water at the time of offering up the sacrifices. To this a second building was added, which they called the

The critics of Europe may make, seems to furnish a number of texts, which give us reason to consider the Chou-tao, known in Europe, as three united, penetrated, or incorporated into one. According to another book, the emperor formerly offered up a solemn sacrifice every three years to the Spirit, Trinity and Unity, Chin-fan-yeh. The following celebrated text of Lao-tze has long been known in Europe. 'Tao is one by nature: the first begot the second; two produced the third; the three created all things.'

'F' Amiot quotes another passage, which appears to be no less singular. 'He who is, as it were, visible, and cannot be seen, is named Khi; he who may be heard, yet speaketh not to the ears, is called Hi; he whom, in a manner, we feel, yet cannot touch, is named Oiwi.' In vain do we interrogate our senses respecting these three; our reason, which alone can give us any satisfaction, will tell us that they make only one. Above there is no light; below there is no darkness. He is eternal; there is no name which can be given him. He resembles nothing that exists; he is an image without figure; a figure without matter: his light is surrounded by darkness. If we look up to him above, we behold no beginning; if we follow him, we discover no end. From what the T'ao hath been at all times, conclude what he is, viz. that he is eternal: he is the beginning of wisdom.' The commentaries which explain this passage speak in such strong and precise terms, that F. Amiot forbears to quote them, lest he might incur the censure of too many incredulous readers.
Magical practices, the invocation of spirits, and the art of foretelling events by divination, quickly diffused themselves over the empire, and the imbecility of the emperors contributed to propagate the deception. Temples consecrated to spirits quickly reared their heads in every corner of the empire; and two of the monuments celebrated of the facts were so authorized to maintain public worship there after the form which had been prescribed by their master. At the same time they distributed, and sold at a dear rate, images of the imaginary spirits with which they had peopled the heavens and the earth. These were, by their command, worshipped as so many deities independent of the Supreme Being; and, in like manner, several of the ancient emperors were invoked as gods.

Being patronized by the emperors of several dynasties, this sect became more and more powerful. At last they had the impudence to affirm, during the night-time, to one of the gates of the imperial city, a book filled with mystic characters and magical figures. At the break of day they inquired of the emperor whether the sudden appearance of this book, and publicly declared that it was fallen from heaven. This trick easily imposed upon the weak prince. He immediately repaired, with a numerous train, to the spot where the sacred volume appeared; and having taken it into his hands in a respectful manner, carried it in triumph to his palace, where he shut it up in a golden box. Another emperor carried his reverence for the sect to fuch an height of impiety and extravagance, as to order a celebrated Tao-fe to be publicly worshipped under the name of Chang-ti. The sect thus patronized by the princes, and accommodated to the credulity of the vulgar, continued to gain ground in spite of every opposition from the wiser part of the people, and is still very powerful in China. At present they offer up three different victims, a hog, a fowl, and a fish, to a spirit whom they invoke. Various ceremonies, such as bowing, drawing fantastic figures upon paper, making a hideous noise with kettles and drums, are used in their incantations; and though it may readily be believed that they are for the most part unsuccessful, yet their credit is still kept up by those cafes in which they succeed by accident.

The chief of the Tao-fe is invested by government with the dignity of grand mandarin, which is enjoyed by his successors; he resides in a sumptuous palace in a town of Kiang-si; and the superstitious confidence of the people attracts an immense number thither from all parts of the empire. Some arrive in order to be cured of diseases, others to get an insight into futurity. The impostor distributes to them small bits of paper filled with magical characters; and the ignorant wretches depart well satisfied, without grudging the expense of their journey, though ever so long.

A still more pernicious and more widely diffused sect is that of the idol Fo, which came originally from Indian philosophers of the same name. The Tao-fe, had promised to the brother of one Fo of the emperors of China to introduce him to a communication with spirits. The credulous prince having heard of a great spirit named Fo, who resided in India, prevailed on his brother to send an embassado ther. On the arrival of the ambassadors, however, they could find only two worshipers of this deity, both of whom they brought to China. Several images
The bonzes of China were also collected at the same time; and these, together with some canonical books of the Indians, were placed on a white horse, and carried in procession to the imperial city.

This superstition was introduced into China about the 6th year of the Christian era, and soon made vast progress. One of its principal doctrines is that of the metempsychosis, or transmigration of souls, of which M. Grolier thinks he was the inventor, and that Pythagoras, who travelled into several parts of India, had borrowed the doctrine from him. The account given of him by the bouzes is, that finding Pythagoras, at the age of 70, oppressed with infirmities, he called his disciples together, and told them he was unwilling to leave the world without communicating the secret and hidden mysteries of his doctrine; which, were in short, that all things had proceeded from a vacuum of the metempsychous, or transmigration of souls, of which M. Grolier thinks he was the inventor, and that Pythagoras, who travelled into several parts of India, had borrowed the doctrine from him. The account given of him by the bouzes is, that finding Pythagoras, at the age of 70, oppressed with infirmities, he called his disciples together, and told them he was unwilling to leave the world without communicating the secret and hidden mysteries of his doctrine; which, were in short, that all things had proceeded from a vacuum and nothing, and to that they must return. This doctrine produced a corresponding mode of action, or rather of inaction, in those who believed it: for thus the great happiness of man was made to consist in absolute annihilation; and therefore the nearer he could bring himself to this state during life, the happier he was supposed to be.

The common doctrine, however, which admits of a distinction between good and evil, finds more profelytes among the vulgar, whose situation in life will not allow them to spend their time in perpetual idleness. According to this, the righteons will be rewarded and the wicked punished after death. They say also, that the god Po came to save mankind, and to expiate their sins; and that he alone can procure them a happy regeneration in the life to come. Five precepts are likewise inculcated on those who adopt this doctrine: 1. Not to kill any living creature. 2. Not to take away the goods of another. 3. Not to pollute themselves by uncleanliness. 4. Not to lie; and, 5. Not to drink wine. Above all, they recommend to them to perform acts of mercy, to treat their bouzes well, build temples, &c.

The doctrine of metempsychosis has been extended by the Chinese to an infinite number of idols, who are all worshipped on the supposition that the spirit of Po has transmigrated into the animals they represent. These idols, however, seem not to be worshipped with great sincerity; but, like the images of saints in the more superstitious countries of Europe, are beaten and thrown in the dirt when their votaries happen not to obtain their desires, which they impute to the obstinacy or weakness of the idol. Nay, M. Grolier gives an account of one man, who having ineffectually paid a sum of money to the bouzes of a certain idol for the cure of his daughter, brought a formal accusation against the idol itself; and in spite of all that the bouzes could say in its behalf, got its worship suppressed throughout the province.

The bouzes of China are represented as a most avaricious and hypocritical race of men, ready to prostitute every kind of villany, and even to subject themselves to the most intolerable tortures, in order to obtain money from the compassion of the public when they cannot get it in any other way; and an edict of one of the emperors is cited by M. Grolier, by which great numbers of their religious houses were suppressed. In order to perpetuate their sect, they purchase young children, whom they take care to instruct in all the mysteries and tricks of their profession; but excepting this, they are in general very ignorant, and few of them would be able to give any tolerable account of the tenets of their own faith. They are not subject to a regular hierarchy, but acknowledge superiors among them whom they call grand bouzes, who have the first place in all religious assemblies at which they happen to be present; and great profit is derived from certain religious clubs, both of men and women, at which the bouzes are always called to assist. Their wealth is likewise augmented by pilgrimages to certain places where there are temples more or less revered, and where a multitude of absurd ceremonies are performed. These bouzes, as may be easily imagined, are invertebrate enemies to the progress of Christianity, telling the most absurd stories concerning the missionaries; as that they pluck out the eyes of their converts to construct telescopes with, &c. The literal, however, and the more sensible part of the nation, hold them in the greatest contempt.

We shall conclude this detail of the Chinese religion with giving an account of one other superstition, which seems peculiar to the nation. It is named fong-eou, which signifies wind and water. By this they mean the lucky or unlucky situation of a house, burying-place, &c. If any imprudent person has built a house close to that of a Chinese, in such a manner that the angle formed by its roof flanks the wall or roof of the former house, the proprietor ever after lives in terror of utter ruin and destruction from the malignant influence of that angle. An implacable hatred instantly commences between the two families, and often gives rise to a law-suit, which furnishes matter of discussion for some of the superior tribunals. If no redress can be had at law, however, the Chinese is then reduced to the necessity of erecting, on the top of his house, an enormous image of a dragon, or some other monster, with its mouth gaping towards the angle, and, as it were, threatening to swallow it up; after which the apprehensions of the proprietor begin to subside, and tranquillity is restored to the family. In this manner the governor of Kien-chang secured himself from the influence of the church of the Jesuits, which, being built on an eminence, overlooked his palace. Not depending, however, entirely on the good offices of his tutelary dragon, he also took the wise precaution of altering his principal apartments, and raising, at the distance of 200 paces from the church, a kind of large facade three stories high. But unluckily the death of his successor was attributed to this facade; for the mandarin being attacked with a disorder in his breast, which made him spit up a white phlegm, this symptom was thought to be owing to the walls of the facade, which were very white, and which were forthwith painted black. The salutary precaution, however, happened to be taken too late; for the governor died notwithstanding the black colour of the walls.

"We should never have done (says M. Grolier), were we to relate all the superstitious ideas of the Chinese, respecting the lucky and unlucky situation of houses, the quarter which doors ought to face, and the plan
A colony of Jews was established in China about the year 206 B.C.; but they are now reduced to a small number of families at Cai-fong, the capital of the province of Honan. The Mahometans have multiplied much more than the Jews. It is above 600 years since they first entered the empire, where they have formed different establishments. At first their number was augmented only by marriages; but for some time past they have been more particularly attentive to the extending of their faith and propagating their doctrine. The principal means employed for this purpose are, to purchase a great number of children brought up in idolatry, whom their poor parents are glad to part with; and these they circumcise, and afterwards instruct in the principles of their religion. During the time of a famine which desolated the province of Chang-tong, they purchased more than 10,000 of these children; for whom, when grown up, they procured wives, built houses, and even formed whole villages of them. They are now become so numerous, that in the places where they reside they entirely exclude every inhabitant who does not believe in their prophets, and frequent a mosque.

With regard to the manners of the Chinese, they bear no resemblance to those of any other nation; and, if we may believe their historians, they are the same at this day that they were 4000 years ago. The women are condemned almost to perpetual imprisonment within the precincts of their own huts, and are never even seen even by their intended husbands before marriage. He knows nothing of her looks or person but from the account of some female relation or confident, who in such cases acts the part of match-maker; though, if imposed upon either with regard to her age or figure, he can have recourse to a divorce. The same matrons who negotiate the marriage, also determine the fine which the intended husband must pay to the parents of the bride; for in China a father does not give a dowry to his daughter; it is the husband who gives a dowry to the wife. When the day appointed for the marriage is arrived, the bride is placed in a chair or close palanquin, the key of which is committed to the hand of a trustworthy domestic, who must deliver it to none but the husband. The latter, richly dressed, waits at his gate for the arrival of the procession. As soon as it approaches the key is put into his hands; he eagerly opens the chair, and for the first time perceives his bride, or unfortunate. If he is contented with his new bride, the bride descends and enters the house, where the marriage is concluded by feasting and mer­­tain-ent as in other countries; but if the bridegroom is very much disappointed, he suddenly shuts the chair, and sends the bride home to her relations. To get rid of her in this manner, however costs a sum equal to what he originally gave in dowry to obtain her.

The Chinese women, even of the first rank, seldom quit their apartments, which is situated in the most retired part of the house, and in which they are secluded from all society but that of their domestics. The book of ceremonies requires that there should be two apartments in every house; the exterior one for the husband, the interior for the wife. They must even be separated by a wall or wooden partition, the door of which is carefully guarded; nor is the husband at liberty to enter the wife's apartment, or she to quit it, without sufficient reason. According to the same book, the prattling and loquacity of a woman are reckoned sufficient grounds for a divorce. A woman, however, cannot be divorced on any account, if she loses her parents after marriage, or if she has worn three years mourning for the loss of her husband, father, or mother.

A widow of any rank above the common, who has children, seldom enters a second time into the marriage state, though those of the ordinary rank generally do. The poorer part are not at liberty to follow their own inclination; but are sold for the behoof of the parents of the deceased. As soon as the bargain is concluded, a couple of persons bring a chair, which is guarded by a number of sturdy people. In this the widow is shut up, and thus conducted to her new husband.

"Masters (says Mr Grosier), for the most part are very desirous of promoting marriage among their slaves, whatever Mr Pau may say; who, without any foundation, has ventured boldly to assert the contrary. They have even very strong motives to induce them to encourage these marriages; the children produced by them are filled their flames; and besides their becoming new property to them, the fathers and mothers are thus more strongly attached to their service."
is punished with death: and the same punishment is
generally inflicted on the person who debauches a
young woman.

From the accounts we have of the education of chil-
dren in China, one might be apt to conclude, that, in-
stead of being the ignorant superstitious race already
described, they ought to be the most intelligent people
in the world. The book of ceremonies directs the edu-
cation of a child to commence as soon as it is born,
and describes exactly the qualities which its nurse
ought to have. She must speak little, adhere strictly
to truth, have a mild temper, behave with affability to
her equals, and with respect to her superiors. The child
is taught to use the right hand as soon as it can put its
hand to its mouth, and then it is weaned. At six
years of age, if a male, he is taught the numbers most
in use, and made acquainted with the names of the
principal parts of the world; at seven, he is separ-
ated from his father, and no longer allowed to eat with
him, nor to sit down in his presence; at eight, he
is instructed in the rules of good breeding and polite-
ess; at nine, he studies the calendar; at ten he is sent
to a public school, where he learns to read, write, and
count accounts; from ten to fifteen he is taught music,
and every thing that he can do; he is sent to a school,
where he is taught to do sums, and to read and write.
He is instructed in the principles of the world; at
eleven, he is taught geography, and the history of
the different empires; at twelve, he is taught to
read the Chinefe authors with

Another method of initiating children into the
principles of knowledge in this empire is, by selecting
a number of characters expressive of the most common
objects, engraving or painting them separately on
some kind of substance, and, under the thing represented,
putting the name, which points out to the children the
meaning of the word.

As the Chinefe have no proper alphabet, they re-
prent almost every thing by different characters. The
labour of their youth, therefore, is intolerable; being
obliged to study many thousand characters, each of
which has a distinct and proper siglitification. Some
idea of their difficulties may be obtained from what we
are told by F. Martini, who affures us, that he was un-
der the necessitv of learning 60,000 different charac-
ters before he could read the Chinefe authors with tol-
able ease.

The book first put into the hands of the Chinefe
children is an abridgment, which points out what is
a child ought to learn, and the manner in which he
should be taught. This volume is a collection of short
sentences, consisting of three or four verses each, all of
which rhyme; and they are obliged to give an account
in the evening of what they have learned in the day.

After this elementary treatise, they put into their hands
the four books which contain the doctrines of Confu-
cius and Mencius. The sense and meaning of the
work is never explained to them until they have got by
heart all the characters, that is to say, the words in the
book: a method no doubt inconceivably disgusting,
and calculated utterly to destroy the genius of a boy,
if he has any. While they are getting these charac-
ters by heart, indeed, they are likewise employed in
learning to form them with a pencil. For this pur-
pose they are furnished with large leaves of paper, on
which are written or printed with red ink very big.
characters; and all they are required to do is to cover
those red characters with black ink, and to follow ex-
actly their shape and figure: which infensibly accustoms
them to form the different strokes. After this they are
made to trace other characters, placed under the pa-
per on which they write. These are black, and much
smaller than the other. It is a great advantage to the
Chinefe literati to be able to paint characters well; and
on this account they bestowed great pains in forming the
hands of young people. This is of the utmost conve-
fersory to literary students in the examinations which
they are obliged to undergo before they can be ad-
mitted to the first degree. A student, in order to secure
his promotion, is obliged to go through a long series of
examinations, which are headed, viz., that "a candidate
for degrees having,

After the scholar has made himself master of the char-
acters, he is then allowed to compose; but the sub-
ject of his composition is pointed out to him only by
one word. Competitions are likewise established in
China, but most of them are of a private nature.
Twenty or thirty families, who are all of the same
name, and who consequently have only one hall for the
names of their ancestors, agree among themselves to
send their children twice a month to this hall in order
to compose. Each head of a family in turn gives the
subject of this literary contest, and adjudges the prize;
but this costs him a dinner, which he must cause to be
carried to the hall of competition. A fine of about
fifteen pounds is imposed on the parent of each scholar who
appears himself from this exercise.

Besides these private competitions, every student is
obliged to compete at least twice a-year under the in-
spection of an inferior mandarin of letters, styled His-
kan. It frequently happens also, that the mandarins of
letters order these students to be brought before
them, to examine the progress they have made in their
studies, to excite a spirit of emulation among them, and
make them give such application as may qualify them
for any employment in the state. Even the governors
of cities do not think it below their dignity to take
these care upon themselves; ordering all those students
who reside near them to appear before their tribunal:

The author of the best composition is honoured with a prize, and the governor treats all the
candidates on the day of competition at his own ex-
 pense. In every city, town, and village in China,
there are schoolmasters who teach such sciences as
are known in that country. Parents puffed of a certain
fortune provide masters for their children, to attend
and instruct them, to form their minds to virtue, and
to initiate them in the rules of good breeding and the
acquiesced ceremonies, as well as to make them ac-
quainted.
Dres. The education of the Chinese women is confined to giving them a taste for polite, and ACCOMPLISHING them to beauty and elegance; and, if their parents are rich, they are likewise instructed in such accomplishments as may render them agreeable to the other sex.

There is little distinction in China between the ordinary dres of men and women. Rank and dignity are distinguished by certain accouterments: and the person would be severely censured who should presume to assume them without being properly authorized. The dres in general consists of a long veil which reaches to the ground. One part of this veil, viz. that on the left side, folds over the other, and is fastened to the right by four or five small gold or silver buttons, placed at a little distance from one another. The sleeves are wide towards the shoulder, growing narrower as they approach the wrist, where they terminate in the form of a horse shoe, covering the hands entirely, and leaving nothing but the ends of the fingers to be seen. Round their middle they wear a large griddle of silk, the ends of which hang down to their knees. From this griddle is suspended a sheet, containing a knife and two of those small flicks which they use as forks. Below this robe they wear a pair of drawers, in summer made of linen, and in winter of satin lined with fur, sometimes of cotton, and in some of the northern provinces of skin. These are sometimes covered with another pair of white safeties. Their shirts are always very short and wide, of different kinds of cloth, according to the season. Under these they wear a silk net to prevent it from adhering to the skin. In warm weather they have their necks always bare; when it is cold, they wear a collar made of silk, 'fable, or fox's skin, joined to their robe, which in winter is trimmed with sheep's skin, or quilted with silk and cotton.

That of people of quality is entirely lined with beautiful fable skins brought from Tartary, or with the finest fox's skin, trimmed with fable; and in the spring it is lined with ermine. Above their robe they wear also a kind of fur-tout with wide sleeves, but very short, which is lined in the same manner. The emperor and princes of the blood only have a right to wear yellow; certain mandarins have liberty to wear satin of a red ground, but only upon days of ceremony; in general they are clothed in black, blue, or violet. The common people are allowed to wear no other colours but blue or black; and their dres is always composed of plain cotton cloth.

Formerly the Chinese were at great pains to preserve their hair; but the Tartars, who subdued them, compelled them to cut off the greater part of it, and to alter the form of their clothes after the Tartar fashion. This revolution in dres was not effected without bloodshed, though the conqueror at the same time adopted in other respects the laws, manners, and customs of the conquered people. Thus the Chinese are painted as if bald, but they are not so naturally; that small portion of hair which they preserve behind, or on the tops of their heads, is all that is now allowed them.

This they wear very long, and plait like a tail. In summer they wear a kind of cap shaped like an inverted cone, lined with satin, and covered with ratan or osier very prettily wrought. The top terminates in a point, to which they fix a tuft of red hair, which spreads over it, and covers it to the brims. This hair grows between the legs of a kind of cow, and is capable of taking any colour, especially a deep red. This ornament is much used, and any person who chooses may wear it.

The mandarins and literati wear a cap of the same form as the foregoing, only it is lined with red satin, and covered on the outside with white. A large tuft of the finest red silk is fixed over it, which is suffered to hang down or wave with the wind. People of distinction generally use the common cap when they mount on horsecback or during bad weather; being better calculated to keep off rain, and shelter those who wear it from the rays of the sun. In winter they have another cap bordered with sable, ermine, or fox's skin, and ornamented with a tuft of silk like the former. In these fur-trimmings they are very curious, sometimes expending 40 or 50 ounces of silver upon them.

The Chinese people of rank never go abroad without boots made of satin, or some other silk, and sometimes of cotton, but always dyed. They have neither heel nor top, and are made to fit the foot with the greatest exactness. When they travel on horsecback, however, they have others made of the skin of a cow or horse made very pliable. Their boot-stockings are of silk stuff, quilted and lined with cotton, reaching above the top of their boot, and ornamented with a border of velvet or cloth. In summer they wear a cooler kind, and in their houses a sort of slippers made of silk stuff. The common people are contented with black slippers made of cotton stuff. The fan is also a necessary appendage of the Chinese dres, and is reckoned equally necessary with the boots.

The dres of the women consists of a long robe quite close at top, and long enough to cover even their toes, with sleeves so long that they would hang down upon the ground, did they not take care to tuck them up; but their hands are seldom seen. The colour of their dress is entirely arbitrary, but black and violet are generally chosen by those advanced in life. The young ladies, like those of Europe, make use of paint to give a bloom to their complexions; but this, though not the same with the kind used in Europe, agrees with it in the effect of soon wrinkling the skin. Their general head-dres consists in arranging their hair in several curls, among which are interperforated small tufts of gold or silver flowers. According to D. Halde, some of them ornament their heads with the image of a fabulous bird, concerning which many stories are told. This is made of copper or silver gilt, its wings extended and lying pretty close to the head-dres, embracing the upper part of their temples, while the long spreading tail forms a kind of plume on the top of the head. Its body is directly over the head, and the neck and bill hang down, the former being joined to the body by a concealed hinge, in order that it may play freely, and move about on the least motion of the head. The whole bird adheres to the head by means of the claws, which are fixed in the hair.

Ladies of quality sometimes wear several of these birds made up into a single ornament, the workmanship of which is very expensive. Young ladies wear also a
Throughout China of confining the feet of female infants in such a manner that they are never allowed to grow to near their full size. The smallness of their feet is accounted such a valuable beauty, that the Chinese women never think they can pay too dear for it. As soon therefore as a female infant is born, the nurse wraps up its feet in very tight bandages; and this torture must be endured until their feet have ceased to grow. So prevalent is the force of custom, however, that as the child grows up the voluntarily submits to new tortures in order to accommodate the purpose more effectually. Thus the Chinese women are deprived almost entirely of the use of their feet; and are scarce able to walk, in the most awkward hobbling manner, for the shortest space. The shoe of a full grown Chinese woman will frequently not exceed six inches.

The Chinese use white as the colour proper for mourning; and though a son cannot wear this while his father and mother are alive, he can use it no other for three years after their death; and ever afterwards his clothes must be of one colour. The law has forbidden the use of satins and fine cloths to children; and has even prescribed the time when they are first to wear a cap. This is put upon their heads by the master of ceremonies himself, who addresses them in the following manner: "Consider that you now receive the drest of those who have attained to maturity, and that you cease to be children; renounce therefore all childish thoughts and inclinations, assume a grave and serious deportment, apply with resolution to the study of virtue and wisdom, and endeavour to merit a long and happy life." "This ceremony (says M. Grouard), which may appear trifling, is attended with the happiest effects. The Chinese give a kind of importance to every thing which can inspire youth with a taste for morality and a love of good order. It might be useful to mankind at every fixed epoch of their lives, to remind them of those new duties imposed by each successive change; but, by uniting the solemnity of a public ceremony to this instruction, it will make a deeper impression, and remain much longer imprinted on their memories."

Nothing can appear more irksome to an European than the multitude of ceremonies used on all occasions by the Chinese. An invitation to an entertainment is not fapposed to be given with sincerity until it has been renewed three or four times in writing. A card is sent on the evening before the entertainment, another on the morning of the appointed day, and a third when everything is prepared and the guests ready to sit down to the table. The master of the house always introduces his guests into the hall, where he формуles them one after another. He then orders wine to be brought him in a small cup made of silvcr, porcelain, or precious wood, and placed upon a small varnished falver. He lays hold of it with both hands, makes a bow to all the surrounding guests, and advances towards the fore-part of the hall, which generally looks into a large court. He there raises his eyes and the cup towards heaven; after which he pours the wine on the ground. He afterwards pours some wine into a silver or porcelain cup, makes a bow to the most considerable person in company, and then goes to place the cup on the table before him; for in China every guest has a table for himself. The person for whom he intends this honour, however, generally saves him the trouble of placing the cup; calls for wine in his turn, and offers to place the cup on the master's table, who endeavours to prevent him; with a thousand apologies and compliments according to the rules of Chinese politeness. A superior domestick conducts the principal guest to an elbow chair covered with rich flowered silk, where the stranger again begins his compliments, and begs to be excused from sitting in such an honourable seat, which nevertheless he accepts of; and all the rest of the guests do the same, otherwise the ceremonial would be gone through with each of them. The entertainment is concluded by some theatrical representations, accompanied with the music of the country; which, however, would give but little pleasure to an European. Besides the guests, a certain number of people are admitted into the court in order to behold these theatrical representations; and even the women are allowed to view them through a wicket, contrived to that they may behold them without being seen themselves.

The entertainments of the Chinese are begun, not by eating, but by drinking; and the liquor they drink must always be pure wine. The intendant, or 'maître de hotel,' falling down on one knee, first invites the guests to take a glass; on which each of them lays hold, with both hands, of that which is placed before him, raising it as high as his forehead, then bringing it lower down than the table, and at last putting it to his mouth; they all drink together, and very slowly, taking three or four draughts. While they are drinking, the dishes on each of the tables are removed, and others brought in. Each of the guests has twenty-four feet before him in succession; all of them fat, and in the form of ragouts. They never use knives in their repasts; and two small-pointed sticks, ornamented with ivory or silver, serve them instead of forks. They never begin to eat, however, until they are invited by the 'maître de hotel'; and the same ceremony must be gone through every time they are going to take a cup of wine or begin to a new dish. Towards the middle of the entertainment the soup is brought in, accompanied with small loaves or meat-pies. These they take up with their small sticks, steep them in the soup, and eat them without waiting for any signal or being obliged to keep time with the rest of the guests. The entertainment, however, continues in other respects with the utmost formality until tea is brought in, after which they retire from table and amuse themselves in another hall, or in the garden for a short time, until the desert be brought in: This, like the entertainment itself, consists of 24 dishes, which are made up of sweetmeats, fruits differently prepared, hams and salted ducks which have been backed or dried in the sun, with flesh and other kinds of fish. The same ceremonies which preceded the repast are now renewed,
The entertainments begin towards evening, and never end till midnight. A small sum of money is generally given to the domestics: when every one of the guests goes home in a chair preceded by several servants, who carry large lanterns of oil, and on which are inscribed the quality, and sometimes the name, of the master. Without such an attendance they would be taken up by the guard; and the day following they never fail to return a card of thanks to the officer.

Their method of drinking tea is not like that of other nations. A small quantity of bohea, sufficient to tinge the water and render it palatable (for they drink no green), is taken in the morning, and thrown into a vessel adapted to the number in family. This stands till milk warms; in which state it is kept the whole day, and a cup drank now and then without sugar or milk, in order to exhilarate the spirits when exhausted by fatigue: and if a stranger call by accident, or a visitor by appointment, the first thing presented, after the usual ceremonies of meeting, is a very small pipe filled with tobacco of their own growth and a cup; the tea already mentioned, or of some freth made of better quality, together with sweetmeats, &c. Tea is the daily beverage in China, and is drunk by all ranks of people.

Some change has been made in the ceremonial of the Chinese by the Tartar conquest, and some new dishes also introduced by the same means; and here M. Grolier observes, that the Tartars are much better cooks than the Chinese. All their dishes are highly seasoned; and by a variation in the proportions of their spiceries, they are able to form a variety of dishes out of the same materials. None of their viands, however, are more esteemed than flags finews, and the nefs of a particular species of birds, which have the property of giving a most agreeable relish to whatever is mixed with them. Other dishes are introduced at these repasts, which would be disagreeable with us; such as the flesh of wild horses, the paws of a bear, and the feet of several wild animals. The greater part of these provisions are brought preferved in salt from Siam, Camboy, and Tartary.

The wines of China have no resemblance to ours either in taste or quality, being procured from rice and not from the vine. A particular kind of rice is employed for making them, and the grain is steeped for 20 or 30 days in water, into which ingredients of a different nature are successively thrown: they afterwards boil it; and as soon as it becomes dissolved by the heat, it immediately ferments, and throws up a vaporous foam not unlike new wine. A very pure liquor is found under this scum, which is drawn off and put into vessels well glazed; from the remaining yses an inflammable spirit is made, little inferior, and sometimes even superior to the European. Another kind of wine is used by the Chinese, or rather Tartars, called lamb-wine. It is very strong, and has a disagreeable smell; and the same may be believed of a kind of spirit distilled from the flesh of sheep; though this last is sometimes used by the emperors.

These entertainments exceed the bounds of ordinary repasts; the Chinese being naturally sober, and those in easy circumstances living chiefly on pork, for which reason a great number of hogs are bred in the country. Their flesh is much easier of digestion, and more agreeable to the taste, than that of Europe. The Chinese cups are in high estimation. The common people live very poorly; being satisfied, in time of scarcity, with the flesh of dogs, horses, cats, and rats, which last are sold publicly in the streets.

There are several public festivals annually celebrated in China. One is that already mentioned, in which the emperor tills the ground with his own hands. This is also celebrated on the same day throughout the empire. In the morning the governor of every city comes forth from his palace crowned with flowers, and, after his chair amidst the noise of different instruments which precede it; a great number of people attending, as is usual on such occasions. The chair is surrounded by litters covered with silk carpets, on which are represented either some illustrious persons who have supported and encouraged agriculture, or some historical painting on the same subject. The streets are hung with carpets, triumphal arches are erected at certain distances, lanterns everywhere displayed, and all the houses illuminated. During the ceremony a figure resembling a cow, made of baked earth, with gilt horns, is carried in procession, and of such enormous magnitude that 40 men are scarce sufficient to support it. A child follows with one foot naked and the other shod, who is called the spirit of labour and diligence, and keeps continually beating the image with a rod to make it advance. Labourers, with their implements of husbandry, march behind; and the procession is closed by a number of comedians and people in masks. The governor advances towards the eastern gate, and returns in the same manner. The cow is then stripped of its ornaments, a prodigious number of earthen calves taken from its belly and distributed among the people; after which the large figure is broken in pieces and distributed in the same manner. The ceremony is ended by an oration in praise of agriculture, in which the governor endeavours to excite his hearers to the practice.

Other two festivals are celebrated in China with still more magnificence than that above described. One of them is at the commencement of the year; the other is called the feast of lanterns. During the celebration the former, all business, whether private or public, is suspended, the tribunals are shut, the posts stopped, presents are given and received, and visits paid. All the family assemble in the evening, and partake of a feast to which no stranger is admitted; though they become a little more sociable on the following day. The feast of lanterns ought to take place on the 15th day of the first month, but usually commences on the evening of the 14th, and does not end till that of the 16th. At that time every city and village, the shores of the sea, and the banks of all the rivers, are hung with lanterns of various shapes and sizes; some of them being seen in the courts and windows of the poorest houses. No expense is spared on this occasion; and some of the rich people will lay out eight or nine pounds sterling on one lantern. Some of these are very large composed of fix wooden frames either neatly painted or gilt, and filled up with pieces of fine transparent silk, upon which are painted flowers, animals, and human figures; others are blue, and made of a transparent kind of horn. Several lamps, and a great
great number of wax candles, are placed in the inside: to the corners of each are fixed fire-creapers of silk and satin of different colours, with a curious piece of carved work on the top. They are likewise acquainted with our magic lantern, which they sometimes introduce in this festival. Besides this they have the art of forming a snake 60 or 80 feet in length, filled with lights from one end to the other; which they cause twist itself into different forms, and move about as if it was a real serpent. During the same festival all the varieties of the Chinfe fire-works, so justly admired, and which, some time ago at least, surpassed everything of the kind that could be done in Europe, are exhibited.

Every public ceremony in China is carefully rendered as striking as possible. A viceroy never quits his palace but with a royal train, drested in his robes of ceremony, and carried in a chair elegantly gilt, which is borne upon the shoulders of eight domesties; two drummers marching before the guards, and bearing upon copper basons to give notice of his approach. Eight other attendants carry standards of wood varnished, upon which are incribed in large characters all his titles of honour. After these come 14 flags with the symbols of his office; such as the dragon, tyger, phoenix, flying tortoise, &c. Six officers follow, each bearing a piece of board in shape like a large towel, on which are written in large golden characters the qualities of the mandarin himself: two others carry, the one a large umbrella of yellow silk, and the other the cover in which the umbrella is kept. The first guards are preceded by two archers on horseback; the latter are followed by others armed with a kind of weapons composed of hooked blades, fixed perpendicularly to long poles ornamented with four tufts of silk, placed at a small distance above one another. Behind these are two other files of soldiers, some of whom carry large maces with long handles; others iron maces in the shape of a snake; others are armed with huge hammers; while those behind them carry long battle-axes in the form of a crescent: others follow, who have battle-axes of another kind; and behind these are some with the hooked weapons already described.

Behind these come soldiers armed with triple-pointed spears, arrows, or battle-axes; having in front two men who carry a kind of box containing the viceroy's deal. Then come two other drummers to give notice of his approach. Two officers follow, having on their heads felt-hats, adorned with plumes of feathers, and each armed with a cane to recommend regularity and good order to the surrounding multitude. Two others bear maces in the form of gilt dragons. These again are followed by a number of magistrates and officers of justice; some of whom carry whips or flat sticks, while others have chains, hangers, and Silk fars. Two standard-bearers and a captain command this company, which immediately precedes the governor. His chair is surrounded by pages and footmen, and an officer attends him who carries a large fan in form of a crescent: he is followed by several guards differently armed, together with ensigns and other officers, who are also followed by a great number of domestics all on horseback, carrying various necessaries for the use of the mandarin. If he marches in the night-time, instead of flambeaus, as are customary in Europe, large lanthorns, exceedingly pretty, are carried before him:

The emperor marches with still more magnificence, in proportion to his superior quality. The trumpets used in his procession are about three feet long, eight inches in diameter at the lower extremity, and pretty much resembling a bell in shape: their sound is peculiarly adapted to that of the drums. His cavalcade is closed by 2000 mandarins of letters and as many of arms. Sometimes the great mandarins, as well as the emperor, travel in barks. Their attendance is then somewhat different, but the magnificence almost the same. The honours paid to a viceroy who has governed a province with equity are exceedingly great on his departure from it. He has scarcely left the capital of the province when he finds on the highway, for the space of two or three leagues, tables ranged at certain distances, each of which is surrounded with a long piece of silk that hangs down to the earth. On these wax candles are placed even in the open day; perfumes are burnt upon them; and they are loaded with a profusion of victuals and various kinds of fruits, while tea and wine are prepared for him on others. The people throw themselves on their knees as he passes, and bow their heads even to the earth; some shed tears, or pretend to do so; some present him wine and sweet meats; others frequently pull off their boots and give him new ones. These boots, which he has perhaps used only for a moment, are considered as a valuable monument: these first taken are preserved in a cage over the gate of the city; the rest are carefully kept by his friends.

Hitherto our author, M. Grober, has seemed inclined to give a favourable idea of the Chinese, and to cause us look upon them as many degrees superior to ourselves in the practice of virtue and morality; but when he comes to give an account of their dealings in trade, he is then obliged to confess that they are as dishonest and knavish a race as any that exist. "The most frequented fairs of Europe (says he) afford but a faint idea of that immense number of buyers and sellers with which the large cities of China are continually crowded. We may almost say, that the one half are employed in over-reaching the other. It is, above all, against strangers that the Chinese merchants exercise, without any sense of shame, their insatiable rapacity. Of this F. du Halde gives a striking example, which might be supported by many others: The captain of an English vessel bargained with a Chinese merchant at Canton for several bales of silk, which the latter was to provide against a certain time. When they were ready, the captain went with his interpreter to the house of the Chinife merchant to examine whether they were found in good condition. On opening the first bale, he found it according to his wish, but all the rest were damaged and good for nothing. The captain on this fell into a great passion, and reproached the merchant in the severest terms for his dishonesty. The Chinife, after having heard him for some time with great coolness, replied, 'Blame, Sir, your knave of an interpreter: he assured me that you would not inspect the bales.' "

"The lower classes of people are, above all, very dexterous..."
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China. terous in counterfeiting and adulterating every thing they fell. Sometimes you think you have bought a capon, and you receive nothing but skin; all the rest has been scooped out, and the place so ingeniously filled, that the deception cannot be discovered till the moment you begin to eat it. The counterfeit hams of China have been often mentioned. They are made of a piece of wood cut in the form of a ham, and coated over with a certain kind of earth which is covered with hog's skin. The whole is so curiously painted and prepared, that a knife is necessary to detect the fraud.

Mr Oktav, that having one day observed a blind man carrying about for sale some of those trees called by the Chinese Fe-kei, he purchased one, which to appearance had fine red and white flowers; but in a closer examination, he found that the flowers were taken from another tree, and that one calyx was so neatly fitted into the other, with nails made of bamboo, that he should scarcely have discovered the deceit, had not the flowers begun to wither. The tree itself had buds, but not one open flower.

"The robbers in China signalize themselves also by their dexterity and ingenuity, which they display in their profession. They seldom have recourse to acts of violence, but introduce themselves into a house either privately or by forming some connection with the family. It is as difficult in China to avoid robbery as it is to apprehend the criminal in the fact. If we are delirious of finding among the Chinese open eyes of temper, benevolence, friendship, and, lastly, virtue, we shall not seek for it in cities, but in the bosom of the country, among that class of men who have devoted themselves to labour and agriculture. A Chinese rustic often discovers moral qualities which would add a lustre to the character of men of the most exalted rank. It appears that rural life naturally inspires sentiments of benevolence; by continually receiving the gifts of nature, the mind is enlarged, and men are infensibly accustomed to diffuse them to those around them."

The internal commerce of China is much greater than that of all Europe; but its foreign trade is by no means equal to that of any of the grand European powers. Its internal commerce is greatly facilitated by the vast number of canals and rivers which intersect the country, among that class of men who have devoted themselves to labour and agriculture. A Chinese rustic often discovers moral qualities which would add a lustre to the character of men of the most exalted rank. It appears that rural life naturally inspires sentiments of benevolence; by continually receiving the gifts of nature, the mind is enlarged, and men are infensibly accustomed to diffuse them to those around them."

The commercial articles of China are exchanged for exchange which they procure at Cambaya or Siam, produces them cent. per cent. Their trade with the Moluccas brings only about 50 per cent. Their profit is more considerable about Batavia, and the Dutch spare no pains to invite them to traffic at their settlement. The Chinese traders go also, tho' not very frequently, to Acheen, Malacca, Bantam, Patan and Lucca, belonging to Siam and Cochinchina; from whence they bring gold and tin, together with some objects of luxury for the table. A great obstacle to the foreign commerce of the Chinese is their indifference about marine affairs, and the bad construction of their vessels. This they themselves acknowledge: but say, that any attempt to remove it would be derogating from the laws, and subverting the constitution of the empire.

The burying-places in China are always situated at a small distance from a city or town, and generally under some edifice, having pines or cypress trees usually planted around them. The form of the tombs is various, according to the different provinces, and the situation of those for whom they are intended. The coffins of the poor are placed under a shade covered with thatch, or inclosed in a small building of brick in the form of a tomb. The tombs of the rich are shaped like a horse-shoe, well whitened, and finished with great taste; but those of the mandarins and people of quality are much more magnificent and elegant. A vault is first constructed, in which the coffin is shut up; over this vault is raised a pyramid of earth well beat together, about 12 feet in height and 10 in diameter. A layer of lime and sand laid over this earth makes a kind of plaster, which renders the whole very durable and solid; various kinds of trees being planted around it in regular order. Before it is placed a large and long table of white marble, on the middle of which are set a cenotaph accompanied with two vases, and the same number of candles, with a profusion of workmanship. Besides this, a great number of figures, representing officers, courtiers, soldiers, saddled horses, camels, lions, tortoises, &c. are ranged round the tomb in different rows; which, F. du Halde assures us, produce a very striking effect.

When a Chinese dies in a province in which he was born, his children have a right, in their indigent state, to transport the body to the burying place of their ancestors. A son who should be wanting in this respect, would be disgraced, and his name never placed in the hall of his ancestors. This is a vault built, as common to all the branches of the same family; and to which they all repair at a certain season of the year. Sometimes they amount to seven or eight thousand persons, of whose fortune, dignity, and rank in society, are all very different; but there no distinction of rank is known: age only gives precedence, and the oldest always takes place at all the rest, though he should be the poorest in the company. When building, the Chinese do not set a table fet against the wall, upon which is generally seen the image of one of their ancestors, who has filled some office of distinction in the empire with honour to himself, or who has been rendered illustrious by his talents and abilities. Sometimes it only contains the names of men, women, and children belonging to the family inscribed upon tablets, together with their age, the day of their death, and the dignities they enjoyed at that time. These tablets are ranged in two rows upon steps, and are only about a foot high each. In the spring, and sometimes in the autumn, the relations of the deceased repair to this hall, where the only privilege enjoyed by the richest is that of preparing an entertainment, and treating the whole family at their own expenses: but they never allow themselves to taste a bit of any thing until an offering has been first made to their ancestors. This does not, however, exclude them from visiting the real tomb of their ancestors once or twice a year, generally in the month of April. At this time they pluck the weeds and bushes from around the tomb, renew their expressions of
of grief, and conclude by placing upon it wine and provisions, which serve to dine their affitants.

The funeral ceremonies are considered by the Chinese as the most important of any. A few moments after a person has expired, he is dressed out in his richest attire, and adorned with every badge of his dignity; after which he is placed in the coffin. The preparation of a coffin, in which his body may be included after death, is one of the chief objects of attention to a Chinese during his life, and great expense is often thrown out upon it; inasmuch that the poor will give all they are worth, and the rich expend a thousand crowns, nay, a thousand times the coffin, when purchased with all this labour and expense. The coffin is deposited in a tomb appropriated for it, not far from which there are tables arranged in different halls, and on which the affitants are entertained with great splendour. The entertainment is sometimes followed by fresh marks of homage to the corpse; but these are often changed into thanks to the eldest son, who, however, answers only by signs. But if the deceased was a grandee of the empire, a certain number of his relations never leave the tomb for a month or two. There they reside in apartments strictly provided for them, and every day renew their marks of grief in company with the children of the deceased. The magnificence of these funeral ceremonies is proportioned to the wealth or dignity of the deceased. That of one of the brothers of the emperor was attended by 16,000 people, each of whom had a particular office assigned him relating to the ceremony.

The manner of interment is as follows: First they sprinkle some lime in the bottom of the coffin; then they lay the body in it, taking care to place the head on a pillow, and to add a great deal of cotton that it may remain more steady, and be prevented from shaking. In this manner the body remains exposed seven days; but the time may be reduced to three, if any weighty reason makes it necessary; and, during this interval, all the relations and friends, who are purposefully invited, come and pay their respects to the deceased, the nearest relations remaining in the houfe. The coffin is exposed in the hall of ceremony, which is then hung with white, but some pieces of black or violet coloured silk are here and there interpersed, as well as some other ornaments of mourning. Before the coffin is placed a table, on which stands the image of the deceased, or a carved ornament inscribed with his name: and these are always accompanied with flowers, perfumes, and lighted wax candles.

In the mean time those who enter the hall are accustomed to salute the deceased as if he were still in life. They prostrate themselves before the table, and knock their foreheads severally against the earth; after which they place on the table some perfumes and wax candles provided for the purpose. The fublation which they have made to the deceased is returned by the eldest son accompanied by his brothers. The latter come forth from behind a curtain, which hangs on one side of the coffin, creeping along the ground until they reach the spot where those fand whom they are going to salute; after which, without rising up, they return to the place from whence they came. The women are also concealed behind the same curtain, from whence they every now and then send forth dillmal cries.

After a number of ceremonies and invitations, the funeral procession at last commences. A troop of men march in a file, carrying different figures made of paste-board, and representing lions, tigers, horses, &c. Others follow, marching in two files; some of which carry standards, some flags or censers filled with perfumes; while melancholy and plaintive airs are played by others on different musical instruments. These musicians immediately precede the coffin, which is covered with a canopy, in form of a dome, of violet-coloured silk: its four corners are ornamented with tufts of white silk very neatly embroidered, and covered at the top with net-work. The coffin is placed on the bottom of this machine, and is carried by 64 men. The eldest son, clothed in a frock of canvas, having his body bent and leaning on a staff, follows near the coffin; and behind him his brothers and nephews, but none of them clothed in canvas. Then come the relations and friends, all clad in mourning, and followed by a great number of chairs covered with white stuff, which contain the wives and female slaves of the deceased. These make great show of sorrow by their doleful cries; but M. Grosier observes, that in spite of all they can do, the lamentations of the Chinese are so methodical, that an European would be apt to conclude that they were the effects of art rather than the natural effusions of a mind agitated and oppressed with grief. When they arrive at the burying-place, the coffin is deposited in a tomb appropriated for it, not far from which there are tables arranged in different halls, and on which the affitants are entertained with great splendour. The entertainment is sometimes followed by fresh marks of homage to the corpse; but these are often changed into thanks to the eldest son, who, however, answers only by signs. But if the deceased was a grandee of the empire, a certain number of his relations never leave the tomb for a month or two. There they reside in apartments strictly provided for them, and every day renew their marks of grief in company with the children of the deceased. The magnificence of these funeral ceremonies is proportioned to the wealth or dignity of the deceased. That of one of the brothers of the emperor was attended by 16,000 people, each of whom had a particular office assigned him relating to the ceremony.

Mourning continues in China for three years; and during all this time they are obliged to abstain from the use of flesh and wine; nor can they affift at any entertainment of ceremony, or attend any public assembly. At first they are not even permitted to go abroad; and when they do so, they are carried in a chair covered with a white cloth. Sometimes the filial piety of the Chinese is carried to such a length, that they preserve the bodies of their deceased fathers in their houses for three or four years; and those who do so impose also upon themselves a great number of other duties, using no other seat during the day but a stool covered with white serge, and no other bed but a plain mat made of reeds, which is placed near the coffin.

According to M. Grosier, the only diversions of the Chinese are those of hunting and fishing, dancing not being practised, and gaming forbidden by law. Fishing is considered by them rather as an object of commerce and industry than amusement. They catch fish by various methods; using nets in their great fisheries, but lines in the private. In certain provinces also they use a certain kind of bird, whose plumage greatly resembles that of a raven, but with a much longer bill, very sharp and hooked. This method of fishing is practised in boats, of which great numbers may be seen on the river about fun-rising, with the fishing-birds perched on their prows. These birds are taught to catch fish almost in the same manner that dogs pursue game. The fishermen, after making several turns with their boats, beat the water strongly with one of their oars: This serves as a signal to the birds, who instantly plunge into the water, and diving, swallow as many fish as they can, and, when full, swim to their boats, which are kept by the fishermen, who take them aboard with their catch.
small fish as they can, repairing immediately afterwards to the boat, and carrying a large one by the middle in their bill. The small ones are prevented from falling into the flounder by a ring placed on purpose to confine its gullet: and thus the fisherman by stroking its neck with the head downwards, makes the bird dig-gorge all those fish it has swallowed. When they have done fishing, the rings are taken off, and the birds allowed to feed. When the fish happens to be too large for a single bird, the others have facility enough to afflit it; one taking it by the tail, another by the head, &c. and thus they transport it to their matter.

Another method of fishing, practised only in China, is as follows: They nail a board, about two feet in breadth, which is covered with a white flining kind of varnish, upon the edges of a long narrow boat, from one end to the other. This board is placed in such a manner as to slope almost imperceptibly to the water. It is used only in the night-time, and is always turned towards the moon, that the reflection of light from the luminary may increase the splendor of the varnish. The fish, in sporting, often mistake this varnished board for water; and endeavours to throw themselves into it, fall into the boat.

The soldiers have a particular method of fishing with a bow and an arrow; the latter of which is fixed to a bow by a string, both to prevent it from being lost, and to enable them to draw out the fish which the arrow has pierced; others make use of tridents to catch large fish which are sometimes found in the mud.

Besides these diversions, the Chinafes have some strolling players, but no regular theatres; they have wise musicians and singers, but no operas, or indeed any public spectacle worthy of notice.

The language of the Chinafes is not only very ancient, but, in M. Grofier's opinion, is still spoken as in the most early ages without variation. His reason for this opinion are, 1. We do not perceive in history, nor even in the most fabulous traditions, a single fact tending to occasion any doubt of the language spoken by the ancient Chinafes, being different from that used at present. 2. China has never changed its inhabitants; and if revolutions have occasioned any mixture of new languages, it appears that the ancient language has always been predominant, and that the new settlers have learned and spoken it, as the Marchew Tartars after their conquest. 3. The most intelligent and discerning of the literati agree, that the first chapters of the Chow-king were written under the reign of Yao 2300 years before Christ; and in these, several speeches of the first emperors are related word for word; and it is not probable that the language of these princes was different from that of the historian. 4. A compliment paid to Yao by one of his subjects, with the answer of that prince, are still preferred, as well as two fongs composed under the same reign. 5. The most ancient inscriptions in China are all in the language spoken throughout the empire at this day. 7. The Chinafes have borrowed nothing from other nations; and their attachment to their own customs, and to antiquity, must undoubtedly be very unfavourable to any innovation. The language spoken by the vulgar, indeed, must have undergone some changes; but these may be accounted trivial, affecting only the pronunciation; which indeed appears to be varied in some few instances. It is certain, however, that the Chinese players act theatrical pieces which were written 1000 years ago, and that these are still understood throughout the empire.

The language of China has no alphabet; all the words which compose it consist of one syllable only, and are very few in number. These always remain the same, and continue monosyllables even when two are joined together, being united in the same manner as the French words bon and jour are united to form bon-jour. These monosyllables never form but one word. When written by a European, they begin with the letters ch, tch, f, g, or j, h, k, ng, or ts, ou; the final letters being a, e, o, or u, n, gu. The middle of Chinese words consists of vowels and consonants producing only one sound, and pronounced always as monosyllables. The whole primary words of the language are in number only about 300, though some dictionaries make them 484. The sense of these words, however, is varied by the accents and changes of the voice in pronouncing them almost ad infinitum. Two principal accents are known in China; the ping, that is even, without elevating or depressing the voice. This is divided into tfeng, eller, and toh, obscure; or rather open and mute. The accent is labialized into chong, sharp, tin, grave, and for re-entering. The tone is changed when one raises the voice at the end of a word, as when the negative no is pronounced with great emphasis and force; it is kiu. When one depresses the voice with an air of timidity. When the accent is jou, the voice is drawn back as it were into the throat; and the aspiration which takes place on certain words beginning with the letters e, e, t, s, still adds to these varieties.

By these differences in pronunciation the signification of the words is totally changed: thus the word tebu pronounced by lengthening the u, and with a clear tone of voice, signifies matter or lord: if it is pronounced in an uniform tone by lengthening the u, it signifies hog; when pronounced lightly, and with rapidity, it signifies kitchen; and when clotted with a firm and high voice depressed towards the end, it signifies hill. By the conjunction and modification of these different monosyllables, a Chinaf can express every thing he has occasion for; and it may be easily seen what variety must result from this art of multiplying words. The Chinaf language therefore has words expressive of the smallest variation of circumstance, and which cannot be expressed in the European languages without a circumlocution. Thus, instead of the five words, calf, bull, ox, heifer, cow, every time that a cow has a calf she acquires a new name in the language of this empire; and still another when she becomes barren. An ox fed for sacrifice has a particular name, which is changed when he goes to the altar. In like manner, a whole dictionary might be composed of the words that are employed to express the different parts of the emperor's palace, and those that are in a manner consecrated to it; others being employed when the palaces of princes or mandarins are spoken of. Thus the number of their characters are augmented beyond all bounds, so that the greater part of their literati spend all their lives in studying them.

In the Chinaf there are four different languages. 1. The kou-ouen, or classical language. This is not
China.

spoken at present, though it is generally believed to have been the language of the early ages. It is so
cunic, and the ideas are so crowded, that it is very
difficult to be understood; however, the literati, who
can read and understand it, are much delighted with it.

2. The K'ouen-chang is the language used in compo-
positions where a noble and elevated style is requisite.
It is never spoken, but certain sentences and compli-
mentary expressions are sometimes borrowed from it.
It approaches near to the laconic brevity and majestic
sublimity of the K'ouen, and is equally proper for every
kind of subject, excepting only the ambiguities of
metaphysics, and the formal rugged diction used in treat-
ing of the abstract sciences.

3. The K'uaan-ka is the language of the court,
of people in office, and of the literati. It admits of ly-
gynymous expressions to moderate the brevity of
monosyllables; of pronouns and relatives; prepositions,
adsverbs, and particles; to supply the want of cafes,
moods, tenses, and numbers, which have place in other
languages.

4. H'iang-tan is a kind of corrupted language, or
provincial dialect, spoken by the lower classes in China;
and of which every province, city, and almost every
village, has its own. Besides the sense of the words,
which is changed in a great variety of places, they are
so altered by diversity of pronunciation as to be almost
unintelligible.

There are five kinds of writing mentioned by the
Chinese literati; the most modern of which is a me-
thod of tracing out the characters with a pencil. This
is difficult, and requires much experience; at any rate,
it distinguishes the characters greatly, and is therefore
only used in the preference of physicians, prefaces to
books, and inscriptions of fancy. The tracing of
characters with neatness and accuracy, however, as we
have already had occasion to observe, is greatly admi-
red in China. They are often preferred to the most
elegant painting; and some will give a most exorbitant
price for a page of an old book, if it happens to be
neatly written. They pay particular attention to well-
formed characters even in the most common books; and
if any of the leaves happen to fall off, will replace
them with the greatest attention. To apply them to
any vile purpose, tread them under foot, &c. would be
reckoned an unpardonable violation of decency and
politeness; nay, it often happens, that workmen, such
as masons and joiners, dare not tear a printed leaf
of paper fixed to the wall.

Punctuation was not formerly used in China, nor are
points as yet employed in works of an elevated style,
or such as are to be presented to the emperor. Poety
is seldom any object of attention, though the taste
for it seems to be pretty general in China. Their ver-
cification has its rules, and is not less difficult than that
of other nations. Only the most harmonious, ener-
getic, and picturesque words, are to be employed, and
they must always be used in the same sense in which
they were used by the ancients. Each verse can
contain only a certain number of words; all of which must
be ranged according to the rules of quantity, and ter-
minate in rhyme. The number of verses in a joprophe
is not determined; but they must be uniform, and
present the same distribution of rhymes. The small
number of poetical expressions contained in the Chi-

ne speech has rendered it necessary to extend the po-
etical licence to a great length in this respect. The Chi-
nese poets are allowed to employ a blank verse in every
four. They are acquainted with most kinds of poetry in
the usual senses. They have fancies, ode, elegies, idylls,
elegies, epigrams, epitaphs; and even want lyrics. The
common people have also ballads and songs peculiar to
themselves. Some of the most distinguished of the
literati have even thought it of importance enough to
turn the most celebrated maxims of morality, with the
rules of civility, into verse. Their poetry is seldom
gracured by any kind of obscenity; and indeed any
such thing would be severely punished by government.
That severe attention with which every thing tending
to corrupt the morals is watched in China, prohibits
not only poems of this kind, but likewise romances of
all sorts. The police, however, permits such novels as
have an useful tendency, and in which nothing is
introduced prejudicial to found morality. Every au-
thor who writes against government is punished with
death, as well as all those who have had any hand in
the printing or distribution of his works.

The art of making paper and printing have been Chi-
inese long known among the Chinese. That kind of paper
now in use was first manufactured about 145 years be-
fore the Christian era. Before that period they used
cloth, and various kinds of silk stuff, instead of paper;
and to this day they still prefer a cushion of writing
the praiseful of the dead upon large pieces of silk, which
are suspended on ornamented coffins and carried in
funeral processions; and of ornamenting their apart-
ments with maxims and moral sentences written in the
same manner. In ages still more early, they wrote
with a kind of style upon pieces of bamboo, or even
upon plates of metal. The first paper was invented by
a mandarin. He took the bark of trees, hemp, and
old pieces of silk-stuff, boiling them together until they
were reduced to a kind of paste, of which he formed his
paper; which by degrees was brought to perfection,
and the art of whitening and giving it a lustre found
out. A great number of different substances are now
used in this empire for making paper; such as the
bamboo, reed, hemp, the bark of the plant called kau-chu,
and of the mulberry tree; hemp, the straw of wheat and rice, parchment, the cords of the
silk warp, and several other substances unknown in
Europe. In this manufacture the bark of trees and
shrubs is used, and the woody substance of the bamboo
and cotton tree, after it has been macerated and redu-
ted to a thin paste. Most of the Chinese paper, how-
ever, is attended with the disadvantage of being very
susceptible of moisture, readily attracts the dust, and
worms insensibly get into it; to prevent which inconve-
niences, it is necessary to beat the books often, and ex-
pose them to the sun. That made of cotton is the
prettiest, and most used of any. All of them, however,
are much more and smoother than ours; which is abso-
lutely necessary for their method of writing with a pen-
cil, in order that it may run with freedom, which it
could not do upon ours. It is formed into sheets of an
enormous size; so that it would be no difficult matter
to procure from the manufactories of this empire sheets
of paper 30 or 50 feet long.

The Chinese ink came originally from Corea; and it
was not until the year 900, that they hit upon the me-

Of their
poetry.

ink.
The Chineze method of printing is exceedingly different from ours; and indeed it would be in a manner impossible to have movable types for such a number of characters as their language requires. The whole work which they intend to print is therefore engraved upon blocks of wood; and their method of proceeding is as follows. They first employ an excellent writer, who transcribes the whole upon very thin paper. The engraver glues each of the leaves of the manuscript upon a piece of plank made of any hard wood; and he then traces over with a graver the strokes of the writing, carves out the characters in relief, and cuts down the intermediate part of the wood. Thus each page of a book requires a separate plank; and the excessive multiplication of these is no doubt a very great inconvenience, one chamber being scarce sufficient to preserve those employed for a single book. The advantages are, that the work is thus free from typographical errors, and the author has no occasion to correct the proofs. Thus also the booksellers in China have decided advantage over those of Europe, as they are able by this method of printing to throw off copies according to their sale, without running the risk of being ruined by too large an addition. In this method the beauty of the work depends entirely upon the skill of the writer previously employed. The engraver must be exceedingly dexterous, and imitate every stroke so exactly, that it is sometimes difficult to distinguish a printed work from one that is only written.

The method of printing in China is not by a press as in Europe, as neither their wooden planks nor their soft paper could sustain so much pressure. They first place the plank level, and then fix it in that position. The printer is provided with two brushes, and, with the hardest, daubs the plank with ink; and one daubing is sufficient for four or five leaves. After a leaf has been adjusted upon the plank, the workman takes the second brush, which is softer than the former, and of an oblong figure, and draws it gently over the ink, pressing it down a little, that it may receive the ink. The degree of pressure is to be regulated by the quantity of ink upon the plank: and in this manner one man is able to throw off almost 10,000 copies a day. The ink used for printing is different from that formerly described, and which is used in writing. The leaves, on account of the thinness of the paper, are printed only upon one side; on which account each leaf of a book is double, so that the fold stands uppermost, and the opening is towards the back, where it is stitched. Hence the Chinese books are not cut on the edges, but on the back. They are generally bound in grey pasteboard, which is very neat; and those who wish to have them more elegantly done, get the pasteboard covered with satin, flowered taffety, and sometimes with gold and silver brocade. Their books are neither gilt nor coloured on the edges like ours.

The art of manufacturing silk, according to the best Vaish authorities, was communicated by the Chinese to the city of Persians, and from them to the Greeks. The art has been known in this empire from the remotest antiquity; and the breeding of silk-worms and making of silk was one of the employments even of the empresses in very early ages.

The most beautiful silk in the whole empire is that of Tche-kiang, which is wrought by the manufactories of Nankin. From these are brought all the stuffs used by the emperor, and such as he distributes in presents to his nobility. A great number of excellent workmen are also drawn to the manufactories of Canton by the commerce with Europe and other parts of Asia. Here are manufactured ribbons, flockings, and buttons. A pair of silk flockings here cost little more than 6s. sterling.

The quantity of silk produced in China seems to be almost inexhaustible; the internal consumption alone being incredibly great, besides that which is exported in the commerce with Europe and the rest of Asia. In this empire all who possess a moderate fortune wear silk clothes; none but the lower class of people wear cotton stuffs, which are commonly dyed blue. The principal stuffs manufactured by them are plain and flowered gauzes, of which they make summer dresses, damask of all colours; stripped and black silk; napped, flowered, striped, clouded, and pinked taffeties; crapes, brocades, pluch, different kinds of velvet, and a multitude of other stuffs unknown in Europe. They make particular use of two kinds; one named tounse, a kind of satin much stronger, but, which has less lustre, than that of Europe; the other a kind of taffety, of which they make drawers and linings. It is worked dexterously, and is yet so pliable that it may be rumpled and rubbed between the hands without any crease; and even when washed like cotton-cloth, it loses very little of its lustre. They manufacture also a kind of gold brocades, but of such a slight nature, that they cannot be worn in clothes; they are fabricated by wrapping fine slips of gilt paper round the threads of silk.

Porcelain is another great branch of Chinese manufacture, and employs a vast number of workmen. The finest is made in a village called Kung-te-ching in the province of Kiang-su. Manufactories have also been erected in the provinces of Po-kien and Canton, but their produce is not esteemed, and one which the emperor caused to be erected at Peking, in order to be under his own inspection, miscarried entirely.

The Chinese divide their porcelain into several classes, according to its different degrees of fineness and beauty. The whole of the first is reserved for the use of the emperor, so that none of it ever comes into the hands of other persons, unless it happen to be cracked or otherwise damaged in such a manner as to be unworthy of being presented to the sovereign. Among that sent to the emperor, however, there is some porcelain of an
tions, viz. that in former ages the musicians could make brute animals leap at the sound of their instruments. Our author, M. Grolier, indeed, does not quote any Chinese author who affirms that the ancient music could make trees dance, or stones arrange themselves into a city; but he quotes them, alleging "that the musicians could call down superior spirits of every age from the ethereal regions; raise the manes of departed beings; inspire men with a love of virtue; and lead them to the practice of their duty." Effects of this supernatural kind are attributed to the sacred music by the inspired writers; as in the case of Saul, out of whom an evil spirit departed at the sound of David's harp; and of Elihu, who was inspired with the spirit of prophecy at the sound of a musical instrument. It is probable therefore, that the relations both of the Greeks and Chinese are founded upon facts of this kind; and we cannot from thence infer, that the music of early ages was at all superior to that which followed. According to those who have employed much time in these researches, the ancient Chinese were acquainted with the division of the octave into twelve semitones; and that before the time of Pythagoras, or even Mercury himself; that the lyre of Pythagoras, his invention of the diatonic tetrachords, and the formation of his grand sytem, were merely borrowed from the ancient Chinese. In short, it is maintained, that the Greeks, even Pythagoras himself, did nothing but apply to firings that theory which the Chinese had before formed, and applied to pipes.

At present the Chinese are not acquainted with the use of our musical notes; they have not that diversity of signs which distinguish the different tones, and the gradual elevation or depression of the voice, nor anything to point out the various modifications of sound to produce harmony. They have only a few characters to mark the principal notes; and all the airs they learn are repeated merely by rote. The emperor Kang-hi was therefore greatly astonished at the facility with which an European could catch and remember an air the first time he heard it. In 1679 he sent for Fathers Grimaldi and Pereira, to play some tunes on the harpsichord, of which they had before made him a present. He was greatly entertained with their music, but altogether astonished when he found that F. Pereira could take down a Chinese air while the musicians were playing it, and then repeat the whole without omitting a single note. Having made several trials of this kind in order to satisfy himself, he bestowed the highest encomiums upon the European music, and the means furnished by it to facilitate and leaven the labour of the memory. "I must confess (says he) that the European music is incomparable, and that the like of this F. Pereira is not to be found in my whole kingdom."

The Chinese have always distinguished eight different musical instruments; and they believe that nature, in order to produce these, formed eight different kinds of animal and vegetable bodies. The order in which they divide these sounds, and the instruments they have contrived to produce them, are, 1. The sound of skin produced by drums. 2. That of stones produced by the king. 3. The sound of metal by bells. 4. That of baked earth by the braten. 5. Of silk by the kin and che. 6. Of wood
wood by the *yu*, and *tebon*. 7. Of the bamboo by the *kuen*, and different flutes. 8. That of a gourd by the *cheng*.

The drums were originally composed of a box made of baked earth, and covered at the extremities with the skin of some animal; but on account of the brittleness of baked earth, wood was soon substituted in its stead. Greater part of these instruments are shaped like our barrels, but some are cylindrical.

The instruments formed of the founorous stones are called *king*, distinguished into *tsa-king* and *pien-king*. The *tsa-king* consists only of one stone, and therefore produces only one note. The *pien-king* consists of 16 stones suspended together, and thus forming an instrument capable of producing all the tones admitted into the mimic of the ancient Chinese. They are cut and flattened into the form of a carpenter's square; their tone is flattened by diminishing their thicknesses, and is made sharper by abridging their length.

The bells in China have always been made of a mixture of tin and copper. They are of different sizes; and those of the ancients were not round, but flatted, and in the smaller part resembing a crescent. An instrument, corresponding to the *king* already mentioned, is composed of 16 bells of different sizes. Some of these bells used on public occasions are of enormous magnitudes. One at Peking is described as 13½ feet in diameter, 12½ in height, and 42 in circumference; the weight being upwards of 120,000 pounds. It is used for announcing the hours or watches of the night; and its sound, which is prodigiously loud and strong, has a most awful effect in the night-time, by reverberating round the walls and the echo of the surrounding country. There are several others likewise of a vast size in the same city; one of which deserves greatly to be admired on account of the beautiful characters with which it is covered: and which are as neat and perfect as if traced out by the hand of the finest writer, or formed by means of a stamp upon wax. F. le Comte tells us, that in all the cities of China there are bells for marking the hours and watches of the night. They generally divide the night into five watches, beginning at seven or eight in the evening. On the commencement of the first they give one stroke, which is repeated a moment after; and thus they continue for two hours till the beginning of the second; they then give two strokes, which are repeated at equal intervals till the beginning of the third watch; and thus they proceed to the fourth and fifth, always increasing the number of the strokes. For the same purpose also they use enormous drums, which they beat in a similar manner. F. Magailans mentions one at Peking upwards of 40 feet in circumference.

The instrument called *huien*, which is made of baked earth is highly esteemed by the Chinese on account of its antiquity. It is distinguished into two kinds, the great and small; the former being of the size of a goose's egg; the latter of that of a hen's. It has six holes, and a seventh for the mouth.

The *kin* and *tebe* have been known from the remotest antiquity. The *kin* has seven strings made of silk, and is distinguished into three kinds, differing only in size. The body is formed of a kind of wood varnished black, and its whole length about five feet five inches. The *tebe* is about nine feet in length, has 25 strings, and is divided into 25 kinds. F. Amiot assure us, that we have no instrument in Europe which deserves to be preferred to it.

The instruments which emit the sound of wood are the *tebon*, the *yu*, and the *tebon-tou*. The first is shaped like a bell-flute, and is beat on the inside with a hammer; the second, which represents a tyger squatting, is made to sound by scraping its back gently with a rod; the third is a collection of twelve pieces of boards tied together, which are used for beating time, by holding them in the right hand, and knocking them gently against the palm of the left.

Many instruments are constructed of the bamboo. These consist of pipes joined together, or separate, and pierced with more or fewer holes. The principal of these wind instruments is the *chung*, which emits the sound of a gourd. This is formed by cutting off the neck of a gourd, and referring only the lower part. To this a cover is fitted, having as many holes as are equal to the number of sounds required. In each of these holes a pipe made of bamboo is fixed, and shorter or longer according to the tone intended. The mouth of the instrument is formed of another pipe shaped like the neck of a goose; which is fixed to the gourd on the outside, and serves to convey the air into the pipes it contains. The ancient *chung* varied in the number of their pipes; those used at present have only 13.

The painting of the Chinese is undoubtedly inferior to that of the Europeans, though we are not by any means to judge of the abilities of the painters of this empire by the performances which are brought to Europe. M. Grolier remarks, that the works of the eminent Chinese painters are never brought to Canton, because they cannot find purchasers among the European merchants. The latter delight only in obscene pictures, which are not permitted by government, nor indeed will any artist of character execute them, though they prevail upon some of the inferior daubers to gratify them in this respect. It seems, however, to be universally agreed, that the Chinese have a great deal of correctness or perspective, and little knowledge of the proportions of the human body, though it cannot be denied that they excel in painting flowers and animals. In these they pride themselves in a scrupulously exact imitation of nature, inasmuch that it is no uncommon thing to hear a painter ask his pupil how many seals are between the head and tail of a carp.

Painting in fresco was known in China long before the Christian era; and, like the Greeks, the Chinese boast much of their celebrated painters of antiquity. Thus we are told of a door painted by *Pan-hien*, which was so perfect an imitation, that the people who entered the temple where it was attempted to go out by it, unless prevented by those who had seen it before.
The present emperor has in his park an European village painted in fresco, which produces the most agreeable deception. The remaining part of the wall represents a landscape and little hills, which are so happily blended with the distant mountains, that nothing can be conceived more agreeable. This was the production of Chinesse painters, and executed from designs sketched out for them.

Engraving. Engraving in three, four, or five colours, is very ancient among the Chineses, and was known in this empire long before its discovery in Europe. A multiplicity of bridges are rendered necessary in Chine by the vast number of canals and rivers which intersect the empire. Anciently, however, the Chineses made bridges were much more ingenuous as well as magnificent than we are at present. Some of them were so contrived that they could be erected in one day to supply the place of others which might happen to be broken down, or for other purposes. At that time they had bridges which derived their name from their figure: as refreshing the rainbow; draw-bridges, bridges to move with pulleys, compass-bridges, &c. with many others entirely unknown at present. The building of bridges indeed was once a luxurious folly of the emperors; so that they were multiplied from whim or caprice, without any necessity, and without use. Still, however, many of them are extremely beautiful and magnificent. The arches of some are very lofty and acute, with easy stairs on each side, the steps of which are not quite three inches in thickness, for the greater facility of ascending and descending; others have no arches, but are composed of large stones, sometimes 18 feet in length, placed transversely upon piles like planks. Some of these bridges are constructed of stone, marble, or brick; others of wood; and some are formed of a certain number of balks joined together by very strong iron chains. These are known by the name of floating bridges, and several of them are to be seen on the large rivers Kiang and Hoang-ho.

For several centuries the Chinese have made no progress in ship-building. Their vessels have neither masts, nor rigging. They have none housetops, nor fore-mast, to which is sometimes added a fore-lant-mast. The main-mast is placed aloft in the same part of the deck as ours; but the fore-mast stands much farther forward. The latter is to the former in the proportion of two to three; and the main-mast is generally two-thirds of the length of the vessel. They use mats for sails, strengthening them with whole bamboos equal in length to the breadth of the sail, and extended across it at the distance of a foot from one another. Two pieces of wood are fixed to the top and bottom of the sail; the upper serves as a sail-yard; and the lower, which is about five or six inches in thickness, keeps the sail fletched when it is necessary to hoist or lower it. This kind of sail may be folded or unfolded like a screen. For caulking their vessels they do not use pitch, but a particular kind of gum mixed with lime, which forms a composition of such excellent quality, that one or two wells in the hold are sufficient to keep the vessel dry. They have not yet adopted the use of pumps, and therefore draw up the water with buckets. Their anchors are made of the hard wood called iron-wood, which they say is much superior.
superior to the metal, because the latter sometimes bend, but the former never do.

The Chinese pretend to have been the first inventors of the mariner's compass, but seem to have little inclination to improve such an important machine: however, they are well acquainted with the art of maneuvering a vessel, and make excellent coasting pilots, though they are bad sailors in open sea.

Chlo.-Root, in the materia medica, the root of a species of Smilax, brought both from the East and West Indies; and thence distingukshed into oriental and occidental. Both roots are longish, full of joints, of a pale-redish colour, with no smell, and very little taste. The oriental, which is the most esteemed, is considerably harder and paler-coloured than the other. Such should be chosen as is fresh, close, heavy, and upon being chewed appears full of a fat unctuous juice. It is generally supposed to promote insensible perspiration and the urinary discharge, and by its unctuous quality to obtund arrimonious juices. China-root was first brought into Europe in the year 1555, and used as a specific against venereal and cutaneous disorders. With this view it was made use of for some time; but has long since given place to more powerful medicines.

China-Ware. See Porcelain.

Chinca, a sea-port town of Peru in South America, situated in an extensive valley of the same name, in W. Long. 76. 0. S. Lat. 13. 0.

Chincough, a convulsive kind of cough to which children are generally subject. See Medicine-Index.

Chinese, in general denotes any thing belonging to China, or its inhabitants.

Chinese Swanpan. See Swanpan.

Chinkapin. See Fagus.

Chinnor, a musical instrument among the Hebrews, consisting of 32 chords. Kircher has given a figure of it, which is copied on Plate CXXXV.

Chinon, an ancient town of Touraine in France, remarkable for the death of Henry II. king of England, and for the birth of the famous Rabelais. It is seated on the river Vienne, in a fertile and pleasant country, in E. Long. 0. 18. N. Lat. 47. 2.

Chio, or Chios, an Aryan island lying near the coast of Natolia, opposite to the peninsula of Ionia. It was known to the ancients by the name of Æthalia, Macris, Pithynia, &c. as well as that of Chios. According to Herodotus, the island of Chios was peopled originally from Ionia. It was at first governed by kings; but afterwards the government assumed a republican form, which by the direction of Iocrates was modelled after that of Athens. They were, however, soon enlaved by tyrants, and afterwards conquered by Cyrus king of Persia. They joined the other Grecians in the Ionian revolt; but were shamefully abandoned by the Samians, Lesbians, and others of their allies; so that they were again reduced under the yoke of the Persians, who treated them with the utmost severity. They continued subject to them till the battle of Mycale, when they were restored to their ancient liberty: this they enjoyed till the downfall of the Persian empire, when they became subject to the Macedonian princes. In the time of the emperor Vespasian the island was reduced to the form of a Roman province; but the inhabitants were Chioceca allowed to live according to their own laws under the suzerainty of a praetor. It is now subjuct to the Turks, and is called Siza. See that article.

Chioceca, in botany: A genus of the monogynia order, belonging to the pantandria class of plants; and in the natural method ranking under the 48th order, Sipariaceae. It is common in Virginia and South Carolina, where it grows by the sides of rivulets. It rises to the height of ten feet; the leaves are small as those of the laurel, but much thinner. They are propagated in May, and are of a pure white; from whence it has the name of the snow-drop tree. They hang down in large branches, and are cut into narrow segments; from which it has got its other name of the fringe-tree. After the flowers are fallen off, the fruit appears, which grows to the size of a floe, having a floe in the middle. The plants are propagated, in Britain, from seeds sown on a hot-bed, and kept in a floe. Some have been raised from layers; but this method is very precarious, and therefore the other is to be preferred. The seeds are procured from America, for they never come to perfection in Britain.

Chione, in fabulous history, was daughter of Daedalion, of whom Apollo and Mercury became enamoured. To enjoy her company, Mercury inflamed her to sleep with his caduceus; and Apollo, in the night, under the form of an old woman, obtained the same favours as Mercury. From this embrace Chione became mother of Philammon and Autolyclus; the former of whom, as being son of Apollo, became an excellent musician; and the latter was equally notorious for his robberies, of which his father Mercury was the patron. Chione grew so proud of her commerce with the gods, that she even preferred her beauty to that of Juno; for which impiety she was killed by the gods, and changed into a hawk. Another of the same name was daughter of Boreas and Ori­ thyia, who had Eumolphus by Neptune. She threw her son into the sea; but he was preferred by his father.

Chios. See Chio and Scio.

Chiourlie, an ancient town of Turkey in Europe, and in Romani, with a see of a Greek bishop. It is seated on a river of the same name, in E. Long. 7. 47. N. Lat. 41. 18.

Chiozzo, an ancient and handsonie town of Italy, in the territory of Venice, and in a small Island, near the Lagunes, with a pontefit, a bishop's see, and a harbour defended by a fort. E. Long. 12. 23. N. Lat. 45. 17.

Chippenham, a town of Wilshire, seated on the river Avon. It is a good thoroughfare town; has a handsome stone-bridge over the river, consisting of 16 arches; and sends two members to parliament.

There
CHIPPING, a phrase used by the potters and china-men to express that common accident both of our own stone and earthen ware, and the porcelain of China, the flying off of small pieces, or breaking at the edges. Our earthen wares are particularly subject to this, and are always finished by it before any crack of the flaw appears in them. Our stone-wares escape it better than these; but not so well as the porcelain of China, which is less subject to it than any other manufacture in the world. The method by which the Chineses defend their ware from this accident, is this: They carefully burn some small bamboo canes to a sort of charcoal, which is very light, and very black; this they reduce to a fine powder, and then mix it into a thin paste, with some of the varnish which they use for their ware: they next take the vessels when dried, and not yet baked, to the wheel; and turning them softly round, they, with a pencil dip in this paste, cover the whole circumference with a thin coat of it; after this, the vessel is again dried; and the border made with this paste appears of a pale greyish colour when it is thoroughly dry. They work on it afterwards in the common way, covering both this edge and the rest of the vessel with the common varnish. When the whole is baked on, the colour given by the ashes disappears, and the edges are as white as any other part; only when the baking has not been sufficient, or the edges have not been covered with the second varnishing, we sometimes find a dusky edge, as in some of the ordinary thick tea-cups. It may be a great advantage to the English manufacturers to attempt something of this kind. The willow is known to make a very light and black charcoal; but the elder, though a thing seldom used, greatly exceeds it. The young green shoots of this shrub, which are almost all pith, make the lightest and the blackest of all charcoal; this readily mixes with any liquid, and might be used in the same way that the Chineses use the charcoal of the bamboo cane, which is a light hollow vegetable, more resembling the elder shoots than any other English plant. It is no wonder that the fixed salt and oil contained in this charcoal should be able to penetrate the yet raw edges of the ware, and to give them in the subsequeint baking a somewhat different degree of vitrification from the other parts of the vessel; which, though, if given to the whole, it might take off from the true semivitrified state of that ware, yet at the edges is not to be regarded, and only serves to defend them from common accidents, and keep them entire. The Chinese use two cautions in this application: the first in the preparation; the second in the laying it on. They prepare the bamboo canes for burning into charcoal, by peeling off the rind. This might easily be done with the elder shoots, which are so succulent, that the bark strips off with a touch. The Chineses say, that if this is not done with their bamboo, the edges touched with the paste will burst in the baking; this does not seem indeed very probable; but the charcoal will certainly be lighter made from the peeled sticks, and this is a known advantage. The other caution is, never to touch the vessel with hands that have any greasy or fatty sub-

CHIROGRAPH, was anciently a deed which, requiring a counterpart, was engrossed twice on the same piece of parchment, counterpart; leaving a space between, wherein was written CHIROGRAPH through the middle whereof the parchment was cut, sometimes straight, sometimes indented; and a moity given to each of the parties. This was afterwards called dividenda, and charta divisa; and was the same with what we now call charter-party. See Charter-Party. The first use of these chirographs, in Britain, was in the time of Henry III.

CHIROGRAPH was also anciently used for a fine; and the manner of engrossing the fines, and cutting the parchment in two pieces, is still retained in England, in the office called the chirographer's office.

CHIROGRAPHER OF FINES, an officer in the common pleas, in England, who engraves FINES acknowledged in that court into a perpetual record (after they have been examined, and passed by other officers), and writes and delivers the indentures thereof to the party. He makes two indentures; one for the buyer, the other for the seller; and a third indented piece, containing the effect of the fine, and called the face of the fine; and delivers it to the esquire breviam. The same officer also, or his deputy, proclaims all fines in court every term, and indorses the proclamations on the backside of the foot; keeping, withal, the writ of covenant, and the note of the fine.

CHIROMANCY, a species of divination drawn from the lines and lineaments of a person's hand; by which means, it is pretended, the dispositions may be discovered. See DIVINATION, no. 9.

CHIRON, a famous peripatetic of antiquity; styled by Plutarch, in his dialogue on music, 'The wife Centaur.' Sir Isaac Newton places his birth in the first age after Deucalion's deluge, commonly called the Golden Age; and adds, that he formed the constellations for the use of the Argonauts, when he was 88 years old; for he was a practical astronomer, as well as his daughter Hippo: he may, therefore, be said to have flourished in the earliest ages of Greece, as he preceded the conquest of the Golden Fleece, and the Trojan war. He is generally called the son of Saturn and Phyllis; and is said to have been born in Thessaly among the Centaurs, who were the first Greeks that had acquired the art of breaking and riding horses: whence the poets, painters, and sculptors, have represented them as a compound of man and horse; and perhaps it was at first imagined by the Greeks, as well as the Americans, when they first saw cavalry, that the horse and the rider constituted the same animal.

Chiron was represented by the ancients as one of Bacco's first inventors of medicine, botany, and chirur. Hyst. of gery; a word which some etymologists have derived from his name. He inhabited a grotto or cave in the foot of Mount Pelion, which, from his wisdom and great knowledge of all kinds, became the most famous and frequented school throughout Greece. Almost all the heroes of his time were fond of receiving his instructions; and Xenophon, who enumerates them, names the following illustrious personages among his disciples: Cephalus, Æsculapius, Melanion, Neor, and Chiron.
CHIRONIA, in antiquity, the art of representing any past transaction by the gestures of the body, more especially by the motions of the hands: this made a part of liberal education; it had the approbation of Socrates, and was ranked by Plato among the political virtues.

CHIROTONY, among ecclesiastical writers, denotes the imposition of hands used in conferring priestly orders. However, it is proper to remark, that chirotony was a method of electing magistrates by holding up the hands.

CHIRURGEON, or SURGEON. See SURGERY.

CHIRURGERY. See SURGERY.

CHISLEY-LAND, in agriculture, a foil of a middle nature between sandy and clayey land, with a large admixture of pebbles.

CHISON, KISON, or KISSON, (Judges iv. and v.), a river of Galilee; said to rise in mount Tabor, to run by the town of Naim, and to fall into the Mediterranean between mount Carmel and Ptolemais, 1 Kings xviii. 40.

CHISSEL, or CHISEL, an instrument much used in sculpture, masonry, joinery, carpentry, &c.

There are chisels of different kinds; though their chief difference lies in their different size and strength, as being all made of steel well sharpened and tempered; but they have different names, according to the different uses to which they are applied.—The chisels used in carpentry and joinery are, 1. The former; which is used first of all before the paring-chisel, and just after the work is finished. 2. The paring-chisel, which has a fine smooth edge, and is used to pare off or smooth the irregularities which the former makes. This is not stuck with a mallet as the former is, but is pressed with the shoulder of the workman. 3. Skew-former: this is used for cleaning acute angles with the point or corner of its narrow edge. 4. The morifice-chisel, which is narrow, but very thick and strong, to endure hard blows, and it is cut to a very broad bevel. Its use is to cut deep square holes in the wood for mortises. 5. The gouge, which is a chisel with a round edge; one side whereof serves to prepare the way for an angle, and the other to cut such wood as is to be rounded, hollowed, &c. 6. Socket-chisels, which are chiefly used by carpenters, &c. have their...
CHITTON, in zoology, a genus of the order of vermes tellaceae. The name chiton is from χίτων, Lorica, a coat of mail. The shell is plated, and consists of many parts lying upon each other transfereably; the inhabitant is a species of the Doris. They are common on the shores of Scarborough, Aberdeen, and Lochbroom. See several species represented of their natural size on Plate CXXXVIII.

CHITTRICK'S MEDICINE FOR THE STONE. This medicine was some years ago kept as a secret, and has great reputation as a lithontriptic, which indeed in medicine is more remarkable events, throw a faint light on the origin of chivalry, as had yielded not only to the arms of the Romans, but also to the influence of their laws, arts, and manners; and the barbarians, who proceeding from the northern regions of Asia and Europe, the wilds of Scythia and Germany, dislocated the fabric of the Roman empire, and made themselves lords of Europe. Amid this confusion of nations, institutions and customs, it becomes almost impossible to trace any regular series of causes and effects.

Yet as the history of that period is not entirely unknown to us, and the obscure and imperfect records in which it is preserved, while they commemorate the more remarkable events, throw a faint light on the customs, manners, and ordinary transactions of the age; we can at least collect some circumstances, which, if they did not of themselves give rise to the institution of chivalry, must certainly have co-operated with others to that end. We may even be allowed, if we proceed with due diffidence and caution, to deduce, from a consideration of the effect, some inferences concerning the cause; from those particulars of its history which are known to us, we may venture to carry imagination backwards, under a proper restraint, to those, which are hid under the darkness of a rude and illiterate age.

Distinction of ranks appear to be essentially necessary to the existence of civil order. Even in the simplest and rudest social establishments, we find not merely the natural distinctions of weak and strong, young and old, parent and child, husband and wife, but these are always accompanied with others which owe their institution to the invention of man, and the consent, either tacit or formal, of the society among whom they prevail. In peace and in war, such distinctions are equally necessary: they constitute an essential and important part of the mechanism of society.

One of the earliest artificial distinctions introduced among mankind, is that which separates the bold and skilful warrior from those whose feebleness of body and mind renders them unable to excel in dexterity, strength, or valour. Among rude nations, who are but imperfectly acquainted with the advantages of civil order, this distinction is more remarkably eminent than in any other state of society. The ferocity of the human character in such a period produces almost continual hostilities among neighbouring tribes: the elements of nature, and the brute inhabitants of the forest, are not yet reduced to be subservient to the will of man; and these, with other concomitant circumstances, render the warrior, who is equally distinguished by cunning and valour, more useful and respectable than any other character.

On the same principles, as the boundaries of society are enlarged, and its form becomes more complex, the classes into which it is already distinguished are again subdivided. The invention of arts, and the acquisition of property, are the chief causes of these new distinctions which now arise among the orders of society; and...
and they extend their influence equally through the whole system. Difference of armour, and different modes of military discipline, produce distinction of orders among those who practice the arts of war; while other circumstances, originating from the same general causes, occasion similar changes to take place amid the scenes of peace.

None of the new distinctions which are introduced among men, with respect to the discipline and conduct of war, in consequence of the acquisition of property and the invention of arts, is more remarkable than that occasioned by the use of horses in military expeditions, and the training of them to the evolutions of the military art. Fire-arms, it is true, give to those who are acquainted with them a greater superiority over those to whom their use is unknown than what the horsemanship over him who fights on foot. But the use of fire-arms is of such importance in war, and the expense attending it is inconceivable, that wherever these have been introduced, they have seldom been confined to one particular order in an army; and therefore they produce indeed a remarkable, though transient, distinction among different nations; but establish no permanent distinctions in the armies of any one nation. But to maintain a horse, to equip him with costly furniture, to manage him with dexterity and vigour, are circumstances which have invariably produced a standing and conspicuous distinction among the military orders, whenever bodies of cavalry have been formed. The Roman equites, who, though they became at length a body of sufferers and farmers-general, were originally the only body of cavalry employed by the state, occupied a respectable rank between the senators and the plebeians; and the elegance and humanity of their manners were suitable to their station. In ancient Greece, and in the celebrated monarchies of Asia, the same distinction prevailed at a similar period.

Since the circumstances and principles on which this distinction depends are not such as must be confined in their influence to one particular nation, or one region of the globe, we may hope to trace their effects among the savage warriors of Scythia and Germany, as well as among the Greeks or Romans. From the valuable treatise of Tacitus de moribus Germanorum, we learn, that among the German warriors a distinction somewhat of this nature did actually subsist; not so much indeed a distinction between the warrior who fought on horseback and those who fought on foot, as between those whom vigour of body and energy of mind enabled to brave all the dangers of war, and such as, from the imbecility of youth, the infirmities of age, or the natural inferiority of their mental and bodily powers, were unequal to scenes of hardship and deeds of valour. The youth was not permitted to take arms and join his warlike countrymen in their expeditions; whereas he himself thought proper. There was a certain age before which he could not be invested with armour. When he had attained that period, if not found deficient in strength, activity, or courage, he was formally honoured with the shield and the lance, called to the duties, and admitted to all the privileges, of a warrior.

Another fact worthy of notice respecting the manners of the barbarians of Germany before they established themselves in the cultivated provinces of the Roman empire is, that their women, contrary to what we find among many other rude nations, were treated with a high degree of respect. They did not generally vie with the men in deeds of valour, but they were admired by them for their orations, with prophetic powers, capable to foresee events hid in the womb of futurity, and even to influence the will of the deities. Hence, though domestic duties were their peculiar province, yet they were not hardly treated nor confined to a state of slavery. There appears indeed a striking analogy between the condition of the women among the rude soldiers of Sparta and the rank which they occupied among the warlike cantons of Germany. Perhaps, indeed, the German were still more honourable than the Spartan women, as they were taught to wield the magic weapons of superstition, which in Greece were appropriated to the priests.

It appears, therefore, that, in the forests of Germany at least, if not in the more northern regions of Asia and Europe, the conquerors of the Roman empire, before they penetrated into its provinces, treated their women with a degree of respect unknown to most of the nations of antiquity; that the character of the warrior was likewise highly honourable, being unfrocked to unite all those qualities which were in the higher estimation; and that it was only at a particular age, and with certain forms, that the youth were admitted to bear arms.

When these nations fell from their defects and changes in the manners of the barbarians, they took place on their circumstances was remarkable; and by a natural influence, it could not but produce an equally settled in remarkable change on their habits, customs, and manners. The great outlines might still remain: but empire, they could not now fail to be filled up in a different manner. Here, however, the records of history are peculiarly imperfect. We have no Caesar or Tacitus to supply facts or direct our reasonings; the Gothic and Roman historians had not yet learned the art of letters, and the Romans were so depressed under the yoke of their own miseries, as to be negligent of the changes which happened around them. But as soon as the light of history begins again to dawn, we find that the leading features of the barbarian character were not effaced, but only modifie in a particular manner, in consequence of their mixing among a more polished people, becoming acquainted with the luxuries of life, and acquiring extensive power and property.

Those who fought on horseback now began to be distinguished with peculiar honours. The manners of the warrior too were become more cultivated, and his spirit more humane. Leisure and opulence, with the influence of a polished people, even though in a state of slavery, taught those barbarians to aspire after more refined pleasures and more splendid amusements than those which they had been before satisfied with. The influence of Christianity too, which, though grossly corrupted, was still favourable to the social happiness of mankind, concurred to polish their manners and exalt their character. Hence, in the end of the tenth and in the beginning of the eleventh century, we fee
Chivalry, knight-errantry, with that romantic gallantry, piety, and humanity, by which it was principally distinguished, made its appearance. At the court of every prince, count, or baron, jousts and tournaments became the favourite amusements. At those entertainments, skill in arms, devotion to the fair, and generosity, were all at once cultivated. About this period began the crusades; and these, to which alone some have referred the origin of chivalry, though they could not give rise to what was already in existence, yet moulded the form and directed the spirit of the institution in such a manner, as to raise it, by a rapid progression from infancy, as it were, to full vigour and maturity. Its character, as it appeared when fully formed, is well described by an eloquent historian in the following manner:


"Between the age of Charlemagne and that of the crusades, a revolution had taken place among the Spaniards, the Normans, and the French, which was gradually extended to the rest of Europe. The service of the infantry was degraded to the plebeians; the cavalry formed the strength of the armies, and the honourable name of knight, or soldier, was confined to the gentlemen who served on horseback, and were invested with the character of knighthood. The dukes and counts, who had usurped the rights of sovereignty, divided the provinces among their faithful barons: the barons distributed among their vassals the fees or benefits of their jurisdiction; and these military tenants, the peers of each other and of their lord, composed the noble or equestrian order, which disdained to conceive the peafant or burgher as of the same species with themselves. The dignity of their birth was preferred by pure and equal alliances; their sons alone who could produce four quarters or lines of ancestry, without spot or reproach, might legally pretend to the honour of knighthood; but a valiant plebeian was sometimes enriched and ennobled by the sword, and became the father of a new race. A single knight could impart, according to his judgment, the character which he received; and the warlike sovereigns of Europe derived more glory from this personal distinction than from the luster of their diadem. This ceremony was in its origin simple and profane; the candidate, after some previous trial, was invested with his sword and spurs; and his cheek and shoulder were touched with a flight blow as the emblem of the left affront which it was lawful for him to endure. But superiority mingled in every public and private action of life: In the holy wars, it sanctified the profession of arms; and the order of chivalry was assimilated in its rights and privileges to the sacred orders of priesthood. The bath and white garment of the novice, were an inexact copy of the regeneration of baptism: his sword, which he offered on the altar, was blessed by the ministers of religion; his solemn reception was preceded by fasts and vigils; and he was created a knight in the name of God, of St George, and of St Michael the archangel. He swore to accomplish the duties of his profession; and education, example, and the public opinion, were the inviolable guardians of his oath. As the champion of God and the ladies, he devoted himself to speak the truth; to maintain the right; to protect the distressed; to practice courtesy, virtue less familiar to the ancients; to pursue the infidels; to subdue the allurements of ease and safety; and to vindicate in every perilous adventure the honour of his character. The abuse of the same spirit provoked the illiterate knight to disdain the arts of industry and peace; to esteem himself the sole judge and avenger of his own injuries; and proudly to neglect the laws of civil society and military discipline. Yet the benefits of this institution, to refine the temper of barbarians, and to exalt some principles of faith, justice, and humanity, were strongly felt, and have been often observed. The superiority of national prejudice was softened; and the community of religion and arms spread a similar colour and generous emulation over the face of Christendom. Abroad, in enterprise and pilgrimage; at home, in martial exercise, the warriors of every country were perpetually associated; and impartial warfare must prefer a Gothic tournament to the Olympic games of classic antiquity. Instead of the naked spears which corrupted the manners of the Greeks, and banished from the stadium the virgins and matrons, the pomposous decoration of the lists was crowned with the presence of chaste and high-born beauty, from whose hands the conqueror received the prize of his dexterity and courage. The skill and strength that were exercised in wrestling and boxing, bear a distant and doubtful relation to the merits of a soldier; but the tournaments, as they were invented in France, and eagerly adopted both in the east and west, presented a lively image of the business of the field. The single combats, the general skirmish, the defence of a pass or castle, were rehearsed as in actual service; and the contest, both in real and mimic war, was decided by the superior management of the horse and lance. The lance was the proper and peculiar weapon of the knight; his horse was of a large and heavy breed; but his charger, till he was routed by the approaching danger, was usually led by an attendant, and he quietly rode a pad or palfrey of a more easy pace. His helmet and sword, his greaves and buckler, it would be superfluous to describe; but I may remark, that at the period of the crusades, the armour was less ponderous than in latter times; and that, instead of a massive cuirass, his breast was defended by an hauberk or coat of mail. When their long lances were fixed in the rest, the warriors furiously spurred their horses against the foe; and the light cavalry of the Turks and Arabs could fold them stand against the direct and impetuous weight of their charge. Each knight was attended to the field by his faithful squire, a youth of equal birth and similar hopes; he was followed by his archers and men at arms; and four, or five, or six soldiers, were computed as the furniture of a complete lance. In the expeditions to the neighbouring kingdoms or the Holy Land, the duties of the feudal tenure no longer subsisted; the voluntary service of the knights and their followers was either prompted by zeal or attachment, or purchased with rewards and promises; and the numbers of each squadron were measured by the power, the wealth, and the fame of each independent chieftain. They were distinguished by his banner, his armament, and his cry of war; and the most ancient families of Europe must seek in these achievements the origin and proof of their nobility."
Chivalry, traces, with great ingenuity and erudition, a strong resemblance between the manners of the age of chivalry and those of the old heroic ages delineated by Homer. There is, says he, a remarkable correspondence between the manners of two of Chivalry.

There is, says he, a remarkable correspondence between the manners of the old heroic ages, as painted by their great romancer Homer, and those which are represented to us in the modern books of knight-errantry. A fact of which no good account can be given, but by another not less certain; that the political states of Greece, in the earliest periods of its story, was similar in many respects to that of Europe, as broken by the feudal system into an infinite number of petty independent governments.

Some obvious circumstances of agreement between the heroic and Gothic manners may be worth putting down.

1. The military enthusiasm of the barons is but a piece with the fanaticism of the heroes. Hence the same particularity of description in the accounts of battles, wounds, deaths, in the Greek poet as in the Gothic romancers. Hence that minute curiosity in the display of their dresses, arms, accompaniments. The minds of all men being occupied with warlike images and ideas, were much gratified by those details, which appear cold and uninteresting to modern readers.

We hear much of knights-errant encountering giants and quelling savages in books of chivalry. These giants were opprobrious feudal lords; and every lord was to be met with, like the giant, in his strong-hold or castle. Their dependents of a lower form, who resided in the deferts, a savage for his brutality. The greater lord was called a giant for his power; the less, a savage for his brutality.

2. Another terror of the Gothic ages was monsters, dragons, and serpents. Their stories were received in those days for several reasons: 1. From the vulgar belief of enchantments: 2. From being reported on the faith of Eastern tradition, by adventurers from the Holy Land: 3. In still later times from the strange things told and believed on the discovery of the new world.

In all these respects, Greek antiquity resembles the Gothic. For what are Homer's Laërtrius and Cypresses, but bands of lawless savages, with each of them a giant of enormous size at their head? And what are the Grecian Bacchus, Hercules, and Theseus, but knights-errant, the exact counterparts of Sir兰ce-lot and Amadis de Gaul?

3. The oppression with which it was the glory of the knights to avenge, were frequently carried on, as we are told, by the charms and enchantments of women. These charms, we may suppose, are often metaphorical; as expounding only the blandishments of the sex. Sometimes they are taken to be real, the ignorance of those ages accounting in such conceits. And are not these stories matched by those of Calypso and Circe, the enchantresses of the Greek poet?

4. Robbery and piracy were honourable in both; so far were they from reflecting any discredit on the ancient and modern redressers of wrongs. What account can be given of this, but that, in the feudal times, and in the early days of Greece, when government was weak, and unable to redress the injuries of petty sovereigns, it would be glorious for private adventurers to undertake this work; and, if they could accomplish it in no other way, to pay them in kind by downright plunder and rapine?

5. Balladry was in credit with both. They were extremely watchful over the chastity of their own women; but such as they could seize upon in the enemies quarter, were lawful prize. Or, if, at any time, they transgressed in this fort at home, the fault was covered by an ingenious fiction. The offspring was reputed divine. Their greatest heroes were the fruit of goddeses approached by mortals; just as we hear of the doughnutkings being born of fairies.

6. With the greatest fierceness and savageness of character, the utmost generosity, hospitality, and courtesy, were imputed to the heroic ages. Achilles was at once the most relentless, vindictive, and generous, and the friendliest of men. We have the very same representation in the Gothic romances. As in those lawless times, dangers and difficulties of all kinds abounded, there would be the same demand for compassion, gentleness, and generous attachment to the unfortunate, those especially of their own clan, as of resentment, rage, and animosity against their enemies.

7. Again, the martial games celebrated in ancient Greece, on great and solemn occasions, had the same origin and the same purpose as the tournaments of the Gothic warriors.

8. Lastly, the passions for adventures so natural in their situation, would be as naturally attended with the love of praise and glory. Hence the same encouragement, in the old Greek and Gothic times, to pugnacity and poets. In the affairs of religion and gallantry, indeed, the resemblance between the hero and the knight is not so striking. But the religious character of the knight was an accident of the times and no proper effect of his civil condition. And that his devotion for the fair sex should so far surpass that of the hero, is a confirmation of the futility here advanced. For the consideration had of the females in the feudal constitution, will of itself account for this deference. It made them capable of succeeding to seats, as well as the men. And does not one see, on the instant, what respect and dependence this privilege would draw upon them?

It was of mighty consequence who should obtain the favour of a rich heiress. And though, in the strict feudal times, she was supposed to be in the power and at the disposal of her superior lord, yet this rigid state of things did not last long. Hence we find some distressed damsel was the spring and mover of every knight's adventure. She was to be rescued by his arms, or won by the fame and admiration of his prowess. The plain meaning of all which was this: That as, in these turbulent times, a protector was necessary to the weakness of the sex, so the courteous and valorous knight was to approve himself qualified for that purpose.

It may be observed, that the two poems of Homer were intended to expoze the mischiefs and inconveniences arising from the political state of Old Greece: the Iliad, the dispositions that naturally spring up among independent chiefs; and the Odyssey, the infolence of their greater subjects, more especially when unrestrained by the presence of their sovereign. And can any thing more exactly resemble the condition of the
CHIVALRY, in law, is used for a tenure of lands by knight's service; whereby the knight was bound to perform service in war unto the king, or the mean lord of whom he held by that tenure. And chivalry was either general or special: general, when it was only in the efferitance that the tenant held per servitium militare, without any specification of serjeantry, ecussonage; &c.; special, when it was declared particularly by what kind of knight service the land was held.

For the better understanding of this tenure it hath been observed, that there is no land but is held mediately or immediately of the crown by some service; and therefore all freeholds that are to us and our heirs, are called feuda or foeda, "fees;" as proceeding from the king for some small yearly rent, and the performance of such services as were originally laid upon the land at the donation thereof. For as the king gave to the great nobles his immediate tenants, large possessions for ever, to hold of him for this or that service or rent; so they in time parcelled out to such others as they liked the same lands for rents and services as they thought good: and these services were by Littleton divided into two kinds, chivalry and serjeantry; the first whereof was martial and military, the other rustic.

Chivalry, therefore, was a tenure of service, whereby the tenant was obliged to perform some noble or military office unto his lord: and it was of two kinds, either regal, that is, held only by the king; or common, where held of a common person. That which might be held only of the king was called servitium, or serjeantry; and was again divided into grand and petit serjeantry. The grand serjeantry was where one held lands of the king by service, which he ought to do in his own person; as to bear the king's banner or spear, to lead his host, to find men at arms to fight, &c. Petit serjeantry was when a man held lands of the king, to yield him annually some small thing towards his wars, as a sword, dagger, bow, &c. Chivalry that might be held of a common person was termed featagium, "ecussonage;" that is, service of the shield; which was either uncertain or certain.

Ecnage uncertain, was likewise two-fold: first, where the tenant was bound to follow his lord, going in person to the king's wars, either himself, or lending a sufficient man in his place, there to be maintained at his expense, so long as was agreed upon between the lord and his first tenant at the granting of the fee; and the days of such service seem to have been rated by the quantity of land so held: as if it extended to a whole knight's fee, then the tenant was to follow his lord 40 days: and if but to half a knight's fee, then 20 days; if a fourth part, then 10 days, &c. The other kind of this ecussonage was called cattle-ward, where the tenant was obliged, by himself or some other, to defend a castle as often as it should come to his turn. And these were called ecussonage uncertain; because it was uncertain how often a Chivalry man should be called to follow his lord to the wars, or to defend a castle, and what his charge would be therein.

Ecnage certain, was where the tenure was set at a certain sum of money to be paid in lieu of such services, as that a man should pay yearly for every knight's fee, half for a knight's fee 10s., or some like rate; and this service, because it is drawn to a certain rent, growtheth to be of a mixed nature, not merely socage, and yet socage in effect, being now neither personal service nor uncertain. The tenure called chivalry had other conditions annexed to it: but there is a great alteration made in these things by the Stat. 12. Car. 2. c. 24, whereby tenures by knight's service of the king, or any other person in capite, &c. and the fruits and consequences thereof, are taken away and discharged; and all tenures are to be confirmed and adjudged to be free and common socage, &c.

Court of Chivalry, a court formerly held before the lord high constable and earl marshal of England jointly, and having both civil and criminal jurisdiction: but since the attainder of Stafford Duke of Buckingham under Henry VIII. and the consequent extinction of the office of lord high constable, it hath usually, with respect to civil matters, been heard before the earl marshal only. This court, by Stat. 13. Rich. II. c. 2. hath cognizance of contracts and other matters touching deeds of arms and war, as well out of the realm as in. And from its sentences lies an immediate appeal to the king in person. This court was in great reputation in the times of pure chivalry; and afterwards during the English connections with the continent, by the territories which their princes held in France: but it is now grown almost entirely out of use, on account of the feebleness of its jurisdiction, and want of power to enforce its judgments; as it can neither fine nor imprison, not being a court of record.

1. The civil jurisdiction of this court of chivalry is principally in two points; the redressing injuries of honour, and correcting encroachments in matters of coat armour, precedence, and other distinctions, of families. As a court of honour, it is to give satisfaction to all such as are aggrieved in that point; a point of a nature so nice and delicate, that its wrongs and injuries escape the notice of the common law, and yet are fit to be redressed somewhere. Such, for instance, as calling a man a coward, or giving him the lie; for which, as they are productive of no immediate damage to his person or property, no action will lie in the courts at Westminster; and yet they are such injuries as will prompt every man of spirit to demand some honourable amends; which by the ancient law of the land, was given in the court of chivalry. But modern resolutions have determined, that how much soever a jurisdiction may be expedient, yet no action for words will at present lie therein. And it hath always been most clearly held, that as this court cannot meddle with any thing determinable by common law, it therefore can give no pecuniary satisfaction or damages; in as much as the quantity and determination thereof is ever of common law cognizance. And therefore this court of chivalry can at most order reparation in point of honour; as, to compel
CHIUM

CHIUM, or CHEVAN, in Hebrew antiquity. We meet with this word in the prophet Amos, cited in the Acts of the Apostles. St. Luke reads the passage thus: “Ye took up the tabernacle of Moloch, and the star of your god Remphan, figures which ye made to worship them.” The import of the Hebrew is as follows: “Ye have borne the tabernacle of your king, and the pekefuf (the chiun) of your images, the star of your gods, which ye made to yourselves.” The Septuagint in all probability read Rephan or Revan, instead of Chiu or Chevan, and took the pekefuf for a god.

Some say that the Septuagint, who made their translation in Egypt, changed the word Chiu into that of Remphan because they had the same signification. M. Balfage, in his book Intitulé Jewish Antiquities, after having discredited a good deal upon Chiu or Remphan, concludes that Moloch was the sun, and Chiu, Chion, or Remphan, the moon.

CHLAMYDS, in antiquity, a military habit worn by the ancients over the tunica. It belonged to the patricians, and was the same in the time of war that the toga was in the time of peace. This sort of gown was called palla, from the rich embroidery with figures in Phrygian work; and purpurea, because the ground-work was purple. The chlamydes of the emperors were all purple, adorned with a golden and embroidered border.

CHLOEIA, in antiquity, a festival celebrated at Athens in honour of Ceres, to whom, under the name Xaoi, i.e. Carii, they sacrificed a ram.

CHLORA, in botany, a genus of the monogynia order, belonging to the oenandria class of plants. The calyx is ochrophyllous, the corolla monopetalous and oenoid; the capsule unilocular, bivalved, and polyispermous.

CHLOROSIS, in medicine, a disease, commonly called the green-sickness, incident to young girls. See (The Index subjoined to) MEDICINE.

CHOCOLATE, in commerce, a kind of paste or cake prepared of certain ingredients, the basis of which is cacao. See CACAO.

The Indians, in their first making of chocolate, used to roast the cacao in earthen pots; and having afterwards cleared it of the husks, and bruised it between two flones, they made it into cakes with their hands. The Spaniards improved this method: when the cacao is properly roasted and well cleared, they pound it in
Cholera. a mortar, to reduce it into a coarse mass, which they afterwards grind on a stone till it be of the utmost fineness; the paste being sufficiently ground, is put quite hot into tin moulds, in which it congeals in a very little time. The form of these moulds is arbitrary: the cylindrical ones, holding two or three pounds, are the most proper; because the bigger the cake is, the longer they will keep. Observe, that these cakes are very liable to take any good or bad scent, and therefore they must be carefully wrapped up in paper, and kept in a dry place. Complaints are made, that the Spaniards mix with the cacao nuts too great a quantity of cloves and cinnamon, besides other drugs without number, as muilk, ambergraife, &c. The grocers of Paris use few or none of these ingredients; they only choose the best nuts, which are called caracas, from the place from whence they are brought; and with these they mix a very small quantity of cinnamon, the fresh sweet vanilla, and the finest sugar, but very seldom any cloves. In England, the chocolate is made of the simple cacao, excepting that sometimes sugar and sometimes vanilla is added.

Chocolate ready made, and cacao paste, are prohibited to be imported into Britain from beyond the seas. It made and sold in Great Britain, it pays inland duty 1s. 6d. per lb. avoidupoise; it must be inclosed in papers containing one pound each, and produced at the excise office to be stamped. Upon three days notice given to the officer of excise, private families may make chocolate for their own use, provided no less than half an hundred weight of nuts be made at one time.

The chocolate made in Portugal and Spain is not near so well prepared as the English, depending perhaps on the machine employed there. viz. the double cylinder, which seems very well calculated for exact trituration. If perfectly prepared, no oil appears on the solution. London chocolate gives up no oil like the foreign; and it also may, in some measure, depend on the thickness of the preparation. The solution requires more care than is commonly imagined. It is proper to break it down, and diffuse it thoroughly in cold water by milling it with the chocolate stick. If heat is applied, it should be done slowly: for, if suddenly, the heat will not only coagulate it, but separate the oil; and therefore much boiling after it is dissolved, is hurtful. Chocolate is commonly required by people of weak stomachs; but often rejected for want of proper preparation. When properly prepared, it is easily digested; is an excellent food where a liquid nutritious vegetable one is required, and is less flainty than any of the farinacea.

Mr. Henry, an ingenious electrician, has lately discovered that chocolate, fresh from the mill, as it cools in the tin-pans into which it is received, becomes strongly electrical; and that it retains this property for some time after it has been turned out of the pans, but soon loses it by handling. The power may be once or twice renewed by melting it again in an iron ladle, and pouring it into the tin pans as at first; but when it becomes dry and powdery, the power is not capable of being revived by simple melting; but if a small quantity of olive oil be added, and well mixed with the chocolate in the ladle, its electricity will be completely restored by cooling it in the tin-pan as before. From this experiment he conjectures, that there is a great affinity between phlogiston and the electric fluid, if indeed they be not the same thing.

Chocolate-Nut Tree. See Cacao.

Chohinix, χοϊίξ, an ancient dry measure, containing the 48th part of a medimnus, or six bushels.

Choir, that part of the church or cathedral where choirmasters sing divine service; it is separated from the chancel where the communion is celebrated, and also from the nave of the church where the people are placed: the patron is said to be obliged to repair to the choir of the church. It was in the time of Constan- tinople that the choir was separated from the nave. In the twelfth century they began to include it with walls; but the ancient basilicas have since been restored, out of a view to the beauty of architecture.

Choir in nunneries, is a large hall adjoining to the body of the church, separated by a grate, where the nuns sing the office.

Chosi (Francis Timoleon de), dean of the cathedral of Bayeux, and one of the forty of the French academy, was born at Paris in 1644. In 1685, he was sent with the chevalier de Chamont to the King of Siam, and was ordained priest in the Indies by the a-potolic vicar. He wrote a great number of works, in a polite, florid, and easy style, the principal of which are, 1. Four dialogues on the Immortality of the Soul, &c. 2. Account of a voyage to Siam. 3. An Ecclesiastical History, in 4 Vols. 4. A Life of David, with an interpretation of the Psalms. 5. Life of Solomon, &c. He died at Paris, in 1724.

Cholechochus, in anatomy, a term applied to a canal or duct, called also ductus communis; formed of the union of the porus bilarius and ductus clycosus. The word comes from χοίλη, cholera; and δυσμὸς, I receive, or contain. The cholechochus ductus passing obliquely to the lower-end of the duodenum, serves to convey the bile from the liver to the intestines. See Anat. n° 97.

Choler. See Bile.

Cholera morbus, a sudden eruption or over-flowing of the bile or bilious matters both upwards and downwards. See (the Index subjoined) to Medicine.

Chomer, or Omer. See CORUS.

Chondrilla, in botany, a genus of the polygama equals order, belonging to the fyngeesia class of plants; and in the natural method ranking under the 40th order, Compositae. The receptacle is naked; the calyx calculated; the pappus simple and flaked; the florets in a unifoliate series.

Chondropterygi, in ichthology, a term for
Chop-church, or Church-chopper, a name, or rather nick-name, given to parsons who make a practice of exchanging benefices. See Permutation.

Chop-church, occupying an ancient stature as a lawful trade or occupation; and some of the judges say it was a good addition. Both holds that it was no occupation, but a thing permissible by law.

Chopin, or Chopine, a liquid measure used both in Scotland and France, and equal to half their pint.

See Pint and Measure.

Chopin (Rene), a famous civilian born at Baileuil in Anjou in 1537. He was advocate in the parliament of Paris, where he pleaded for a long time with great reputation. He at last shut himself up in his closet; and composed many works, which have been collected together, and printed in 6 vols. folio. He died at Paris in 1606.

Choral, signifies any person that, by virtue of any of the orders of the clergy, was in ancient times admitted to fit and serve God in the choir.

Dugdale, in his history of St Paul's Church, says, that there were with the choros formerly six vicars choral belonging to that church.

Chorassan, or Khorassan, a province of Persia adjoining to Ubec Tartary. This was the ancient Baetria, and the birth-place of Kouli Khan.

Chorax, or Charax. See Characene.

Chorazin, or Charax. See Characene.

Choral, or Cord, primarily denotes a lusher or cordage *. The word is formed of the Latin, chorda, and that from the Greek, χορδα, a gut, whereof strings may be made.

Chord, in geometry, a right line drawn from one part of an arch of a circle to another. Hence, Chord of an Arch, is a right line joining the extremities of that arch.

Chord, in music, the union of two or more sounds uttered at the same time, and forming together an entire harmony.

The natural harmony produced by the resonance of a sound-body, is composed of three different sounds, without reckoning their octaves; which form among themselves the most agreeable and perfect chord that can possibly be heard: for which reason they are called, on account of their excellence, perfect chords. Hence, in order to render this harmony complete, it is necessary that each chord should at least consist of three sounds. The trio is likewise found by musicians to include the perfection of harmony; whether because in this all the cords, and each in its full perfection, are used; or, because upon such occasions as render it improper to use them all, and each in its integrity, arts have been successfully practised to deceive the ear, and to give it contrary persuasion, by deluding it with the principal sounds of each chord, in such a manner as to render it forgetful of the other sounds necessary to their completion. Yet the octave of the principal sound produces new relations, and new consonances, by the completion of the intervals: they commonly add this octave, to have the embellishment of all the consonances in one and the same chord; (See Consonance.) Moreover, the addition of the diapason (see Discord), producing a fourth sound superadded to the perfect chord, it becomes indispensably necessary, if we would render the chord full, that we should include a fourth part to express this diapason. Thus the series of chords can neither be complete nor connected but by means of four parts.

Chords are divided into perfect and imperfect. The perfect chord is that which we have lately described: which is composed of the fundamental sound below, of its third, is fifth, and its octave: they are likewise subdivided into major and minor, according as the thirds which enter into their composition are flat or sharp: (See Interval.) Some authors likewise give the name of perfect to all chords, even to dissonances, whose fundamental sounds are below. Imperfect chords are those in which the sixth, instead of the fifth, prevails, and in general all those whose lowest are not their fundamental sounds. These denominations, which had been given before the fundamental bass was known, are now most unaptly applied: those of chords direct and reversed, are much more suitable in the same sense.

Chords are once more divided into consonances and dissonances. The chords denominated consonances, are the perfect chord, and its derivatives; every other chord is a dissonance.

A table of both, according to the system of M. Rameau, may be seen in Rouleau's Musical Dictionary, vol. 1. p. 27.

After the table to which our readers have been referred, Rouleau adds the following observations, which are at the same time so just and so important, that we should be very sorry if they escape the reader's attention.

At the words harmony, fundamental bass, composition, &c. he promises to treat concerning the manner of using all the chords to form regular harmony; and only adds, in this place, the subjequent reflections.

1. It is a capital error to imagine, that the methods of inverting the same chord are in all cases equally eligible for the harmony and for the expression. There is not one of these different arrangements but had its proper character. Every one feels the contrast between the softness of the flat fifth, and the grating found of the tritone, though the one of these intervals is produced by a method of inverting the other. With the seventh diminished, and the second redundant, the caes are the same with the interval of the second in general use, and the seventh. Who does not feel how much more vocal and sonorous the fifth appears when compared with the fourth? The chord of the great sixth, and that of the lesser sixth minor, are two forms of the same fundamental chord: but how much less is the one harmonious than the other? On the contrary, the chord of the lesser sixth major is mucius more pleasing and agreeable than that of the flat fifth. And only to mention the most simple of all chords, reflect on the majesty of the perfect chord, the sweetness of that which is called the chord of the sixth, and the insipidity of that which is composed of...
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a sixth and a fourth; all of them, however, composed of the same sounds. In general, the redundant intervals, the sharps in the higher part, are proper by their severity to express violent emotions of mind, such as anger and the rougher passions. On the contrary, flats in the higher parts, and diminished intervals, form a plaintive harmony, which melts the heart. There are a multitude of similar observations, of which when a musician knows how to avail himself, he can command at will the affections of those who hear him.

2. The choice of simple intervals is scarcely of less importance than that of the chords, with regard to the stations in which they ought to be placed. It is, for instance, in the lower parts that the fifth and octave should be used in preference; in the upper parts, the third and sixth are more proper. If you transpose this order, the harmony will be ruined even though the same chords are preferred.

3. In a word, the chords are rendered still more harmonious, by being approximated and only divided by the smallest practicable intervals, which are more suitable to the capacity of the ear than such as are remote. This is what we call contrasting the harmony, an art which few composers have skill and abilities enough to put in practice. The limits in the natural compass of voices, afford an additional reason for lessening the distance of the intervals, which compose the harmony of the chorus, as much as possible. We may affirm, that a chorus is improperly composed when the distance between the chords increases; when those who perform the different parts are obliged to scream; when the voices rise above their natural extent, and are so remotely distant from one another, that the perception of harmonical relations between them is lost.

We say likewise, that an instrument is in concord when the intervals between its fixed sounds are what they ought to be; we say in this sense, that the chords of an instrument are true or false, that it preserves or does not preserve its chords. The same term of speaking is used for two voices which sing together, or for two winds which are heard at the same time, whether in unison or in parts.

CHORDS, or CHORDS, of Musical instruments, are strings, by the vibration of which the tension of sound is excited, and by the divisions of which the several degrees of tone are determined.

CHORDEE, in medicine and surgery, a symptom attending a gonorrhoea, consisting in a violent pain under the fricrum, and along the duct of the urethra during the erection of the penis, which is incurvated downwards. These erections are frequent and involuntary.

CHOREA SACRIP II. See VIRUS'S DANCE.

CHOREPISCOPI, an officer in the ancient church, about whose function the learned are extremely divided. The word comes from CHOREUS, a chorus, little country, and episcopus, a bishop, or overseer.

The choreepisci were suffragan or local bishops, holding a middle rank between bishops and presbyters, and delegated to exercise episcopal jurisdiction within certain districts, when the boundaries of particular churches, over with separate bishops presided, were considerably enlarged. It is not certain when this office was first introduced: some trace it to the close of the first century; others tell us, that choreeposci were not known in the east till the beginning of the fourth century; and in the west about the year 459. They ceased both in the east and west in the tenth century.

CHOREPISCOPI is also the name of a dignity still subsisting in some cathedrals, particularly in Germany; signifying the same with CHOREUS, or bishop of the choir. The word, in this sense, does not come from CHOREAUS, place, but CHOREAUS guor, &c. In the church of Cologne, &c. the first chanter is called choreepiscopus.

CHOREUS, XOBUO, a foot in the ancient poetry, more commonly called trocheus. See TROCHEE.

CHORIAMBUS, in ancient poetry, a foot consisting of four syllables, whereof the first and last are long, and the two middle ones are short; or, which is the same thing, it is made up of a trocheus and lambus; such is the word nöbaus.

CHORIOIDES, or CHOROEIDES, in anatomy, the exterior membrane which invests the focus in the uterus. See FEETUS.

CHOROBATA, or CHOROBATES, a kind of water level among the ancients, of the figure of the letter T, according to Vitruvius's description.

CHOROGRAPHY, the art of making a map of some country or province.

Chorography differs from geography, as the description of a particular country is different from that of the whole earth; and from topography, as the description of a country is different from that of a town or district. See the articles GEOGRAPHY, TOPOGRAPHY, and MAP.

CHOROIDES, or CHOROEIDES, in anatomy, a term applied to several parts of the body; bearing some resemblance to the chorion. The word is formed from CHOREUS, chorion, and OIDE, likeness.

CHOROEIDES is particularly used for the inner membrane which immediately invests the brain; so called as being intermingled with a great number of blood-vessels, like the chorion; but more usually denominated the pia mater, or meninx tenus.

PLEXUS or Lucii CHOROEIDES, is a knot of veins and arteries in the anterior ventricle of the brain, woven out of the branches of the carotid.

CHOROEIDES is also applied to the inner and posterior tunics of the eye; immediately under the sclerotica. It is soft, thin, and black; and its inner or concave surface is very smooth and polished. It has its name from its being intermixed with vessels.

CHORUS, in dramatic poetry, one or more persons present on the stage during the representation, and supposed to be by-standers without any share in the action.

Tragedy in its origin was no more than a single chorus, who trod the stage alone, and without any actors, singing dithyrambs or hymns in honour of Bacchus. Thebpis, to relieve the chorus, added an actor, who rehearsed the adventures of some of their heroes; and Aeschyus, finding a single person too dry an entertainment, added a second, at the same time reducing the singing of the chorus, to make more room...
CHOUSCH, in ornithology, the trivial name of a species of Corvus.

CHOUS, in the eastern military orders, the title of the messengers of the divan of Janisaries. There are several degrees of honour in this post. When a person is first advanced to it, he is called a cucuk, or little choos; after this he is advanced to be the alloy choos; that is, the messenger of ceremonies; and from this, having passed through the office of perelma, or procurator of the effects of the body, he is advanced to be the bat choos.

CHOWDER-BEER, a provincial phrase of Devonshire, in England, denoting a cheap and easily prepared drink, highly commended for preventing the scurvy in long voyages, or for the cure of it where it may have been contracted. It is prepared in the following manner: Take twelve gallons of water, in which put three pounds and a half of black spruce; boil it for three hours, and having taken out the fir or spruce, mix with the liquor seven pounds of melasses, and juice boil it up; strain it through a sieve, and when milk warm put it to about four spoonfuls of yeaf to work it. In two or three days flop the bung of the cafe, and in five or six days, when fine, bottle it for drinking. Two gallons of melasses are sufficient for an hoghead of liquor; but if melasses cannot be procured, treacle or coarse sugar will answer the purpose.

CHREMENITZ, the principal of the nine-towns in Upper Hungary, situated about 68 miles north-east of Pressburg, and subject to the house of Austria. E. Long. 10. N. Lat. 48. 45.

CHREMENCRUDA, a term occurring in writers of the middle age, and expressing a custom of those times; but its signification is doubtful. It is mentioned in Leges Salicae, Tit. 61. which says, he who kills a man, and hath not wherewithal to satisfy the law or pay the fine, makes oath that he has delivered up every thing he was possessed of; the truth of which must be confirmed by the oaths of 12 other persons. Then he invites his next relations by the father's side to pay off the remainder of the fine, having first made over to them all his effects by the following ceremony. He goes into his house, and taking in his hand a small quantity of dust from each of the four corners, he returns to the door, and with his face towards the door dust with his left hand over his shoulders, and his nearest of kin. Which done, he xips to his shirt, and coming out with a pole in his hand, jumps over the hedge. His relations, whether one or several, are

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Das in prison, and the son upon the throne of Persia. He used his father tenderly at first; but afterwards called him to be put to death. This, together with his killing some of the nobility, obliged him to fly: he gave his horse the bride, which carried him into a town of the Romans, where Maurice, the emperor, received him kindly, and sent an army under Narses, which set him again upon the throne. He took Jerusalem; after this he made himself master of Libya and Egypt, and carried Carthage. Heraclius sued for peace; which was offered him on condition, That he and his subjects should deny Jesus Christ; hereupon Heraclius attacked him with success, and put him to flight. His own son purified him, and he was starved in prison in 627.

CHOUCH, in music, is when, at certain periods of a song, the whole company are to join the finger in repeating certain couplets or verses.

CHOSE, (Fr.) "a thing:" used in the common law with divers epithets: as chose local, chose translatory, and choes in action. Chose local is such a thing as is annexed to a place, as a mill and the like; chose translatory, is that thing which is moveable, and may be taken away, or carried from place to place; and chose in action is a thing incorporeal, and only a right, as an obligation for debt, annuity, &c. And generally all causes of suit for any debt, duty, or wrong, are to be accounted choses in action: and it seems, chose in action may be also called chose in sequence; because it hath no real existence, or being, nor can properly be said to be in our possession.

CHOSROES I. the Great, king of Persia, after his father Cabades, A. D. 532. He made peace with the Romans; but broke it the third year, and forced Jusfinian to a disadvantageous peace. Afterward, he was so swelled with his victories, as to bid the emperor's ambassador follow him for audience to Caucasus: but Tibereus sent an army under Jusfinian, who made himself master of the country, and put Chosroes to death in 586.

CHOSROES II. His subjects put his father Hormif-
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Chelsea upon this obliged to pay off the composition for the
murder. And if these (or any one of them) are not
able to pay, iterum super ilium chronencia, qui pauper
est, jadat, et ille totam legem componat. Whence it ap-
ppears, that chronencia, is the same with throwing
the duft, gathered from the four corners of the
hoafe. Goldastus and Spelman translate it viridem
herbam, "green grafts," from the German, gruen, kraut,
or from the Dutch, groen, "green," and gnrad, "grafts."
Wendelinus is of a contrary opinion, who thinks that
by this word denstar purifications approbationem, from
cherem, "pure, chaste, clean," and keuren, "to prove;"
so that it must refer to the oaths of the twelve juors.
Be this as it will, king Childebert reformed this law
by a decree, chap. 15, both because it favoured of
pagan ceremonies, and because several persons were
thereby obliged to make over all their
revenue, chrein, ofes, white frankincenfe, and fcveral other drugs
formed by a decree, chap. 15, of the adminiftration of baptifm,
confirmation, and extreme
unction, by Albert bishop of Riga.

CHRIST is also the name of a military order in Li-
bonia, instituted in 1205 by Alexander bishop of Riga.
The end of this institution was to defend the new
Christians, who were converted every day in Lisbonia,
but were perfecuted by the heathens. They wore on
their cloaks a sword with a crofs over it, whence they
were also denominated brothers of the sword.

Chri$t-Burgh, a town of Poland, near the lake
Draufen, and about three Polish miles from Marien-
burgh.

Chri$t-Church, a borough-town of Hampshire, in
England, 30 miles south-west of Winchester, near the
sea-coast. W. Long. 2. N. Lat. 50. 40. It sends two
members to parliament.

Chri$t-Tree, in botany. See Rhamnus.

Chri*stan. See Christianity and Chri*tians.

Mfi Christian King, one of the titles of the king
of France.

The French antiquariest race the origin of this ap-
pellation up to Gregory the Great, who, writing a
letter to Charles Martel, occasionally gave him that
title, which his successors have since retained.

Christian Religion, that instituted by Jesus Christ.
See Christianity.

CHRISTIANITY, the religion of Christians. The Origin of
word is analogically derived, as other abstractions from
their concretes, from the adjective Christian. This
again is derived from the name Christ, from the
word χριστός, ἵνα πνεύμα, I anoint. Christ is called the
annoned, from a custom which extensively prevailed in anj-
curity, and was originally paid to be of divine infli-
ton, of anointing persons in the facerdotal or regal
character, as a public signal of their conferation to
their important offices, and as a testimony that heav-
in itself was the guarantee of that relation which
then commenced between the persons thus conferat-
ced and their subordinates.

The disciples of Jesus, after the death of their teach-
er, had for some time been called Nazarens, from the name
Nazaréth in Galilee where he dwelt; which after-
wards became the designation of a particular sect.

They, who adopted the principles and profess the
guiled
religion which he taught, were first distinguished by
the name of Christians at Antioch. That profession,
and those doctrines, we now proceed to delineate with
as much perfisquity as the limits of our plan will ad-
mite, yet with the conciseness which a work so fo-
form and extensive requires.

When a Christian is interrogated concerning the Delinemat-
nature and foundation of his faith and practice, his ut-
on of Chr-

Building: (1) of the New Testament, from the books
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the materials of which it is compos’d, be extracted or deduced. Other formulæs, or confessions of faith, may, according to the Christian, deserve more or less attention, as they are more or less immediately contained or implied in the scriptures. But whatever is not actually exprefled in, or deduced by fair and necessary conjequence from, these writings, must be regarded as merely human; and can have no other title to our affent and observation than what they derive from their conformity with the scriptures, with the dictates and feelings of a reformed and cultivated mind, or with those measures which are found expedient and useful in human life. But as those books, from whence the Christian investigates his principles of belief and rules of conduct, have been variously interpreted by different professors and commentators, these diversities have given birth to a multiplicity of different facts. It cannot, therefore, be expected, that any one who undertakes to give an account of Christianity, should comprehend all the writings and opinions which have been propagated and exhibited by historical, systematical, or polemical authors. These, if at all contained in such a work as this, should be ranged under their properarticles, whether scientifical, controversial, or biographical. It is our present business, if possible, to confine ourselves to a detail of such facts and doctrines as in the strict and primitive sense of the word, are catholic, or in other exprefions, to such as uniformly have been, and still are, recognized and admitted by the whole body of Christians.

We have already faid that these, or at leaft the greatest number of them, appeal to the scriptures of the Old and New Testament as the ultimate standard, the only infallible rule of faith and manners. If you ask them, by what authority these books claim an absolute right to determine the confidences and understandings of men with regard to what they should believe and what they should do? they will answer you, that all scripture, whether for doctrine, correction, or reproof, was given by immediate inspiration from God.

If again you interrogate them how these books, which they call Scripture, are authenticated? they reply, that the evidences by which the Old and New Testament are proved to be the Word of God, are either external or internal. The external may again be divided into direct or collateral. The direct evidences are such as arise from the nature, confciency, and probability, of the facts; and from the simplicitly, uniformity, compenance, and fidelity, of the testimonies by which they are supported. The collateral evidences, are either the same occurrences supported by Hea-then testimonies, or others which concur with and corroborate the history of Christianity. Its internal evidences arise either from its exact conformity with the character of God, from its aptitude to the frame and circumstances of man, or from those supernatural convictions and affinities which are impressed on the mind by the immediate operation of the divine Spirit. These can only be mentioned in a cursory manner in a detail too concise as the present.

Such facts as are related in the history of his religion, the Christian afferts to be not only consistent each with itself, but likewise one with another. Hence it is, that, by a series of antecedents and conjequences, they corroborate each other, and form a chain which cannot be broken but by an absolute subversion of all historical authenticity. Nor is this all; for, according to him, the facts on which Christianity is founded, not only constitute a series of themselves, but are likewise in several periods the best resources for supplying the chafms in the history of our nature, and preferring the tenor of its annals entire. The facts themselves are either natural or supernatural. By natural facts we mean such occurrences as happen or may happen from the various operations of mechanical powers, or from the interposition of natural agents without higher affi.iations. Such are all the common occurrences of history, whether natural, biographical, or civil. By supernatural facts, we mean such as could not have been produced without the interposition of Deity, or at leaft of powers superior to the laws of mechanism or the agency of embodied spirits. Among these may be reckoned the immediate change of water into wine, the instantaneous cure of diseases without the intervention of medicine, the refolution of the dead, and others of the same kind. In this order of occurrences may likewise be numbered the extraordinary talents and performances of prophetic power, where the persons by whom these extraordinary talents were displayed, could neither by penetration nor conjecture unravel the mazes of futurity, and trace the events of which they spoke from their primary causes to their remote completions. So that they must have been the passive organs of some superior Being, to whom the whole concatenation of causes and effects which operate from the origin to the consummation of nature, was obvious at a glance of thought.

It has already been hinted, that the facts which we Natural have called natural, not only agree with the analogy of human events, and corroborate each other, but in a great many emergencies nobly illustrate the history of nature in general. For this a Christian might offer the illustration of one instance, of which philosophy will not perhaps be history, able to produce any tolerable solution, without having recourse to the facts upon which Christianity is founded. For if mankind were originally descended from one pair alone, how should it have happened that long before the date of authentic history every nation had its own distinct language? Or if it be supposed, as some late philosophers have maintained, that man is an indigenous animal in every country; or, that he was originally produced in, and created for, each particular soil and climate which he inhabits; still it may be demanded, whence the prodigious multiplicity, the immense diversity of languages? Is the language of every nation intuitive, or were they dictated by exigencies, and establihed by convention? If the last of these suppositions be true, what an immense period of time must have passed? How many revolutions of material and intellectual nature must have happened? What accessions of knowledge, refinement, civilization, must human intercourse have gained before the formation and establishment even of the most simple, imperfect, and barbarous language? Why is a period so vast, obliterated so entirely as to escape the retrospect of history, of tradition, and even of fable itself; Why was the acquisition and improvement of other
arts are so infinitely distant from that of language, that 
the aera of the latter is entirely lost, whilst we can 
trace the former from their origin through the vari-
ous gradations of their progress.

These difficulties, inextricable by all the lights of 
history or philosophy, this more than Cimmerian dark-
ness, is immediately disipated by the Mofaic ac-
count of the confusion of tongues: wisely intended to 
separate the tribes of men one from another, to replen-
ish the surface of the globe, and to give its multiplied 
habitants those opportunities of improvement which 
might be derived from experiment and industry, var-
iously exerted, according to the different situations in 
in which they were placed, and the different employ-
ments which those situations dictated. Thus the time 
of nature's existence is limited to a period within the 
ken of human intellect. Thus whatever has happen-
ded might have happened during the present mode of 
things; whereas, if we deduce the origin and diversity 
of language from a period so remotely di
distant as to be 
abolutely lost, and entirely detached from all the 
known occurences and vicissitudes of time, we must 
admire the present forms and arrangements of things 
to have fulfilled perhaps for a much longer duration 
than any mechanical philosopher will allow to be pos-
ible. Other infancies equally pregnant with convic-
tion might be multiplied; but, precluded by the limits 
of our plan, we proceed to a single observation upon 
the facts which have been termed supernatural.

Of those changes which happen in sensible objects, 
fatination alone can be judge. Reason has nothing to 
do in the matter. She may draw conclusions from 
the testimonies of sense, but can never refute them.
If, therefore, our senses inform us that snow is white, 
in vain would the most learned and subtle philosopher 
endeavour to convince us that it was of a contrary 
colour. He might confound us, but never could per-
suade us. Such changes, therefore, as appear to hap-
pen in sensible objects, must either be real or fallac-
ious. If real, the miracle is admitted, if falacious, 
there must be a case of deception equally unaccount-
able from the powers of nature, and therefore equally 
miraculous. If the veracity or competency of the 
witneces be questioned, the Christian answers, that 
they must be competent, because the facts which they 
relate are not beyond their capacity to determine. 
They must likewise be faithful, because they had no 
peculiar motives for maintaining, but many for sup-
prefing or disbelieving, what they testified. Now the Chri-
Stian appeals to the whole series of history and expe-
rience, whether such a man is or can be found, as will 
offer a voluntary, solemn, and deliberate facrifice of 
truth at the shrine of caprice. But such facts as after 
a long continuance of time have been found exactly 
agreable to predictions formerly emitted, must su-
forder the fidelity of testimony, and infallibly prove 
that the event was known to the Being by whom it 
was foretold. In vain has it been urged, that proph-
ecies are ambiguous and equivocal. For though they 
may prefigure inordinate events, yet if the grand oc-
currences to which they ultimately relate, can alone 
fulfil them in their various circumstances, and in their 
utofit extent, it is plain, that the Being by whom 
they were revealed must have been actually present 
of those events, and must have had them in view when 
the predictions were uttered. For this see a learned 
and ingenious Dissertation on the Credibility of Gop-
history, by Dr M'Knight; where the evidences 
urged by the Christian in defence of his tenets, which 
appear detached and scattered through innumerable 
Volumes, are assembled and arranged in such a manner 
as to derive strength and luftre from the method in 
which they are disposed, without diminishing the 
force of each in particular. See also the works of Dr 
Hurd; confult likewise those of Newton, Sherlock 
Chandler, &c. For the evidences of those preternatu-
ral facts which have been termed miracles, the reader 
may consult a short but elegant and conclusive defence 
of these astonishing phenomena, in answer to Mr Hume, 
by the Rev. George Campbell, D. D.

It must be obvious to every reflecting mind, that Properties 
whether we attempt to form the idea of any religion common 
apriori, or contemplate those which have been already 
exhibited, certain facts, principles, or data, must be 
pre-established, from whence will result a particular 
frame of mind and course of action suitable to the 
character and dignity of that Being by whom the 
religion is enjoined, and adapted to the nature and situ-
ation of those agents who are commanded to observe it. Hence Christianit 
may be divided into creeds or doctrines, and agendas or precepts.

As the great foundation of his religion, therefore, Christian 
the Christian believes the existence and government theology. 
of one eternal and infinite God, who, for ever re-
tains in himself the cause of his own existence, and 
inhernently posses all those perfections which are com-
patible with his nature: such are, his almighty power, 
omnicient wisdom, infinite justice, benevolence good-
ness, perfect holiness, and universal presence. That Jefus Chrift is the Son of God, in whom the fulnes-
se of the Godhead dwells, by whom he created and 
governs the univerfe, exercising in his universal govern-
ment the energy of the Holy Spirit, and conducing 
all his dispensations to accomplish the designs of infi-
nite wisdom and benevolence.

The Supreme Being, though absolutely independent 
and for ever sufficient for his own beatitude, was gra-
ciously pleased to create an univerfe replete with in-
ferior intelligences, who might for ever contemplate and 
and enjoy his glory, participate his happiness, and imita-
tate his perfections. But as freedom of will is essen-
tial to the nature of moral agents, that they may co-
operate with God in their own improvement and hap-
piness, to their natures and powers are necessarily li-
imited, and by that constitution rendered peccable. 
This degeneracy first took place in a rank of intelli-
gence superior to man. But guilt is never stationary. 
Impatient of itself, and cursed with its own feelings, it 
proceeds from bad to worse, whilst the poignancy of 
it torment is increafes with the number of its perpe-
trations. Such was the situation of Satan, and his apo-

defate angels. They attempted to transfer their tur-
pitude and misery to man; and were, alas! but too 
foeful. Hence the heterogeneous and irreconcilable 
principles which operate in his nature. Hence 
that inexplicable medley of wisdom and folly, of re-
titude and error, of benevolence and malignity, of fin-
cerity and fraud, exhibited through his whole con-
duct.
The Christian is convinced, that there is and shall continue to be a society upon earth, who worship God as revealed in Jesus Christ; who believe his doctrines; who observe his precepts; and who shall be saved by his death, and by the use of these external means of salvation which he hath appointed.

These are few and simple. The sacraments of the extern-baptism and the eucharist, the interpretation and application of scripture, the habitual exercise of public and private devotion, are obviously calculated to diffuse and promote the interests of truth and virtue, by superinducing the salutary habits of faith, love, and repentance.

The Christian is firmly persuaded, that at the period which God hath appointed, and to which the purposes of providence in the various revolutions of progressive nature tend, the whole human race shall once more be free from their graves; some to supreme felicity, in the actual perception and enjoyment of their Creator’s presence; others to that consummate flame and misery, which are the native confusions of their wickedness.

The two grand principles of action, according to Christian the Christian, are, The love of God, which is the sovereign passion in every perfect mind; and the love of man, which regulates our actions according to the various relations in which we stand, whether to communities or individuals. This sacred connection can never be totally extinguished by any temporary injury. It ought to subsist in some degree even amongst enemies. It requires that we should pardon the offences of others, as we expect pardon for our own; and that we should no farther refill evil than is necessary for the preservation of personal rights and social happiness. It dictates every relative and reciprocal duty between parents and children, masters and servants, governors and subjects, friends and friends, men and men. Nor does it merely enjoin the observation of equity, but enforces it with the motive of benevolence and extensive charity, a boundless and disinterested effusion of tender affections for the whole species, which feeds their diftresses and operates for their relief and improvement. These celestial dispositions, and the different duties which are their natural exertions, are the various gradations by which the Christian hopes to attain the perfection of his nature; and the most exquisite happiness of which it is susceptible.

Such are the speculative, and such the practical principles of Christianity. From the former, its vortaries contend, that the origin, economy, and revolutions of intelligent nature alone can be rationally explained. From the latter, they assert, that the nature of man, whether considered in his individual or social capacity, can alone be conducted to its highest perfection and happiness. With the determined Atheists they fearlessly design to expostulate. For, according to them, philosophers who can deduce the origin and constitution of things from casual encounters or mechanical necessity, are capable of deducing any conclusion from any premises. Nor can a more glaring instance of absurdity be produced, than the idea of a contingent or self-originated universe. When Deists
Decorts and other sceptics upbraid them with mysterious or incompatible principles, they without hesitation deny the charge. They demand of any reasoner who admits that a being may be omnipresent without extension; or that he can impute motion upon other things whilst he himself is necessarily immovable upon what ground he charges Christianity with incompatible principles. They ask the fage, why it should be thought more extraordinary, that the Son of God should be sent to this world, that he should be a man of like passions with other men, that he should suffer and die for the relief of his degenerate creatures, than that an existence whose felicity is eternal, inherent, and infinite, should have any motive for creating beings exterior to himself? Is it not, says the Christian, equally worthy of the divine interposition to restore order and happiness where they are lost, as to communicate them where they never have been? Is not infinite goodness equally confounding in relieving misery as in diffusing health? Is not the existence of wise beings, who call evil in the world, under the tuition of an infinitely perfect Being, as inferterable as the mean exhibited by Christianity for its abolition? The death and resurrection of the Son of God, and pardon and life through him, are certainly not less reconcilable to human reason, a priori, than the existence of vice and punishment in the productions of infinite wisdom, power, and goodness; particularly when it is considered, that the virtues exerted and displayed by a perfect Being in a state of humiliation and suffering, shall ultimately be productive of the restored felicity of inferior creatures, in proportion to their glory and excellence; and that such goodness may apply the blessings which it has obtained, in whatever manner, in whatever degree, and to whomsoever it pleases, without being under any necessity to violate the freedom of moral agents, by recalling them to the paths of virtue and happiness by a mechanical and irresistible force.

It will be granted to philosophy by the Christian, that no theory of mechanical nature can be formed without presupposing sacred and established laws from which the ought rarely or never to deviate, so in fact the tenaciously pursues these general institutions, and from their constant observance refult the order and regularity of things. But he cannot admit, that the important ends of moral and intellectual improvement may be uniformly obtained by the same means. He affirms, that if the hand of God should either remain always entirely invisible, or at least only perceptible in the operation of second causes, intelligent beings would be apt in the course of time to resolve the interpositions of Deity into the general laws of mechanism, to forget their connection with nature, and consequently their dependence upon him. Hence, according to the dictates of common sense, and to the unanimous voice of every religion in every age or clime, for the purposes of wisdom and benevolence, God may not only control, but has actually controlled, the common course and general operations of nature. So that, as in the material world the law of cause and effect is generally and supremely observed for the purposes of natural subsistence and accommodation; thus dispensations and changes of that universal law are equally necessary for the advancement of moral and intellectual perfection.

But the disciple of Jesus not only contends, that no system of religion has ever yet been exhibited so conformable with itself, so congruous to philosophy and the common sense of mankind, as Christianity; he likewise avers, that it is infinitely more productive of real and sensible consolation than any other religious opinion or philosophical tenet, which has ever entered into the soul, or been applied to the heart of man. For what is death to that mind which considers eternity as the career of its existence? What are the frowns of fortune to him who claims an eternal world as his inheritance? What is the loss of friends to that heart which feels, with more than natural conviction, that it shall quickly rejoin them in a more tender, intimate, and permanent intercourse than any of which the present life is susceptible? What are the fluctuations and vicissitudes of external things to a mind which strongly and uniformly anticipates a state of ends and immovable felicity? What are misfortunes, disappointments, and insults, to a spirit which is conscious of being the original offspring and adopted child of God; which knows that its omnipotent Father will, in proper time, effectually avert the dignity and privileges of its nature? In a word, as earth is but a specé of creation, as time is not an instant in proportion to eternity, such are the hopes and prospects of the Christian in comparison of every fublime misfortune or difficulty. It is therefore, in his judgment, the eternal wonder of angels, and indelible opprobrium of man, that a religion so worthy of God, so favorable to the frame and circumstances of our nature, so conformable to all the dictates of reason, so friendly to the dignity and improvement of intelligent beings, pregnant with genuine comfort and delight, should be rejected and despised. Were there a possibility of falshood or hesitation between this and any other religion extant, he could freely trust the determination of a question so important to the candid decision of real virtue and impartial philosophy.

Mr. Gibbon, in his History of the Decline and Fall of the Roman Empire, mentions five secondary causes to which he thinks the propagation of Christianity, and all the remarkable circumstances which attended it, may be with good reason ascribed. He seeks to intimate, that Divine Providence did not act in a regular or extraordinary manner in disseminating the religion of Jesus through the world; and that, if every other argument which has been adduced to prove the sacred authority of this religion can be repaired or refuted, nothing can be deduced from this source to prevent it from sharing the same fate with other systems of superstition. The causes of its propagation were in his opinion founded on the principles of human nature and the circumstances of society. If we ascribe not the propagation of Mahometanism, or of the doctrines of Zerdust, to an extraordinary interposition of divine providence, operating by an unperceived influence on the dispositions of the human heart, and controlling and confounding the ordinary laws of nature; neither can we, upon any reasonable grounds, refer the promulgation of Christianity to such an interposition.

The
The secondary causes to which he ascribes these effects are, 1. The indolent and intolerant zeal of the Christians; derived from the Jewish religion, but purified from the narrow and unocial spirit which, instead of inviting, deterred the Gentiles from embracing the law of Moses. 2. The doctrine of a future life, improved by every additional circumstance which could give weight and efficacy to that important truth. 3. The miraculous powers ascribed to the primitive church. 4. The pure and abstract morals of the Christians. 5. The union and discipline of the Christian republic, which gradually formed an independent and increasing state in the heart of the Roman empire.

In pointing out the connection between the first of these causes and the effects which he represents as arising from it, this learned and ingenious writer observes, that the religion of the Jews does not seem to have been intended to be propagated among the Heathens, and that the conversion of profelytes was rather accidental than consistent with the purport and the general spirit of the institutions of Judaism. The Jews were, of consequence, induced to preserve themselves a peculiar people. Their zeal for their own religion was intolerant, narrow, and unocial.

In Christianity, when it made its appearance in the world, all the better part of the predominant spirit of Judaism was retained; but whatever might have a tendency to confine its influence within narrow limits was laid aside. Christians were to maintain the doctrines and adhere to the institutions of their religion with sacred fidelity. They were not to violate their allegiance to Jesus by entertaining or professing any reverence for Jupiter or any other of the Heathen deities; it was not even necessary for them to comply with the positive and ceremonial institutions of the law of Moses,—although these were acknowledged to have been of divine origin. The zeal, therefore, which their religion inculcated, was inflexible. It was even intolerant: for they were not to content themselves with professing Christianity and conforming to its laws; they were to labour with unremitting avidity, and to expose themselves to every difficulty and danger, in converting others to the same faith.

But the same circumstances which rendered it thus intolerant, communicated to it a more liberal and a less unocial spirit than that of Judaism. The religion of the Jews was intended only for a few tribes: Christianity was to become a catholic religion; its advantages were to be offered to all mankind.

All the different sects which arose among the primitive Christians uniformly maintained the same zeal for the propagation of their own religion, and the same abhorrence for every other. The Orthodox, the Ebionites, the Gnostics, were all equally animated with the same exclusive zeal, and the same abhorrence of idolatry, which had distinguished the Jews from other nations.

Such is the general purport of what Mr. Gibbon advances concerning the influence of the first of these secondary causes in the propagation of Christianity. It would be unaccountable to deny, that his statement of facts appears to be, in this instance, almost fair, and his deductions tolerably logical. The first Christians were remarkable for their detestation of idolatry, and for the generous disinterested zeal with which they laboured to convert others to the same faith. The first of these principles, no doubt, contributed to maintain the dignity and Christlike purity of Christianity; and the second to diffuse it through the world. But the facts which he relates are far less consistent throughout. He seems to represent the zeal of the first Christians as so hot and intolerant, that they could have no social intercourse with those who still adhered to the worship of Heathen deities. In this case, how could they propagate their religion? Nay, we may even ask, How could they live? If they could not mingle with the Heathens in the transactions either of peace or war, nor mingle in the marriage or the funeral of the nearest friend, if a Heathen; nor practice the elegant arts of music, painting, eloquence, or poetry; nor venture to use freely in conversation the language of Greece or Rome:—it is not easy to see what opportunities they could have of disseminating their religious sentiments. If, in such circumstances, and observing rigidly such a tenor of conduct, they were yet able to propagate their religion with such amazing success as they are said to have done; they must surely either have practiced some wondrous arts unknown to us, or have been assisted by the supernatural operation of divine power.

But all the historical records of that period, whether placed or profane, concur in testifying that the primitive Christians in general did not retire with such religious horror from all intercourse with the Heathens. They refused not to serve in the armies of the Roman empire: They appealed to Heathen magistrates, and submitted respectfully to their decisions: The Husband was often a Heathen, and, the wife a Christian; or, again, the husband a Christian, and the wife a Heathen. These are facts so universally known and believed, that we need not quote authorities in proof of them.

This respectable writer appears therefore not to have stated the facts which he produces under this head with sufficient ingenuity; and he has taken care to exaggerate and improve those which he thinks useful to his purpose with all the dazzling, delusive colours of eloquence. But had the zeal of the first Christians been so intolerant as he represents it, it must have been highly unfavourable to the propagation of their religion: all their wishes to make converts would, in that case, have been counteracted by their unwillingness to mix, in the ordinary intercourse of life, with those who were to be converted. Their zeal, and the liberal spirit of their religion, were indeed secondary causes which contributed to its propagation: but their zeal was by no means so ridiculously intolerant as this writer would have us believe; if it had, it must have produced effects directly opposite to those which he ascribes to it.

In illustrating the influence of the second of these secondary causes to which he ascribes the propagation of Christianity, Mr. Gibbon displays no less ingenuity than in tracing the nature and the effects of the first. The doctrine of a future life, improved by every additional circumstance which can give weight and efficacy to that important truth, makes a conspicuous figure in the Christian system; and it is a doctrine highly flattering to the natural hopes and wishes of the human heart.

Though the Heathen philosophers were not acquainted with this doctrine, yet to them the spirituality of the human soul, its capacity of existence in a separate state from the body, its immortality, and its
Christianity. prospect of lasting happiness in a future life, rather appeared things possible and desirable, than truths fully established upon solid grounds. These doctrines, Mr. Gibbon would persuade us, had no influence on the moral sentiments and general conduct of the Heathens. Even the philosophers, who amused themselves with displaying their eloquence and ingenuity on those splendid themes, did not allow them to influence the tenor of their lives. The great body of the people, who were occupied in pursuits very different from the speculations of philosophy, and were unacquainted with the questions discussed in the schools, were scarce ever at pains to reflect whether they consisted of material and a spiritual part, or whether their existence was to be prolonged beyond the term of the present life; and they could not regulate their lives by principles which they did not know.

In the popular superstition of the Greeks and Romans, the doctrine of a future state was not omitted. Mankind were not only flattered with the hopes of continuing to exist beyond the term of the present life; but different conditions of existence were promised or threatened, in which retributions for their conduct in human life were to be enjoyed or suffered. Some were exalted to heaven, and associated with the gods; others were rewarded with less illustrious honours, and a more moderate state of happiness, in Elysium; and those, again, who by their conduct in life had not merited rewards, but punishments, were configned to Tartarus. Such were the ideas of a future state which made a part of the popular superstition of the Greeks and Romans. But they produced only a very faint impression on the minds of those among whom they prevailed. They were not truths supported by evidence; they were not even plausible; they were a tinsel of absurdities. They had not therefore a more powerful influence on the morals, than the more refined speculations of the philosophers.

Even the Jews, whose religion and legislature were communicated from heaven, were in general, till within a very short time before the propagation of the gospel, as imperfectly acquainted with the doctrine of a future state as the Greeks and Romans. This doctrine made no part of the law of Moses. It is but darkly and doubtfully intimated through the other parts of the Old Testament. Those among the Jews who treated the sacred scriptures with the highest reverence, always denied that such a doctrine could be deduced from any thing which they taught; and maintained that death is the final dissolution of man.

The rude tribes who inhabited ancient Gaul, and some other nations not more civilized than they, entertained ideas of a future life, much clearer than those of the Greeks, the Romans, or the Jews.

Christianity, however, explained and inculcated the truth of this doctrine in all its splendour and all its dignity. It exhibited an alluring, yet not absurd, view of the happiness of a future life. It conferred new horrors on the place of punishment, and added new severity to the tortures to be inflicted, in another world. The authority on which it taught these doctrines, and displayed these views, was such as to silence inquiry and doubt, and to command implicit belief. What added to the influence of the doctrine of a future state of existence, thus explained and inculcated, was that the first Christians confidently prophesied and sincerely believed that the end of the world, the consummation of all things, was fast approaching, and that the generation then present should live to witness that awful event. Another circumstance which contributed to render the same doctrine so favourable to the propagation of Christianity was, that the first Christians dealt censure without remorse, and almost without making any exceptions, on all who died in the belief of the absurdities of Heathen superstition. Thus taught and improved with these additional and heightening circumstances, this doctrine, partly by presenting alluring prospects and exciting pleasing hopes, partly by working upon the fears of the human heart with representations of terror, operated in the most powerful manner in extending the influence of the Christian faith.

Here, too, facts are rather exaggerated, and the observations scarce fairly deduced. It must be confessed, that the speculations of the Heathen philosophers did not fully and undeniable establish the doctrine of the immortality of the human soul; nor can we presume to assert, in contradiction to Mr. Gibbon, that their arguments could impress such a conviction of this truth as might influence in a very strong degree the moral sentiments and conduct. They must, however, have produced some influence on those. Some of the most illustrious among the Heathen philosophers appear to have been so strongly impressed with the belief of the soul's immortality, and of a future state of retribution, that their general conduct was confantly and in a high degree influenced by that belief. Plato and Socrates are eminent and well known instances. And if, in such instances as these, the belief of these truths produced such conspicuous effects; it might be fairly inferred, though we had no further evidence, that those characters were far from being singular in this respect. It is a truth acknowledged as unquestionable in the history of the arts and sciences, that wherever any one person has cultivated these with extraordinary success, some among his contemporaries will always be found to have rivalled his excellence, and a number of them to have been engaged in the same pursuits. On this occasion we may venture, without hesitation, to reason upon the same principles. When the belief of the immortality of the human soul produced such illustrious patterns of virtue as a Plato and a Socrates; it must certainly have influenced the moral sentiments and conduct of many others, although in an inferior degree. We speculate, we doubt, concerning the truth of many doctrines of Christianity; many who profess that they believe them, make this profession only because they have never considered seriously whether they be true or false. But, notwithstanding this, these truths still exert a powerful influence on the sentiments and manners of society in general. Thus, also, it appears, that the doctrines of ancient philosophy concerning a future life, and even the notions concerning Olympus, Elysium, and Tartarus, which made a part of the popular superstition, did produce a certain influence on the sentiments and manners of the heathens in general. That influence was often indeed inconsiderable, and not always happy; but still it was somewhat greater than Mr. Gibbon seems willing to allow. Christians have been sometimes at pains to exaggerate the absurdities of Pagan superstition, in order that the advantages.
The advantages of Christianity might acquire new value from being contrasted with it. Here we find one who is rather disposed to be the enemy of Christianity, displaying, and even exaggerating, those absurdities for a very different purpose. But the truth may be fairly admitted: it is only when exaggerated that it can serve any purpose improper to the sacred authority of our holy religion. Mr Gibbon certainly represents the religious doctrine of the ancient Gauls, in respect to the immortality of the human soul and a future state, in too favourable a light. It is only because the whole system of superition which prevailed among those barbarians is so imperfectly known, that it has been imagined to conflict of more sublime doctrines than those of the popular superstition of the Greeks and Romans. The evidence which Mr Gibbon adduces in proof of what he affers concerning these opinions of the ancient Gauls, is partial, and far from satisfactory. They did indeed affect and believe the soul to be immortal; but this doctrine was blended among a number of absurdities much greater than those which characterize the popular religion of the Greeks and Romans. The latter was the superstition of a civilized people, among whom reason was unfolded and improved by cultivation, and whose manners were polished and liberal; the former was that of barbarians, among whom reason was, as it were, in its infancy, and who were strangers to the improvements of civilization. When hasty observers found that those barbarians were not absolutely strangers to the idea of immortality, they were moved to undue admiration; their surprife at finding what they had not expected, confused their understanding, and led them to misconceive and misrepresented. What we ought to ascribe to the savage ferocity of the character of those rude tribes, has been atributed by mistake to the influence of their belief of a future state.

In the law of Moses, it must be allowed, that this doctrine is not particularly explained nor earnestly inculcated. The author of the Divine Legation of Moses, &c. has founded upon this fact an ingenious theory, which we shall elsewhere have occasion to examine. The reasons why this doctrine was not more fully explained to the Jews, we cannot pretend to assign, at least in this place: yet we cannot help thinking, that it was more generally known among the Jews than Mr Gibbon and the author of the Divine Legation are willing to allow. Though it be not strongly inculcated in their code of laws, yet there is some reason to think that it was known and generally prevalent among them long before the Babylonish captivity; even in different passages in the writings of Moses, it is mentioned or alluded to in an unequivocal manner. In the history of the patriarchs, it appears that this doctrine was known to them; it appears to have had a strong influence on the mind of Moses himself. Was David, was Solomon, a stranger to this doctrine? We cannot here defend to very minute particulars; but surely all the efforts of ingenuity must be insufficient to torture the sacred scriptures of the Old Testament, so as to prove that they contain nothing concerning the doctrine of a future state anywhere but in the writings of the latter prophets, and that even in these it is only darkly intimated. Were the Jews, in the earlier part of their history, so totally secluded from all intercourse with other nations, that a doctrine of so much importance, more or less known Christianity to all around, could not be communicated to them? The Pharisees did admit traditions, and set upon them an undue value; yet they appear to have been confedered as the most orthodox of the different sects which prevailed among the Jews: the Sadducees were rather regarded as innovators.

But though we are of opinion, that this ingenious writer allows to the doctrine of the Greek and Roman philosophers, concerning the immortality of the human soul, as well as to the notions concerning a future state which made a part of the popular superstitions of those nations, less influence on the moral sentiments and conduct of mankind than what they really exerted; though we cannot agree with him in allowing the ideas of the immortality of the soul and of a future state, which were entertained by the Gauls and some other rude nations, to have been much superior in their nature, or much happier in their influence, than those of the Greeks and Romans; and though, in consequence of reading the Old testament, we are disposed to think that the Jews knew somewhat more concerning the immortality of the human soul, and concerning the future state in which human beings are destined to exist, than Mr Gibbon represents them to have known; yet still we are very sensible, and very well pleased to admit, that "life and immortality were brought to light through the gospel."

The doctrine of a future life, as it was preached by the first Christians, was established on a more solid basis than that on which it had been before maintained; was freed from every absurdity; and was, in short, so much improved, that its influence, which, as it was explained by Heathen poets and philosophers, must be confessed to have been in many instances doubtful, now became favourable only to the interests of piety and virtue, and to them in a very high degree. It undoubtedly contributed to the successful propagation of Christianity; for it was calculated to attract and please both the speculating philosopher and the simple unenlightened votary of the vulgar superstition. The views which it exhibited were distinc; and all was plausible and rational, and demonstrated by the fullest evidence. But the happiness which it promised was of a less sensual nature than the enjoyments which the Heathens expected on Olympus or in Elysium; and would therefore appear less alluring to those who were not very capable of refined ideas, or preferred the gratification of the senses in the present life to every other species of good. If the first Christians rejoiced in the hope of beholding all the votaries of Pagan idolatry afflicted with the torments of hell in a future state, and boasted of these hopes with inhuman exultation, they would in all probability rather irritate than alarm those whom they sought to convert from that superstition: the Heathens would be moved to regard with indignant scorn the preacher who pretended, that those whom they venerated as gods, heroes, and wise men, were condemned to a state of unpeachable and laffing torment. Would not every feeling of the heart revolt against the idea, that a parent, a child, a husband, a wife, a friend, a lover, or a mistress, but lately left, and still lamented, was consigned to eternal torments for affions and opinions which they had deemed highly agreeable to superior powers? We
We may conclude, then, with respect to the influence of this secondary cause in promoting the propagation of Christianity, that the circumstances of the Hebraic world was less favourable to that influence than Mr. Gibbon pretended; that the means by which he represents the primitive Christians, as improving its efficacy, were of some them not employed, and others rather likely to weaken than to strengthen it; and that therefore more is attributed to the operation of this cause than it could possibly produce.

The third cause, the miraculous powers of the primitive church, is with good reason represented as having conducted very often to the conviction of infidels. Mr. Gibbon's reasonings under this head are, That numerous miraculous works of the most extraordinary kind were ostentatiously performed by the first Christians: that, however, from the difficulty of fixing the period at which miraculous powers ceased to be communicated to the Christian church, and from some other circumstances, there is reason to suspect them to have been merely the pretences of imposture; but this (to use a phrase of his own) is only darkly intimated: and, lastly, that the Heathens having been happily prepared to receive them as real by the many wondrous nearly of a similar nature to which they were accustomed in their former superstition, the miracles which the first Christians employed to give a sanction to their doctrines, contributed in the most effectual manner to the propagation of Christianity.

In reply to what is here advanced, it may be suggested, that the miracles recorded in the New Testament, as having been performed by the first Christians when engaged in propagating their religion, as well as a number of others recorded by the Fathers, are established as true, upon the most indubitable evidence which human testimony can afford for any fact. An ingenious Scotch writer *, who was fond of employing his ingenuity in undermining truths generally received, has endeavoured to prove that no human testimony, however strong and unexceptionable, can afford sufficient evidence of the reality of a miracle. But his reasonings on this head, which once excited doubt and wonder, have been since completely refuted; and mankind still continue to acknowledge, that though we are all liable to mistakes and capable of deceit, yet human testimony may afford the most convincing evidence of the most extraordinary and even supernatural facts. The reader will not expect us to enter, in this place, into a particular examination of the miracles of our Saviour, and his apostles, and the primitive church. An enquiry into these will be a capital object in another part of this work (Theology). We may here consider it as an undeniable and a generally acknowledged fact, that a certain part of those miracles were real. Such as were real, undoubtedly contributed, in a very eminent manner, to the propagation of Christianity; but they are not to be ranked among the natural and secondary causes.

It is difficult to distinguish at what period miraculous gifts ceased to be conferred on the members of the primitive church; yet we may distinguish, if we take pains to inquire with minute attention, at what period the evidence ceases to be satisfactory. We can also by considering the circumstances of the church through the several stages of its history, form some judgment concerning the period during which the gifts of prophecy, and speaking with tongues, and working miracles, were most necessary to Christians to enable them to avert the truth and dignity of their religion. The Heathens were strangers to pretended miracles and prophecies, and other seeming interpositions of superior beings, disturbing the ordinary course of nature and of human affairs: but the miracles to which they were familiarised had been so often detected to be tricks of imposture or pretences of mad enthusiasm, that, instead of being prepared to witness or to receive accounts of new miracles with easy credulity, they must have been in general disposed to view them with jealousy and suspicion. Besides, the miracles to which they had been accustomed, and those performed by the apostles and the first preachers of Christianity, were directly contradictory; and therefore the one could receive no assistance from the other.

Yet we must acknowledge, notwithstanding what we have above advanced, that as disagreements with respect to the principles and institutions of their religion very early arose among Christians; so they, likewise sought to extend its influence, at a very early period, by the use of pious frauds. Pious frauds, too, appear to have sometimes served the immediate purposes for which they were employed, though eventually they have been highly injurious to the cause of Christianity.

We conclude, then, that Christianity was indebted to the influence of miracles in a considerable degree for its propagation: but that the real miracles of our Saviour and his apostles, &c. were not among the secondary causes of its success: that the Heathens who were to be converted were not very happily prepared for receiving the miracles of the gospel with blind credulity: that, as it is possible to discern between sufficient and insufficient evidence, so it is not more difficult to distinguish between true and false miracles: and, lastly, that false miracles were soon employed by Christians as engines to support and propagate their religion, and perhaps not unsuccessfully; but were, upon the whole, more injurious than serviceable to the cause which they were called in to maintain.

The fourth of this series of secondary causes, which this author thinks to have been adequate to the propagation of Christianity, is the virtues of the primitive Christians. These he is willing to attribute to other and less generous motives, rather than to the pure influence of the doctrines and precepts of their religion.

The first converts to Christianity were most of them from among the lowest and most worthless characters. The wife, the mighty, and those who were distinguished by generous virtues, were in general perfectly satisfied with their present circumstances and future prospects. People whose minds were naturally weak, unenlightened, or oppressed with the sense of atrocious guilt, and who were infamous or outcasts from society, were eager to grasp at the hopes which the gospel held out to them.

When, after enlisting under the banner of Christ, they began to consider themselves as "born again to newness of life; remorse and fear, which evenly prevail over weak minds; selfish hopes of regaining their reputation, and attainting to the honours and happiness of those mansions which Jesus was said to have gone to prepare;
The principles, too, from which the virtues of the first Christians originated, were not peculiarly mean and filthy; nay, they seem to have been uncommonly sublime and disinterested. Remove in the guilty mind is a natural and reasonable sentiment; the desire of happiness in every human breast is equally so. It is uncandid to cavil against the first Christians for being, like the rest of mankind, influenced by these sentiments. And when we behold them overlooking temporary poffessions and enjoyments, extending their views to futurity, and "living by faith;" when we observe them "doing good to those who hated them, blefling those who cursed them, and praying for those by whom they were defpised," the reader will not deny their virtues to have been of the most generous and disinterested kind.

We allow, then, that the virtues of the first Christians must have contributed to the propagation of their religion: but it is with pain that we observe this respectable writer studiously labouring to misrepresent the principles from which those virtues arose; and not only the principles from which they arose, but also their importance in society.

The fifth cause was the mode of church government. The Church adopted by the first Christians, by which they were knit together in one society; who preferred the church and its interests to their county and civil concerns. We wish to deny, that the mutual attachment of the primitive Christians contributed to spread the influence of their religion; and the order which they maintained, in conformance of being animated with this spirit of brotherly love, and with such ardent zeal for the glory of God, must have doubt have produced no less happy effects among them than order and regularity produce on every other occasion on which they are strictly observed. But whether the form of church-government, which was gradually established in the Church, was actually the happiest that could possibly have been adopted; or whether, by establishing a distinct society, with separate interests, within the Roman empire; it contributed to the dissolution of that mighty fabric, we cannot here pretend to decide. These are subjects of diffision, with respect to which we may with more propriety endeavour to satisfy our readers elsewhere.

From the whole of this review of what Mr. Gibbon generally has so speciously advanced concerning the influence of conclusion the five secondary causes in the propagation of the gospel, we think ourselves warranted to conclude that the zeal of the first Christians was not, as he represents it, intolerant: that the doctrine of the immortality of the human soul was somewhat better understood in the heathen world, particularly among the Greeks and Romans and the Jews, than he represents it to have been; and that an influence more happily than what he ascribes to it: That the additional circumstances by which, he tells us, the first preachers of Christianity improved the effects of this doctrine, were far from being calculated to allure converts: That the heathens, therefore, were not quite so well prepared for an eager reception of this doctrine as he would persuade us they were; and, of consequence, could not be influenced by it in so considerable a degree, in their conversion: That real, unquestionable miracles, performed by our Saviour, by his apostles, and
CHRISTIANS, those who profess the religion of Christ. See Christianitv and Messiah.—The name Christian was first given at Antioch in the year 42 to such as believed in Christ, as we read in the Acts: till that time they were called disciples.

The first Christians distinguished themselves in the most remarkable manner by their conduct and their virtues. The faithful, whom the preaching of St Peter had converted, hearkened attentively to the exhortations of the Apostles, who failed not carefully to instruct them, as persons who were entering upon an entirely new life. They went every day to the temple with one heart and one mind, and continued in prayers; doing nothing different from the other Jews, because it was yet not time to separate from them. But they made a still greater progress in virtue: for they fold all that they possessed, and distributed their goods in proportion to the wants of their brethren. They set their meat with gladness and singleness of heart, praising God, and having favour with all the people. St Chrysostom, examining from what source the eminent virtue of the first Christians flowed, ascribes it principally to their devoting themselves of their possessions; For "(says that father) persons from whom all that they have is taken away, are not subject to sin: whereas, whoever has large possessions, wants not a devil or a tempter to draw him into hell by a thousand ways."

The Jews were the first and the most inveterate enemies of the Christians had. They put them to death as often as they had it in their power: and when they revolted against the Romans in the time of the emperor Adrian, Barchochbas, the head of that revolt, employed against the Christians the most rigorous punishments to compel them to blaspheme and renounce Jesus Christ. And we find that, even in the third century, they endeavoured to get into their hands Christian women, in order to torture and stone them in their synagogues. They forced the Christians solemnly three times a-day in their synagogues, and their rabbins would not suffer them to converse with Christians upon any occasion. Nor were they contented to hate and detest them, but they dispatched emissaries all over the world to defame the Christians, and spread all sorts of calumnies against them. They accused them, among other things, of worshipping the sun and the head of an ass. They reproached them with idleness, and being an useless race of people. They charged them with treason, and endeavouring to erect a new monarchy against that of the Romans. They affirmed, that, in celebrating their mysteries, they used to kill a child and eat its flesh. They accused them of the most shocking iniquities, and of intemperance in their feasts of charity. But the lives and behaviour of the first Christians were sufficient to refute all that was said against them, and evidently demonstrated that these accusations were mere calumnies and the effect of inveterate malice.

Pliny the younger, who was governor of Pontus and Bithynia between the years 103 and 105, gives a very particular account of the Christians in that province, in a letter which he wrote to the emperor Trajan, of which the following is an extract: "I take the liberty, Sir, to give you an account of every difficulty which arises to me. I have never been prefect at the examination of the Christians; for which reason I know not what questions have been put to them, nor in what manner they have been punished. My behaviour towards those who have been accused to me has been this: I have interrogated them, in order to know whether they were really Christians. When they have confessed it, I have repeated the same question two or three times, threatening them with death if they did not renounce this religion. Those who have persisted in their confession, have been, by my order, led to punishment. I have even met with some Roman citizens guilty of this perversity, whom, in regard to their quality, I have set apart from the rest, in order to send them to Rome. These persons declare, that their whole crime, if they are guilty, consists in this; that, on certain days, they assemble before sun-rise, to sing alternately the praises of Christ, as of a God, and to oblige themselves, by the performance of their religious rites, not to be guilty of theft, or adultery, to observe inviolably their word, and to be true to their truth. This deposition has obliged me to endeavour to inform myself still farther of this matter, by putting to the torture two of their women-servants, whom they call despenfieres; but I could learn nothing more from them, than that the superstitious of these people is as ridiculous as their attachment to it is astonishing."

There is extant a justification, or rather panegyric, of the Christians, pronounced by the mouth of a Pagan prince. It is a letter of the emperor Antoninus, written in the year 152, in answer to the States of Asia, who had accused the Christians of being the cause of some earthquakes which had happened in that part of the world. The emperor advises them to take care, left, in torturing and punishing those whom they accused of Atheism (meaning the Christians,
Chriilians), they should render them more obdurate, instead of prevailing upon them to change their opinion; since their religion taught them to suffer with pleasure for the sake of God." As to the earthquakes which had happened, he puts them in mind, "that they themselves are always discouraged, and link under such misfortunes; whereas the Christians never discovered more cheerfulness and confidence in God than upon such occasions." He tells them, "that they pay no regard to that religion, neither to the sacrifices of the Eternals, and, because the Christians honour and adore Him, therefore they are jealous of them, and persecute them even to death." He concludes: "Many of the governors of provinces have formerly written to my father concerning them; and his answer always was, that they should not be molested or disturbed, provided they quietly submitted to the authority of the government. Many persons have likewise consulted me upon this affair, and I have returned the same answer to them all; namely, that if any one accuses a Christian merely on account of his religion, the accused person shall be acquitted, and the accuser himself punished." This ordinance, according to Eusebius, was publicly fixed up at Ephesus in an assembly of the states. It is no difficult matter to discover the causes of the many persecutions, to which the Christians were exposed during the three first centuries. The purity of the Christian morality, directly opposite to the corruption of the Pagans, was double to one of the most powerful motives of the public averion. To this may be added, the many calumnies unjustly spread about concerning them by their enemies, particularly the Jews. And this occasioned so strong a prejudice against them, that the Pagans condemned them without inquiring into their doctrine, or permitting them to defend themselves. Besides, their worshipping Jesus Christ, as God, was contrary to one of the most ancient laws of the Roman empire, which expressly forbade the acknowledging of any God which had not been approved by the senate.

But notwithstanding the violent opposition made to the establishment of the Christian religion, it gained ground daily, and very soon made a surprizing progress in the Roman empire. In the third century, there were Christians in the camp, in the senate, in the palace; in short, everywhere, both in the temples and the theatres: they filled the towns, the country, the islands. Men and women, of all ages and conditions, and even those of the first dignities, embraced the faith; insomuch that the Pagans complained that the revenues of their temples were ruined. They were in such great numbers in the empire, that (as Tertullian expresses it,) were they to have retired into another country, they would have left the Romans only a frightful solitude.

The primitive Christians were not only remarkable for the practice of every virtue; they were also very eminently distinguished by the many miracles, gifts and graces bestowed by God upon them. "Some of the Christians (says Irenæus) drive out devils, not in appearance only, but so as that they never return; whence it often happens, that those who are possessed of evil spirits embrace the faith and are received into the church. Others know what is to come, feer visions, and deliver oracles as prophets. Others heal the sick by laying their hands on them, and restore them to perfect health: and we find some who even raise the dead.—It is impossible to reckon up the gifts and graces which the church has received from God—what they have freely received they as freely bestow. They offer these gifts by prayer alone, and invocation, of the name of Jesus Christ, without any mixture of enchantment or superstition."

We shall here subjoin the remarkable story, attested by pagan authors themselves, concerning the Christian legion in the army of the emperor Marcus Aurelius. That prince having led his forces against the Quadi, a people on the other side of the Danube, was surprised and hemmed in by the enemy in a disadvantageous place, and where they could find no water. The Romans were greatly embarrassed, and, being pressed by the enemy, were obliged to continue under arms, exposed to the violent heat of the sun, and almost dead with thirst; when, on a sudden, the clouds gathered, and the rain fell in great abundance. The soldiers received the water in their bucklers and helmets, and satisfied both their own thirst and that of their horses. The enemy, presently after, attacked them; and so great was the advantage they had over them, that the Romans must have been destroyed, but had not heaven again interposed by a violent storm of hail, mixed with lightning, which fell on the enemy, and obliged them to retreat. It was found afterwards, that one of the legions, which consisted of Christians, had by their prayers, which they offered up on their knees before the battle, obtained this favour from heaven: and from this event that legion was firnamed the Thundering Legion. See, however, the criticism of Mr. Moyle on this story in his Works, vol. ii. p. 31—390. See also Mofheim’s Church History, vol. i. p. 124.

Such were the primitive Christians, whose religion has by degrees spread itself over all parts of the world, though not with equal purity in all. And though, by the providence of God, Mahometans and Idolaters have been suffered to possess themselves of those places in Greece, Asia, and Africa, where the Christian religion formerly most flourished; yet there are still such remains of the Christian religion among them as to give them opportunity sufficient to be converted. For, in the dominions of the Turk in Europe, the Christians make two thirds parts at least of the inhabitants; and in Constantinople itself there are above twenty Christian churches, and above thirty in Thessalonica. Philadelphia, now called Alus-Shahir, has no fewer than twelve Christian churches. The whole island of Chio is governed by Christians; and some islands of the Archipelago are inhabited by Christians only. In Africa, besides the Christians living in Egypt, and in the kingdom of Congo and Angola, the islands upon the western coasts are inhabited by Christians; and the vast kingdom of Abyssinia, supposed to be as big as Germany, France, Spain, and Italy, put together, is possessed by Christians. In Asia, most part of the empire of Russia, the countries of Circassia and Mingrelia, Georgia, and Mount Libanus, are inhabited only by Christians. In America, it is notorious that the Christians are very numerous, and spread over most parts of that vast continent.

 Chr. of St. John, a seat of Christians very numerous in Baffara and the neighbouring towns: they formerly
CHRISTIANA, a town of Norway, in the province of Agderhusa, situated on a bay of the sea. E. Long. 10° 15'. N. Lat. 59° 30'.

CHRISTIANOPLE, a port-town of Sweden, situated on the Baltic Sea, in the territory of Blecking, and province of South Gothland. E. Long. 15° 40'. N. Lat. 57°.

CHRISTIANSTAD, a strong fortified town of Sweden; situated in the territory of Blecking and province of South Gothland. It was built in 1614 by Christian IV. king of Denmark, when this province belonged to the Danes; and finally ceded to the Swedes by the peace of Roskild in 1658. The town is small but neatly built, and is esteemed the strongest fortres in Sweden. The houses are all of brick, and mosty flueced white. It stands in a marshy plain close to the river Helge-a, which flows into the Baltic at Ahus about the distance of 20 miles, and is navigable only for small craft of seven tons burden. English vessels annually resort to this port for alum, pitch, and tar. The inhabitants have manufactures of cloth and flake stuffs, and carry on a small degree of commerce. E. Long. 14° 40'. N. Lat. 56° 30'.

CHRISTINA, daughter of Gustavus Adolphus king of Sweden, born in 1626; and succeeded to the crown in 1632, when only seven years of age. This princess discovered even in her infancy, what afterwards expressed in her memoirs, an invincible antipathy for the employments and conversation of women; and she had the natural awkwardness of a man with respect to all the little works which generally fall to their share. She was on the contrary, fond of violent exercises, and such amusements as consist in feats of strength and activity. She had also both ability and taste for abstracted speculations; and amused herself with language and the sciences, particularly that of legislature and government. She derived her knowledge of ancient history from its source: and Polybius and Thucydides were her favourite authors. As she was the sovereign of a powerful kingdom, it is not strange that almost all the princes in Europe aspired to her bed. Among others, were the Prince of Denmark, the Elector Palatine, the Elector of Brandenburg, the king of Spain, the king of the Romans, Don John of Austria; Sigismund of Rockocci, count and general of Cauffia; Stanislaus king of Poland; John Callimur his brother; and Charles Gustavus duke of Deux Ponts, of the Bavarian Palatinate family, son of her father the great Gustavus's sister, and consequently her first cousin. To this nobleman, as well as to all his competitors, she faintly refused her hand; but she caused him to be appointed her successor by the slates. Political interests, differences of religion, and contrariety of manners, furnished Christina with pretences for rejecting all her suitors; but her true motives were the love of independence, and a strong aversion she had conceived, even in her infancy, from the marriage yoke. "Do not force me to marry (said she to the slates); for if I should have a son, it is not more probable that he should be an Augustus than a Nero."

An accident happened in the beginning of her reign which gave her a remarkable opportunity of displaying the strength and equanimity of her mind. As she was at the chapel of the castle of Stockholm, sitting at divine service with the principal lords of her court, a poor wretch, who was disordered in his mind, came to the place with a design to assassinate her. This man, who was preceptor of the college, and in the full vigour of his age, chose, for the execution of his design, the moment in which the assembly was performing what in the Swedish church is called an act of recollection; a silent and separate act of devotion, performed by each individual kneeling and hiding the face with the hands. Taking this opportunity, he rushed through the crowd, and mounted a balloontrade within which the queen was upon her knees. The Baron Braki, chief justice of Sweden, was alarmed, and cried out; and the guards crost their partisans, to prevent his coming further: but he struck them furiously on one side; leaped over the barrier; and, being then close to the queen, made a blow at her with a knife which he had concealed without a sheath in his sleeve. The queen avoided the blow, and pulled the captain of her guards, who instantly threw himself upon the assassin, and feized him by the hair. All this happened in less than a moment of time. The man was known to be mad, and therefore nobody supposed he had any accomplices; they therefore contented themselves with locking him up, and the queen returned to her devotion without the least emotion that could be perceived by the people, who were much more frightened than herself.

One of the great affairs that employed Christina while she was upon the throne, was the peace of Westphalia, in which many clashing interests were to be reconciled, and many claims to be ascertained. It was concluded in the month of October 1648. The success of the Swedish arms rendered Christina the arbitrers of this treaty; at least as to the affairs of Sweden, to which this peace confirmed the possession of many important countries. No public event of importance took place during the rest of Christina's reign; for there were neither wars abroad, nor troubles at home. This quiet might be the effect of chance; but it might also be the effect of a good administration,
during this accident, her recollection was such, that the moment her lips were above water, she cried, out, "Take care of the Admiral." When she was got out of the water, she discovered no emotion either by her gesture or countenance; and she disdained the same day in public, where she gave a humorous account of her adventure.

But, though at first she was fond of the power and splendor of royalty, yet she began at length to feel that it embarrassed her; and the same love of independence and liberty which had determined her against marriage, at last made her weary of her crown. As, after her first disgust, it grew more and more intolerable to her, she resolved to abdicate; and, in 1652, communicated her resolution to the senate. The senate zealously remonstrated against it; and was joined by the people; and even by Charles Gustavus himself, who was to succeed her: she yielded to their importunities, and continued to sacrifice her own pleasure to the will of the public till the year 1654, and then she carried her design into execution. It appears by one of her letters to M. Canut, in whom she put great confidence, that she had meditated this project for more than eight years; and that she had communicated it to him five years before it took place.

The ceremony of her abdication was a mournful solemnity, a mixture of pomp and sadness, in which scarce any eyes but her own were dry. She continued firm and composed through the whole; and, as soon as it was over, prepared to remove into a country more favourable to science than Sweden was. Concerning the merit of this action, the world has always been divided in opinion; it has been condemned alike both by the ignorant and the learned, the trifler and the sage. It was admired, however, by the great Condé: "How great was the magnanimity of this prince (said he), who could so easily give up that for which the rest of mankind are continually destroying each other, and which so many throughout their whole lives, pursue without attaining!" It appears by the works of St. Evermond, that the abdication of Christina was at that time the universal topic of speculation and debate in France. Christina, besides abdicating her crown, abjured her religion: but this act was universally approved by one party and condemned by another; the Papists triumphed, and the Protestants were offended. No prince, after a long imprisonment, ever showed so much joy upon being restored to his kingdom, as Christina did in quitting hers. When she came to a little brook, which separates Sweden from Denmark, she got out of her carriage; and leaping to the other side, cried out in a transport of joy, "At last I am free, and out of Sweden, whither I hope I shall never return." She disinherited her women, and laid by the habit of her sex: "I would become a man (said she); yet I do not love men because they are men, but because they are not women." She made her abjuration at Brussels; where she saw the great Condé, who, after his defection, made that city his asylum. "Cousin (said she), who would have thought ten years ago, that we should have met at this distance from our countries!

The inconstancy of Christina's temper appeared in her going continually from place to place: from Brus-
Bayle was also threatened for having said that the Christina letter which Chriflina wrote, upon the revocation of the edict of Nantes, was "a remain of Proteftantism;" but he made his peace by apologies and submission. See the article Bayle.

Upon the whole, it appears to have been an uncommon mixture of faults and great qualities; which, however it might excite fear and reftlefs, was by no means amiable. She had wit, taste, parts, and learning; she was indefatigable upon the throne; great in private life; firm in misfortunes; impatient of contradiction; and, except in her love of letters, infconftant in her inclinations. The moft remarkable infance of this ficklenefs is, That after she had abdicated the crown of Sweden, she intrigued for that of Poland. She was, in every action and purpofe, violent and ardent in the higheft degree; impetuous in her defires, dreadful in her relentment, and fickle in her conduct. She fays of herfelf, "that she was minutrafh, ambitious, pafiionate, haughty, impatient, contemptuous, fafyrical, incredulous, undevout, of an ardent and violent temper, and extremely amorous;" a disposition, however, to which, if she may be believed, her pride and her virtufe were always fuperior. In general, her failings were thofe of her fex, and her virtues the virtues of ours.

Santa-CHRISTINA, one of the M Arquesas Islands.

CHRISTMAS-DAY, a festival of the Chrifiian church; obferved on the 25th of December, in memory of the nativity or birth of Jesus Christ. As to the antiquity of this festival, the ftirt footsteps we find of it are in the fecond century, about the time of the emperor Commodus. The decretal epifoles indeed carry it up a little higher; and fay that Telephorus, who lived in the reign of Antoninus Pius, ordered divine service to be celebrated, and an angelfcal hymn to be ftung, the night before the nativity of our Saviour. However, that it was kept before the times of Conflantine we have a melancholy proof: for while the perfecutions raged under Dioclefas, who then kept his courft at Nicomedia, that prince, among other acts of cruelty, finding multitudes of Chrifilians assembled together to celebrate Chrift's nativity, commanded the church-doors where they were met to be ftung, and fire to be put to it, which, in a short time, reduced them and it to ashes.

CHRISTOPHER'S, St. one of the Caribbea Islands, in America, lying to the north-weft of Nevis, and about 60 miles weft of Antigua. It was formerly inhabited by the French and Engliſh; but, in 1712, it was ceded entirely to the latter. In 1782, it was taken by the French, but refcued by Britain at the peace. It is about 20 miles in breadth and feven in length; and has high mountains in the middle, whence rivulets run down. Between the mountains are dreadful rocks, horrid precipices, and thick woods; and in the south-weft part of the island, hot sulphurous springs at the foot of them. The air is good; the falt, light, fandy, and fruitful; but the island is fubjeft to hurricanes. The produce is chiefly fugar, cotton, gin­ger, indigo, and the tropical fruits. W. Lon. 62. 52. N. Lat. 17. 20.

CHRIOASTACES, in natural history, a genus of pellicud gems, comprehending all thofe of variable colours, as viewed in different lights; of which kinds are
CHROMATIC, a kind of music which proceeds by several semitones in succession. The word is derived from the Greek χρωματικ, which signifies colour. For this denomination several causes are assigned, of which none appear certain, and all equally unsatisfactory. Instead, therefore, of fixing upon any, we shall offer a conjecture of our own; which, however, we do not impose upon the reader as more worthy of his attention than any of the former. χρωματικ may perhaps not only signify a colour, but that shade of a colour by which it melts into another, or what the French call nuance. If this interpretation be admitted, it will be highly applicable to semitones; which being the smallest interval allowed in the diatonic scale, will most easily run one into another. To find the reasons assigned by the ancients for this denomination, and their various divisions of the chromatic species, the reader may have recourse to the same article in Rolfeau’s Musical Dictionary. At present, that species consists in giving such a procedure to the fundamental bass, that the parts in the harmony, or at least some of them may proceed by semitones, as well in rising as descending; which is most frequently found in the minor mode, from the alterations to which the sixth and seventh note are subjected, by the nature of the mode itself.

The successive semitones used in the chromatic species are rarely of the same kind; but alternately major and minor, that is to say, chromatic and diatonic: for the interval of a minor tone contains a major or chromatic semitone, and another which is major or diatonic; a measure which temperament renders common to all tones: so that we cannot proceed by two minor semitones which are conjunctive in succession, without entering into the enharmonic species: but two major semitones twice follow each other in the chromatic order of the scale.

CHROMATICS;

That part of optics which explains the several properties of the colours of light, and of natural bodies.

Before the time of Sir Isaac Newton, we find no hypothesis concerning colours of any consequence. The opinions of the old philosophers, however, we shall briefly mention, in order to gratify the curiosity of our readers. The Pythagoreans called colour the superficies of body. Plato said that it was a flame flowing from them. According to Zeno, it is the first configuration of matter; and Aristotle said it was that which moved bodies actually transparent. Defartes asserted, that colour is a modification of light; but he imagined, that the difference of colour proceeds from the prevalence of the direct or rotary motion of the particles of light. Father Grimaldi, Dechales, and many others, thought the differences of colour depended upon the quick or slow vibrations of a certain elastic medium filling the whole universe. Rohault imagined, that the different colours were made by the rays of light entering the eye at different angles with respect to the optic axis; and from the phenomenon of the rainbow, he pretended to calculate the precise quantity of the angle that constituted each particular colour. Lastly, Dr. Hook, the rival of Newton, imagined that colour is caused by the refraction of the oblique or uneven pulse of light; and this being capable of no more than two varieties, he concluded there could be no more than two primary colours.

In the year 1666, Sir Isaac Newton began to investigate this subject; and finding the coloured image of the sun, formed by a glass prism, to be of an oblong and not of a circular form, as, according to the laws of refraction, it ought to be, he began to conjecture that light is not homogeneal; but that it consists of rays, some of which are much more refrangible than others. See this discovery fully explained and ascertained under the article Optics.

This method of accounting for the different colours of bodies, from their reflecting this or that kind of rays most copiously, is so easy and natural, that Sir Isaac's system quickly overcame all objections, and to

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CHROMATICS.

this day continues to be almost universally believed. It is now acknowledged, that the light of the sun, which to us seems perfectly homogeneal and white, is composed of no fewer than seven different colours, viz. red, orange, yellow, green, blue, purple, and violet or indigo. A body which appears of a red colour, has the property of reflecting the red rays more powerfully than any of the others; so of the orange, yellow, green, &c. A body which is of a black colour, instead of reflecting, absorbs all or the greatest part of the rays that fall upon it; and, on the contrary, a body which appears white, reflects the greatest part of the rays indiscriminately, without separating the one from the other.

The foundation of a rational theory of colours being thus laid, it next became natural to inquire, by what peculiar mechanism in the structure of each particular body it was fitted to reflect one kind of rays more than another? This Sir Isaac Newton attributes to the density of these bodies. Dr Hooke had remarked, that thin transparent substances, particularly water and soap blown into bubbles, exhibited various colours according to their thiness, though, when they have a considerable degree of thiness, they appear colourless; and Sir Isaac himself had observed, that as he was compressing two prisms hard together, in order to make their sides (which happened to be a little convex) to touch one another, in the place of contact they were both perfectly transparent, as if they had been but one continued piece of glass. Round the point of contact, where the glasses were a little separate from each other, rings of different colours appeared. To observe more nicely the order of the colours produced in this manner, he took two object-glasses; one of them a plano-convex one belonging to a 14 feet reflecting telescope, and the other a large double convex one for a telecope of about 50 feet; and laying the former of them upon the latter, with its plain side downwards, he pressed them slowly together; by which means the colours very soon emerged, and appeared distinct to a considerable distance. Next to the pellucid central spot, made by the contact of the glasses, succeeded blue, white, yellow, and red. The blue was very little in quantity, nor could he discern any violet in it; but the yellow and red were very copious, extending about as far as the white, and four or five times as far as the blue. The next circuit immediately surrounding these, consisted of violet, blue, green, yellow, and red: all these were copious and vivid, except the green, which was very little in quantity, and seemed more faint and dilute than the other colours. Of the other four, the violet was the least in extent; and the blue less than the yellow or red. The third circle of colours was purple, blue, green, yellow, and red. In this the purple seemed more red-diff than the violet in the former circuit and the green was more conspicuous; being as brisk and copious as any of the other colours, except the yellow; but the red began to be a little faded, inclining much to purple. The fourth circle consisted of green and red; and of these the green was very copious and lively, inclining on the one side to blue, and on the other to yellow; but in this fourth circle there was neither violet, blue, nor yellow, and the red was very imperfect and dirty.

All the succeeding colours grew more and more imperfect and dilute, till after three or four revolutions they ended in perfect whiteness.

As the colours were thus found to vary according to the different distances of the glass-plates from each other, our author thought that they proceeded from the different thinesses of the plate of air intercepted between the glasses; this plate of air being, by the mere circumstance of thiness or thiness, dispensed to reflect or transmit this or that particular colour. From this he concluded, as already observed, that the supposed colours of all natural bodies depended on their density, or the bigness of their component particles. He also constructed a table, wherein the thickness of a plate necessary to reflect any particular colour was expressed in parts of an inch divided into 1,000,000 parts.

Sir Isaac Newton pursuing his discoveries concerning colours by reflecting the colours of thin substances, found that the same reflection were also produced by plates of a considerable thickness. There is no glass or speculum, he observes, how well polished soever, but, besides the light which it refracts or reflects regularly, scatters every irregularly a faint light; by means of which the polished surface, when illuminated in a dark room by a beam of the sun's light, may easily be seen in all portions of the eye. It was with this scattered light that the colours in the following experiments were produced.

The fun shining into his darkened chamber through a hole in the shutter one inch wide, he let the beam of light fall perpendicularly upon a glass speculum, concave on one side and convex on the other, ground to a sphere of five feet eleven inches radius, and quicksilvered over on the convex side. Then, holding a quire of white paper at the centre of the sphere, to which the speculums were ground, in such a manner that the beam of light might pass through a little hole made in the middle of the paper, to the speculum, and thence be reflected back to the same hole, he observed on the paper four or five concentric rings of colours, like rainbows surrounding the spot, very much like those which appeared in the thin plates abovementioned, but larger and fainter. These rings, as they grew larger and larger, became more dilute, so that the fifth was hardly visible; and yet sometimes, when the sun shone very clear, there appeared faint traces of a sixth and sevenths.

We have already taken notice, that the thin plates colours by made use of in the former experiments reflected some refracted kinds of rays in particular parts, and transmitted and reflection coloured others in the same parts. Hence the coloured rings appeared variously dispensed, according as they were viewed by transmitted or reflected light; that is, according as the plates were held up between the light and the eye, or not. For the better understanding of which we subjoin the following table, wherein on one side are mentioned the colours appearing on the plates by reflected light, and on the other those which were opposite to them, and which became visible when the glasses were held up between the eye and the window.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Reflected Light</th>
<th>Transmitted Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>green</td>
<td>red</td>
</tr>
<tr>
<td>Orange</td>
<td>red</td>
<td>green</td>
</tr>
<tr>
<td>Yellow</td>
<td>green</td>
<td>red</td>
</tr>
<tr>
<td>Green</td>
<td>red</td>
<td>green</td>
</tr>
<tr>
<td>Red</td>
<td>green</td>
<td>red</td>
</tr>
</tbody>
</table>

We have already observed, that the centre, when the glasses were in full contact, was perfectly transparent. This spot, therefore, when viewed by reflected light,
appeared black, because it transmitted all the rays: and for the same reason it appeared white when viewed by transmitted light.

<table>
<thead>
<tr>
<th>Colours by reflected Light</th>
<th>Colours by Transmitted Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>White</td>
</tr>
<tr>
<td>Blue</td>
<td>Yellowish-red</td>
</tr>
<tr>
<td>White</td>
<td>Black</td>
</tr>
<tr>
<td>Yellow</td>
<td>Violet</td>
</tr>
<tr>
<td>Red</td>
<td>Blue</td>
</tr>
<tr>
<td>Violet</td>
<td>White</td>
</tr>
<tr>
<td>Blue</td>
<td>Yellow</td>
</tr>
<tr>
<td>Green</td>
<td>Red</td>
</tr>
<tr>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>Red</td>
<td>Yellowish-green</td>
</tr>
<tr>
<td>Purple</td>
<td>Red</td>
</tr>
<tr>
<td>Blue</td>
<td>Bluish-green</td>
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<tr>
<td>Green</td>
<td>Red</td>
</tr>
<tr>
<td>Yellow</td>
<td>Red</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>Bluish-blue</td>
<td>Yellow</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
</tr>
</tbody>
</table>

The colours of the rings produced from reflection by the thick plates, followed the order of those produced by transmission through the thin ones: and by the analogy of their phenomena with those produced from the thin plates, Sir Isaac Newton concluded that they were produced in a similar manner. For he found, that if the quicksilver was rubbed off from the back of the speculum, the glafs alone would produce the same rings, but much more faint than before; so that the phenomenon did not depend upon the quicksilver, except as far as, by increasing the reflection at the back of the glafs, it increased the light of the coloured rings. He also found that a speculum of metal only, produced none of those rings; which made him conclude, that they did not arise from one surface only, but depended on the two surfaces of the plate of glafs of which the speculum was made, and upon the thickness of the glafs between them.

From these experiments and observations, it will be easy to understand the Newtonian theory of colours. Every substance in nature seems to be transparent, provided it is made sufficiently thin. Gold, the most dense substance we know, when reduced into thin leaves, transmits a bluish-green light through it. If, therefore, we suppose any body, gold, for instance, to be divided into a vast number of plates so thin as to be almost perfectly transparent, it is evident that all or greatest part of the rays will pass through the upper plates, and when they lose their force will be reflected from the under ones. They will then have the same number of plates to pass through which they had penetrated before; and thus, according to the number of those plates through which they are obliged to pass, the object appears of this or that colour, just as the rings of colours appeared different in the experiment of the two plates, according to their distance from one another, or the thickness of the plate of air between them.

This theory is adopted by Edward Hicsey Delaval, in his Experimental Inquiry into the cause of the changes of colours in opaque and coloured bodies. He endeavours to confirm it by a number of experiments on the infusions of flowers of different colours, which his strongest arguments seem to be those derived from the different tinges given to glafs by metallic substances. Here he observes, that each metal gives a tinge according to its specific density: the more dense metals producing the less refrangible colours, and the lighter ones those colours which are more easily refrangible. Gold, which is the densest of all metals, imparts a red colour to glafs, whenever it can be divided into particles so minute, that it is capable of being mixed with the materials of which glafs is made. It seems indifferent by what means it is reduced to this state, nor can it by any means be made to produce another colour. If it is mixed in large masses without being minutely divided, it imparts no colour to the glafs, but remains in its metallic form. Lead, the metal whose density is next in order to that of gold, affords a glafs of the colour of the hyacinth; a gem whose distinguishing characteristic is, that it is red with an admixture of yellow, the same colour which is usually called orange. Glafs of lead is mentioned by several authors as a composition proper, without the addition of any other ingredient, for imitating the hyacinth. Silver, next in density to lead, can only be made to communicate a yellow colour to glafs. If the metal is calcined with sulphur, it readily communicates this colour. Lead-silver laid upon red-hot glafs-like tinges it yellow. When we meet with authors who mention a blue or greenish colour communicated by silver, the cause, most have been, that the silver used in such processes was mixed with copper. Mr Delaval assures us, from his own experience, that silver purified by the tefl retains so much copper, that, when melted several times with nitre and borax, it always imparted a green colour at the first and second melting; though afterwards no such colour was obtainable from it. The only colour produced by copper is green. It is indifferent in what manner the copper is prepared in order to tinge the glafs, provided it is exposed without any other ingredient to a sufficient degree of heat. If a quantity of salts are added in the preparation, they will, by attenuating the mixture, make the glafs incline to blue, the colour next in order; but this happens only when the fire is moderate; for, in a greater degree of heat, the redundant salts, even those of the most fixed nature, are expelled. It is true, that copper is mentioned by some writers as an ingredient in red glafs and enamel: but the red, which is the colour of the metal not divided or mixed with the glafs, remains only while the composition is exposed to such a degree of heat as is too small to melt and incorporate it; for, if it be suffered to remain in the furnace a few minutes after the copper is added, the mass will turn green instead of red. Iron, the metal next in density to copper, is apt to be calcined, or reduced to a ruddy crocus, similar to that rust which it contracts spontaneously in the air. In this state, it requires a considerable degree of heat to dissolve and incorporate it with glafs: till that heat is applied, it retains its ruddy colour: by increasing the heat, it passes through the intermediate colours, till it arrives at its permanent one, which is blue; this being effected in the greatest degree of heat.
the glass will bear, without losing all colour whatever. Iron vitrified per se is converted into a blue glass. In short, it is indubitable, that iron is the only metal which will, without any addition, impart to the glass a blue colour: for copper will not communicate that colour without the addition of a considerable quantity of salts; or some other matter that alleviates it; and the other metals cannot by any means be made to produce it at all.

These are the principal of Mr Delaval's arguments in favour of Sir Isaac Newton's theory of colours being formed by density. Dr Priestley too hath mentioned some which deserve attention. "It was a discovery of Sir Isaac Newton (says he), that the colours of bodies depend upon the thickness of the fine plates which compose their surfaces. He hath shown, that a change of the thickness of these plates occasions a change in the colours of the body; rays of a different colour being thereby disposed to be transmitted through it; and consequently rays of a different colour reflected at the same place, so as to present an image of a different colour to the eye. A variation in the density occasions a variation in the colour; but still a medium of any density will exhibit all the colours, according to the thickness of it. These observations he confirmed by experiments on plates of air, water, and glass. He likewise mentions the colours which arise on polished steel by beating it, as likewise on bell-metal, and some other metaline substances, when melted and poured on the ground, where they may cool in the open air; and he attributes them to the scoriæ or vitrified parts of the metal, which, he says, most metals, when heated or melted, do continually protrude and f entend out to their surfaces, covering them in the form of a thin glassy skin. This great discovery concerning the colours of bodies depending on the thickness of the fine plates which compose their surfaces, of whatever density these plates may be, I have been so happy as to hit upon a method of illustrating and confirming by means of electrical experiments. A number of these being received on the surface of any piece of metal, change the colour of it to a considerable distance from the spot on which they were discharged; so that the whole circular space is divided into a number of concentric rings, each of which consists of all the prismatic colours, and perhaps as vivid as they can be produced in any method whatever. Upon showing these coloured rings to Mr Canton, I was agreeably surprized to find, that he had likewise produced all the prismatic colours from all the metals, but by a different operation. He extended fine wires of all the different metals along the surfaces of pieces of glass, ivory, wood, &c.; and when the wire was exploded, he always found them tinged with all the colours. They are not disposed in so regular and beautiful a manner as in the rings I produced, but they equally demonstrate that none of the metals thus exploded discovers the least preference to one colour more than to another. In what manner these colours are formed it may not be easy to conjecture. In Mr Canton's method of producing them, the metal, or the calcined and vitrified parts of it, seem to be dispersed, in all directions from the plate of explosion, in the form of spheres of a very great variety of sizes, tinged with all the variety of colours, and some of them smaller than can be distinctly seen by any magnifier. In my method of making these colours, they seem to be produced in a manner similar to the production of noise in a drum by the concussion of a small metal ball by heat; i. e., the surface is affected without the parts of it being removed from their places, certain plates or laminae being formed of a thickness proper to exhibit the respective colours."

But, however well supported this doctrine of the Newtonian formation of colours by density may be, we find the theory infamous author (Dr Priestley), whom we have just now seen arguing for it in his history of electricity, arguing against it in his history of vision. "There are (says he) no optical experiments with which Sir Isaac Newton seems to have taken more pains than those relating to the rings of colours which appear in thin plates; and in all his observations and investigations concerning them, he discovers the greatest sagacity both as a philosopher and mathematician; and yet in no subject to which he gave his attention, does he seem to have overlooked more important circumstances in the appearances he observed, or to have been more mistaken with regard to their causes. The former will be evident from the observations of those who succeeded him in these inquiries, particularly those of the Abbé Mazes. This gentleman, endeavouring to give a very high polish to the flat side of an object-glass, happened to be rubbing it against another piece of flat and smooth glass; when he was surprized to find, that after this friction, they adhered very firmly together, till at last he could not move the one upon the other. But he was much more surprized to observe the same colours between these plane glasses that Newton observed between the convex object-glasses of a telescope and another that was plane. These colours between the plane glasses, the Abbé observes, were in proportion to their adhesion. The resemblance between them and the colours produced by Newton, induced him to give a very particular attention to them; and his observations and experiments are as follows:

"If the surfaces of the pieces of glass are transparent, and well polished, such are used for mirrors, and the pressure be as equal as possible on every part of the two surfaces, a resistance, he says, will soon be perceived when one of them is made to slide over the other; sometimes towards the middle, and sometimes towards the edges; but wherever the resistance is felt, two or three very fine curve lines will be perceived, some of a pale red, and others of a faint green. Continuing the friction, the red and green lines increase in number at the place of contact, the colours being sometimes mixed without any order, and sometimes disposed in a regular manner. In the latter case, the colored lines are generally concentric circles, or ellipses, or rather ovals, more or less elongated as the surfaces are more or less united. These figures will not fail to appear, if the glasses are well wiped and warmed before the friction."

"When the colours are formed, the glasses adhere with considerable force, and would always continue so without any change in the colours. In the centre of all these ovals, the longer diameter of which generally exceeds ten lines, there appears a small plate of the same figure, exactly like a plate of gold interpolated between the glasses; and in the centre of it there is often..."
CHROMATICS.

Order of the Colours in the
Plane Glasses.

Order of the Colours in the

<table>
<thead>
<tr>
<th>Colours</th>
<th>Colours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Blue</td>
<td>Violet</td>
</tr>
<tr>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>Greenish blue</td>
<td>Greenish blue</td>
</tr>
<tr>
<td>Purpled red</td>
<td>Pale red</td>
</tr>
<tr>
<td>Yellowish green</td>
<td>Purple</td>
</tr>
</tbody>
</table>

**Order I.**

- Black spot
- Whith oval
- Yellow border
- Deep purple
- Blue
- Orange
- Purple

**Order II.**

- Black
- White
- Red
- Blue
- Violet
- Green
- Yellow
- Red

**Order III.**

- Greenish blue
- Blue
- Red
- Greenish blue
- Light red
- Very faint green

**Order IV.**

- Green
- Very faint green

**Order V.**

- Faint green
- Faint red

**Order VI.**

- Weak green
- Light red

**Order VII.**

- Very faint green
- Very faint red.


When these coloured glases were suspended over the flame of a candle, the colours disappeared suddenly, though the glases still continued to adhere to one another when they were parallel to the horizon. When they were heated to near the flame, the colours returned by degrees to their former places, in the order of the preceding table.

After this the Abbe took two plates much thicker than the former, in order to observe at his leisure the action of fire upon the matter which he supposed to produce the colours and observed, that as they grew warm, the colours retired to the edges of the glases, and there became narrower and narrower till they were reduced to imperceptible lines. Withdrawing the flame, they returned to their place. This experiment he continued till the glases were bent by the violence of the heat. It was pleasant, he says, to observe these colours slide over the surface of the glases as they were purfued by the flame.

At the first, our author had no doubt but that these colours were owing to a thin plate of air between the glases, to which Newt. has ascribed them; but the remarkable difference in the circumstances attending these produced by the flat plates, and those produced by the object-glasses of Newton, convinced him that the air was not the cause of this appearance. The colours of the flat plates vanished at the approach of flame, but those of the object-glasses did not. He even heated the latter till that which was next the flame was cracked by the heat, before he could observe the least dilatation of the coloured rings. This difference was not owing to the plane glases being lens compressed than the convex ones; for though the former were compressed ever so much by a pair of forces it did not in the least hinder the effect of the flame.

Afterwards he put both the plane glases and the convex ones into the receiver of an air-pump, suspending the former by a thread, and keeping the latter compressed by two string; but he observed no change in the colours of either of them in the most perfect vacuum he could make.

Notwithstanding these experiments seemed to be conclusive against the hypothesis of these colours being formed by a plate of air, the Abbe frankly acknowledges, that the air may adhere so obstinately to the surface of the glases as not to be separated from them by the force of the pump; which, indeed, is agreeable to other appearances; but the following experiments of our author make it still more improbable that the air should be the cause of these colours.
CHROMATICS.

"To try the utmost effect of heat upon these coloured plates, after warming them gradually, he laid them upon burning coals; but though they were nearly red, yet when he rubbed them together by means of an iron rod, he observed the same coloured circles and oval as before. When he ceased to press upon them, the colours seemed to vanish; but when he repeated the friction, they returned, and continued till the pieces of glass began to be red-hot, and their surfaces to be united by fusion.

"When the outward surface of one of his plates of glass was quicksilvered, none of those colours were visible, though the glasses continued to adhere with the same force. This he ascribed to the stronger impression made on the eye by the greater quantity of light reflected from the quicksilver.

"Judging from the resemblance between his experiments and those of Sir Isaac Newton, that the colours were owing to the thickness of some matter, whatever that was, interpolated between the glasses, the Abbe, in order to verify his hypothesis, tried the experiment on thicker substances. He put between his glasses a little ball of wax, about a fourth of a line in diameter, and prefixed it between the two surfaces, warming them at the same time, in order to disperse the wax; but, though he rubbed them together as before, and used other soft substances besides wax, his endeavours to produce the colours had no effect. But, rubbing them with more violence in a circular manner, he was surprised, on looking at a candle through them, to see it surrounded with two or three concentric rings, very broad, and with very lively delicate colours; namely, a red inclining to a yellow, and a green inclining to that of an emerald. At that time he observed only these two colours; but continuing the friction, the rings assumed the colours of blue, yellow, and violet, especially when he looked through the glasses on bodies directly opposed to the sun. If, after having rubbed the glasses, the thickness was considerably diminished, the colours grew weaker by transmitted light, but they seemed to be more stronger by reflection, and to gain on one side what they lost on the other.

"Our author was confirmed in his opinion, that there must be some error in Newton's hypothesis, by considering, that, according to his measures, the colours of the plates varied with the difference of a millionth part of an inch; whereas he was satisfied that there must have been much greater differences in the distance between his glasses, when the colours remained unaltered.

"If the colour depended upon the thickness only, he thought that the matter interpolated between the glasses ought to have given the same colour when it was reduced to a thin plate by simple fusion as well as by friction, and that, in rubbing two plates together, warming them at different times, and compressing them with a considerable force, other colours would have appeared besides those above mentioned.

"These circumstances made him suspect, that the different thicknesses of the substance interpolated between the glasses served only to make them more or less transparent, which was an essential condition in the experiment; and he imagined that the friction diffused over the surface of the thin substance a kind of matter on which the colours are formed by reflection.

"To try the effect of vapour, he breathed upon one of his plates of glass, and observed that the vapours which adhered to the glasses sometimes formed, before they were entirely dispersed, a surprising variety of colours. This experiment, he observes, does not always succeed at the first trial. The glass must be breathed upon several times, and care must be taken to wipe it every time with one's hand, both to take off the moisture, and also to make upon the glass a kind of furrows, which contribute very much to the variety of colours, by making inequalities in the thicknesses of the vapours. It is necessary, also, that the glasses
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When the particles of water which formed this vapour were too thick to exhibit their colours, he struck them several times with his pencil, in order to attenuate them; and then he saw an infinity of small coloured threads which succeeded one another with great rapidity.

"Putting a drop of water between two pieces of common glass, he observed that the compression of them produced no colour; but if, while they were compressed, the water was made to pass from one place to another, it left behind it large spots, red, yellow, green, purple, &c. and the spots allured different colours with a surprising rapidity, and presented to the eye a most beautiful variety of shades.

"In order to determine with greater certainty whether they were vapours that caused the colours in his first observations, he first breathed upon one of his plates of glass, and then rubbed them against one another, when the colours appeared in the same order as before, but darker, and dispersed in confusion in the places occupied by the vapours; but when he made use of fire to diffuse the watery particles, the colours refumed their lustre.

"Newton, having introduced a drop of water between his two object-glasses, observed, that in proportion as the water imbibed itself between the glasses, the colours grew fainter, and the rings were contracted; and ascribing these colours to the thickness of the plate of water, as he ascribed the former to that of the plate of air, he measured the diameters of the coloured rings made by the plate of water, and concluded that the intervals between the glasses at the similar rings of these two mediums were nearly as three to four; and thence he inferred, that, in all cases, these intervals would be as the sines of the refractions of these mediums.

"The Abbé Mazeas, in order to abuse himself whether, agreeable to this rule, the coloured rings of his glases depended upon the thickness of the water only, dipped one of the edges of his coloured glases in a vellcel of water, having taken care to wipe and warm them, and before he produced his colours by friction. The water was a considerable time in rising as high as the glases; and in proportion as it ascended, he perceived a very thin plate of water, which seemed to pass over the matter which he thought produced the colours, without mixing with it; for beyond this plate of water, he still perceived the colours in the same place and order, but deeper and darker; and holding the glases above the flame of a candle, he saw the colours go and come several times as he moved them nearer to or farther from the flame. He then moistened both the glasses more than before; and rubbing them with oil, he always saw the same appearance; and feeling the moment when the colours had disappeared to separate the glasses, he always found that they were wet. On this account, he thought that it could not be the water on which the colour depended, but some substance much more volatile than heat. He also thought that these coloured rings could not be owing to the compression of the glases; or that, if this circumstance did contribute any thing to them, it served rather to modify than to generate them.

"M. du Tour gave particular attention to the preceding observations of the Abbé Mazeas. He repeated the experiments with some variation of circumstances, particularly comparing them with those of Sir Isaac Newton. He is so far from supposing a plate of air to be necessary to the formation of these coloured rings, that he thinks the reason of their not appearing between the flat plates of glass is the adhering of the air to their surfaces; and that mere pressure is not sufficient to expel it; except, as the Abbé Mazeas observed, the rings had before been made in the same place; in which case, simple apposition without friction is sufficient; the air, probably, not having had time to apply itself closely to the surface of the glass. The contact of some other substances, M. du Tour observes, is not prejudicial in this experiment as that of air; for he found, that, if he only gave the plates a light coating of any kind of grease, the rings would appear without friction. Also dipping them lightly in water, or wiping them with his finger, would answer the same purpose. He verified his conjectures by means of the air-pump: for, dipping two pieces of glass in water, one of which had been wiped, and the other not, the former appeared to have no bubbles adhering to it when the air was exhausted, whereas the other had.

"When one of the glases is convex, our author observes, that the particles of air may more easily make their escape by pressure only; whereas their retreat is in a manner cut off when they are compressed between two flat surfaces. The air-pump, he found, was not able to detach these particles of air from the surfaces to which they adhere; leaving these flat plates for a considerable time in an exhausted receiver, was not sufficient to prepare them so well for the experiment, as wiping them.

"Besides the observations on the colours of thin plates, it has been seen that Sir Isaac Newton imagined he could account for the colours exhibited by thick ones in some cases in a similar manner; particularly in those curious experiments in which he admitted a beam of light through a hole in a piece of pasteboard, and observed the rings of colours reflected back upon it by a concave glass mirror of equal thickness in all places. These experiments were resumed, and happily pursued, by the Duke de Chaullins, who ascribed these colours to the refraction of light. Chance, as B. O. led the duke to observe, that when the nearer surface of the glases mirror was clouded by breathing upon it, so as lightly to tarnish it, a white diffused and vivid light was seen upon the pasteboard, and all the colours of the rings became much stronger, and more distinct. This appearance he made contiguous by moistening the surface of the mirror with a little milk and water, and suffered it to dry upon it.

"In all his experiments upon this subject, he found, when the rays fell converging on the surface of the mirror, the rings were hardly visible; when they fell parallel upon it, as they must have done in all the experiments of Newton, they appeared sufficiently distinct; but when, by means of a convex lens placed in the hole of the window, they were made to diverge from
from the centre of the sphere to which the mirror was ground, so that they fell perpendicularly on the surface of the mirror, the colours were as vivid as he could make them. In this case he could remove the reflected image to a great distance from the hole, without making the rings disappear; and he could plainly perceive them to arise from their central spot, which changed their colours several times.

"The effect of tarnishing the mirror convinced him, that these coloured rings depended on the first surface of the mirror, and that the second surface, or that which reflected them after they had passed the first, only served to collect and throw them upon the pasteboard in a quantity sufficient to make them visible, and he was confirmed in his supposition by the following experiments.

"He took a plano-convex object-glass, of six feet focus, and placed it six feet from the pasteboard with its convex side towards it. By this means the rays which fell upon that surface, after being refracted there, were transmitted through the thickness of the glass, parallel to one another, and fell perpendicularly on the plane surface that reflected them, and, in their return, would be collected upon the pasteboard. In these circumstances the rings appeared very distinct after he had tarnished the convex surface, which in this position was next to the light.

"Turning the same glass the contrary way, so that the plane surface was towards the pasteboard, he could perceive none of the rings at the distance of six feet; but they were visible at the distance of three feet: because at that distance the second surface reflected the rays by its convexity directly towards the pasteboard.

"These two experiments demonstrate the use of the second surface of the mirror, and show the manner of placing it to most advantage. Tho' that follow show the use of the first surface with respect to these rings; and he was led to make them by the casual observation aforesaid.

"Newton, he observes, had remarked, that when he made use of a mirror of the same focus with the first he had used, but of twice the thickness, he found the diameter of the rings much smaller than before. This observation the duke thought favourable to his own conclusion; for if these rings depend upon the first surface, the nearer it is to the second, which only reflects the ray transmitted from it, the larger they ought to appear upon the pasteboard.

"To ascertain this fact, he thought of making use of two moveable surfaces; and to make use of a micrometer to measure the distance between them with exactness. For this purpose he took a metallic mirror belonging to a reflecting telescope, being part of a sphere of ten feet radius; and he fixed it firm upon a foot in which was a groove that carried a light frame, to which was fastened a thin piece of tallow tarnished with milk and water. The frame that supported the piece of tallow could neither be brought into contact with the mirror, or be removed to the distance of eight or nine inches from it, and the micrometer showed to the utmost exactness the least motion of the frame.

"Having placed this mirror ten feet from the pasteboard, that is, at the distance of the radius of its own sphere, he observed the rings to appear very distinct: the form of his mirror being very true; but the diameter of the rings upon the pasteboard varied with the distance of the tallow from the mirror; so that they were very large when the tallow was near the mirror, and very small when it was placed at the distance of seven or eight inches.

"These experiments proved, that the rings were formed by the first surface, and reflected by the second; but it still remained to be determined in what manner they were formed. He imagined, that the small pencils of rays that were transmitted through the pores of the glass, or any other transparent substance, might suffer a kind of refraction, which might change the cylinder which they formed into a truncated cone, either by means of their different degrees of inflexibility, or by the different distances at which they pass by the edges of the small hole through which they are transmitted. Pursuing this idea, he thought of making use of some body, the pores of which were of a known and determined shape. Instead, therefore, of the piece of tallow, he placed a piece of fine linen in the above-mentioned frame, stretching it as even as possible, to make the pores formed by the threads more exact and more permeable by the light; and he soon found, with great pleasure, that his conjecture was verified: for, instead of the circular rings which he had before, they were now manifestly square, though their angles were a little rounded; and they were coloured as the others, though the light was not very vivid, on account of the quantity that was stopped by the muslin.

"When, instead of the muslin, he stretched across his frame fine silver wires exactly parallel, at the distance of about three quarters of a line, or a whole line from one another, without any other wires across them; instead of the rings which he had seen before, there was nothing upon the pasteboard but a gleam of white light divided by many small streaks, coloured in a very vivid manner, and in the same manner as the rings."

Thus we have another hypothesis of the formation of colours, namely, by the refraction of light in its passage out from between the solid and impenetrable particles of which bodies are composed. It is, however, very difficult, upon the hypothesis either of Sir Isaac Newton, or that of the Duke de Chauny, to give a reason why bodies that are not entirely white, should not appear variously coloured. For, it appears from Sir Isaac Newton's experiments, that plates of different density are capable of exhibiting the same colours; and that where a plate is continually varying in density, it will produce all the colours. Now it is evident, that the plates of which we suppose all natural bodies to be composed, must be similar to one that is perpetually varying in its thickness; for supposing the plates of which any substance is composed to be of any determinate thickness, 9 millionth parts of an inch for instance; such of the rays that are reflected from this plate will be red. But if any of them penetrate to the depth of 1/10 of these parts, they will be reflected of a violet colour, &c. and thus must alloy and obscure the red, and so of others. If we suppose the colours to be produced by reflection, it will be equally difficult to account for some particular rays being infected and others not; seeing we observe:
serve that all of them are capable of being infected by every substance whatever, when they pass very near it. In some cases too, colours are produced when the light is neither refracted nor infected, as far as we can judge; and this seems to obscure the theory of chromatics more than any thing we have yet mentioned.

As the experiments we are now about to mention are of the greatest importance, and in direct terms contradict one of Sir Isaac Newton's, we shall give a full account of them, from Prieley's history of Vision, &c. with his remarks thereon.

The experiment in question is the eight of Newton's second book of Optics: "He (Sir Isaac Newton) found, that when light goes out of air through several contiguous refracting mediums, as through water and glafs, and thence goes out again into air, whether the refracting surfaces be parallel or inclined to one another, that light, as often as, by contrary refractions, it is so corrected, that it emerges in lines parallel to those in which it was incident, continues ever after to be white: but if the emergent rays be inclined to the incident, the whiteness of the emerging light will, by degrees, in passing on from the place of emergence, become tinged, at its edges with colours. This he tried by refracting light with prisms of glafs, placed within a prismatic vessel of water.

"By theorems deduced from this experiment, he infers, that the refraction of the rays of every fort, made out of any medium into air, are known by having the refraction of the rays of any one fort; and also, that the refraction out of one medium into another is found as often as we have the refractions of them both into any third medium.

"On the contrary, a Swedish philosopher (M. Klingentierna) observes*, that, in this experiment, the rays of light, after passing through the water and the glafs, though they come out parallel to the incident rays, will be coloured; but that the smaller the glafs prism is, the nearer will the refult of it approach to Newton's description.

"This paper of M. Klingentierna, being commu­nicated to Mr Dollond by M. Mallet, made him entertain doubts concerning Newton's report of the refult of his experiment; and determined him to have recourse to experiments of his own.

"He therefore cemented together two plates of parallel glafs, at their edges, so as to form a prismatic vessel when flopped at the ends or bafes; and the edge being turned downwards, he placed in it a glafs prism with one of its edges upwards, and filled up the vacan­cy with clear water: so that the refraction of the prism was contrived to be contrary to that of the water, in order that a ray of light, transmitted through both these refracting mediums, might be affected by the difference only between the two refractions. As he found the water to refract more or less than the glafs prism, he diminished or increased the angle between the glafs plates, till he found the two contrary refractions to be equal, which he discovered by viewing an object through this double prism. For when it appeared neither raised nor depressed, he was satisfied that the refractions were equal, and that the emergent rays were parallel to the incident.

"Now, according to the prevailing opinion, he observes, that the object should have appeared through this double prism in its natural colour; for if the difference of refrangibility had been in all respects equal, in the two equal refractions, they would have rectified each other. But this experiment fully proved the fallacy of the received opinion, by showing the divergency of the light by the glafs prism to be almost double of that by the water; for the image of the object, though not at all refracted, was yet as much infected with prismatic colours, as though it had been seen through a glafs wedge only, while the angle was near 30 degrees.

"This experiment is the very same with that of Sir Isaac Newton abovementioned, notwithstanding the refult was so remarkably different; but Mr Doll­ond affures us, that he used all possible precaution and care in his process; and he kept his apparatus by him, that he might evince the truth of what he wrote, whenever he should be properly required to do it.

"He plainly saw, however, that if the refra­acting angle of the water-vessel could have admitted of a sufficient increafe, the divergency of the coloured rays would have been greatly diminished, or entirely rectified; and that there would have been a very great refraction without colour, as he had already produced a great difcolouring without refraction: but the inconvenient of fo large an angle as that of the prismatic vessel must have been, to bring the light to an equal divergency with that of the glafs prism, whose angle was about 60°, made it necessary to try some experiments of the same kind with smaller angles.

"Accordingly he got a wedge of plate-glafs, the angle of which was only nine degrees; and, using it in the same circumstances, he increafed the angle of the water-vessel, in which it was placed, till the divergency of the light by the water was equal to that by the glafs; that is, till the image of the object, though considerably refracted by the excess of the refraction of the water, appeared nevertheless quite free from any colour proceeding from the different refrangibility of the light.

"Notwithstanding it evidently appeared, I may defy almost all philosophers, that Mr Dollond had made a real discovery of something not comprehended in the optical principles of Sir Isaac Newton, it did not appear to fo sensible a man, and fo good a mathematician, as Mr Murdoch is universally acknowledged to be. Upon this occasion he interposed in the defence, as he imagined, of Sir Isaac Newton; maintaining, that Mr Dollond's positions, which he says, he knows not by what mishap have been deemed paradoxes in Sir Isaac's theory of light, are really the necessary con­sequences of it. He also endeavours to shew, that Sir Isaac might not be mistaken in his account of the experiment abovementioned. But admitting all that he advances in this part of his defence, Newton must have made use of a prism with a much smaller refracting angle than, from his own account of his experiments, we have any reason to believe he ever did make use of.

"The faét probably was, that Sir Isaac deceived himself in this case, by attending to what he imagined to be the clear con­sequences of his other experiments; and though the light he saw was certainly tinged with
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The changes of colour in permanently coloured bodies, our author observes, are produced by the same laws which take place in transparent colourless substances; and the experiments by which they can be investigated chiefly of various methods of uniting the colouring particles into larger, or dividing them into smaller masses. Sir Isaac Newton made his experiments chiefly on transparent substances; and in the few places where he treats of others, acknowledges his deficiency of experiments. He makes the following remark, however, on those bodies which reflect one kind of light and transmit another, viz. that if these glases or liquors were so thick and mally that no light could get through them, he questioned whether they would not, like other opaque bodies, appear of one and the same colour in all positions of the eye; though he could not yet affirm it from experience.

It was the opinion of this great philosopher, that all coloured matter reflects the rays of light, some reflecting the more refrangible and others the less refrangible rays more copiously; and that this is not only a true reason of these colours, but likewise the only reason. He was likewise of opinion that opaque bodies reflect the light from their anterior surface by some power of the body evenly diffused over and external to it. With regard to transparent coloured liquids, he expresses himself in the following manner: "A transparent body which looks of any colour by transmitted light, may also look of the same colour by reflected light; the light of that colour being reflected by the farther surface of that body, or by the air beyond it; and then the reflected light will be diminished, and perhaps cease, by making the body very thick, and pitching it on the back-side to diminish the reflection of its farther surface, so that the light reflected from the tinging particles may predominate. In such cases the colour of the reflected light will be apt to vary from that of the light transmitted."

To investigate the truth of these opinions Mr Delaval entered upon a course of experiments with transparent coloured liquids and glases, as well as with opaque and semitransparent bodies. From these he discovered several remarkable properties of the colouring matter; particularly, that in transparent coloured substances, it does not reflect any light; and when, by intercepting the light which was transmitted, it is hindered from passing through such substances, they do not vary from their former colour to any other, but become entirely black (a). This incapacity of the colouring particles of transparent bodies to reflect light, being deduced from very numerous experiments, may therefore be held as a general law. It will appear the more extensive, if we consider that, for the most part, the tinging particles of liquids or other transparent substances are extracted from opaque bodies; that the opaque bodies owe their colours to those particles, in like manner as the transparent substances do; and that by the loss of them they are deprived of their colours.

For making his experiments, Mr Delaval used small vials.

(a) Here our author observes, that he makes use of the word colour only to express those called primary; such a mixture of them as does not compose white, or any of the gradations between white and black; such as are called by Sir Isaac Newton, grey, dun, or ruflet brown.
Apparatus for making the experiments.

Experiments to determine the proportion of tinge- 

6. When a lighted candle is placed near one of those coloured plates, the flame is reflected by the medium which is diffused over the anterior surface. The image thus reflected entirely resembles the flame in size and colour; being fearfully diminished, and not in the least tinged by the coloured glass.

7. If the plate be not so intensely coloured, or so mally, as to hinder the transmision of the light of the candle, there appears a secondary image of the flame, which is reflected by the medium contiguous to the farther surface of the glass; and as the light thus reflected passes through the coloured glass, it is tinged very vividly.

8. When the glass used in this experiment is of a green colour, the image of the flame is always of a bright green; and when glasses of other colours are used, that of a secondary flame is always the same with that of the glass.

9. The secondary image is less than that reflected from the anterior surface. This diminution is occasioned by the loss of that part of the light which is absorbed in passing through the coloured glasses. For whenever any medium transmits one part of rays more copiously than the rest, it stops a great part of the different coloured rays. Much more light also is lost in passing through coloured than transparent substances. In making these observations, it is proper to choose coloured plates of glasses which are not in every part of an equal thickness, that the secondary image may not coincide with that reflected from the anterior surface, and be intercepted by it.

10. When the plates are so thick, and so copiously coloured, that the light cannot penetrate to their far-
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Hence again it is manifest, that the colouring particles do not possess any share of reflective power; for if they had any share in this reflection, they would certainly impart some share of colour to the light they reflected. Hence also it appears, that transparent coloured bodies, in a solid state, possess no more reflective power than those in a fluid state.

Our author next considers the colouring particles themselves, pure, and unmixed with other media. In order to procure masses made up of such particles, several transparent coloured liquids were reduced to a solid consistence by evaporation. By employing a gentle heat, the colouring matter may thus remain unimpaired; and is capable of having its particles again separated by water or other liquids, and tincting them as before.

In this state the colouring particles reflect no light, and therefore appear uniformly black, whatever substance they have been extruded from. In the course of his experiments, Mr Delaval made use of the infusions of brazil wood, logwood, fuffle, turmeric, red sanders, alkane, sap-green, kernes, and all the other transparent coloured liquors he had tried before, among which were infusions of red and yellow flowers, without observing the least variation in the result.

Some liquids are apt to become totally opaque by evaporation: the reason of which may be the crystallization of saline matters, or the coalescence of the particles into masses, differing considerably in density from the menstrua in which they were dissolved. When this opacity takes place, our author has constantly observed, that they become incapable of entering the pores of wool, silk, or other matters of that kind, or of adhering to their surface; and consequently unfit for the purposes of dyeing. This he supposes to arise from their increased bulk; for the attractive force by which the particles cohere together is weakened in proportion as their bulk increases: so that the degree of magnitude of the colouring particles, which is essential to the opacity of liquors, is inconsistent with the minuteness requisite for dyeing. An instance of this is given in an infusion of fuffle. Having infused some of this wood in such a quantity of water, that the latter was saturated with the colouring particles, he evaporated the liquor to a solid consistence with an uninterrupted, but very gentle heat. During every part of the process the liquor continued transparent, and the fluid extract yielded by it was transmitted a yellow colour when spread thin, but appeared black when thicker masses were viewed. Having prepared another pint of this liquor, he evaporated half the water, and allowed the remainder to become cold. In this state it became turbid and opaque; on filtering, a transparent tincture passed through an opaque fecula remaining on the paper. This fecula did not adhere to the paper, but was easily separable from it: on being dried, it appeared white with a slight tinge of yellow; but was nevertheless soluble in water, and by solution gave a liquid in all respects similar to the original infusion.

From these circumstances (says he) it appears that a given proportion of water, or a sufficient degree of heat, is requisite to the solution of the colouring particles of fuffle. And experience evinces, that those particles which are too gross to pass through filtering paper, are incapable of entering the pores or firmly cohering to the surface of bodies. Many ingredients, such as the colouring particles of logwood, kernes, and various other matters, are soluble in water in every proportion; and therefore their infusions are not subject to become opaque or turbid during their evaporation. The solid extracts obtained by evaporation reflect no colour, but are black.

Our author also formed solid masses by mixing a small quantity of drying oil with pigments which confit chiefly of colouring matter; as Prussian blue, indigo, and sap-green. These paints likewise exhibit their respective colours only by transmitted light; appearing entirely black when viewed by reflection. Instances of blackness arising from this density of the colouring matter may be observed in several kinds of fruits, as black currants, cherries, &c. For the juices of these appear red when spread thin on a white ground, or otherwise viewed by transmitted light.

Mr Delaval's next attempt was to consider the action and properties of the colouring particles of opaque bodies themselves, and the means by which these colours are produced. Here our author endeavours to prove, that these colours of opaque bodies appear on the same principles as those already mentioned, which seem black when very dense, but show their proper tinge when spread thin upon a white ground. On this subject the following experiments were made.

1. Grass, and other green leaves of plants, were digested in rectified spirit of wine; by which means a transparent green tincture was obtained. One of the vials formerly mentioned being filled with this liquor, it was observed to transmit a vivid green colour; but the other part of the tincture, which was contiguous to the uncovered side of the vial, reflected no light, and therefore appeared black.

2. Having poured some of the tincture into a China cup, the bottom was thereby made to look green, exactly resembling the colour which had been extracted from the leaves.

3. After the colour had been totally absorbed by the vinous spirit, the leaves remained apparently unaltered, either as to figure or texture; but were entirely white, or had their whiteneys slightly tinged with brown.

4. Red, purple, and blue flowers, were also digested in spirit of wine; all of which yielded their colouring matter to the spirit, and became white by being deprived of it. From most of these flowers, however, the spirit acquired either no tinge at all, or only a very faint one; but when acidulated, it became red, and by the addition of an alkali appeared blue, purple, or green, according to the quantity of alkali and the nature of the infusion. In these states, all of them, when viewed...
viewed by transmitted light, or poured upon a white ground, showed their colours, but universally appeared black by reflection.

5. Red, purple, and blue flowers, were digested in water slightly acidulated with nitrous acid. Thus, red infusions were obtained, which, by saturation with sea salt, might be preferred for many years.

6. The same liquors were changed, green, blue, or purple, by the addition of an alkali; but here the case was the same as before; all of them yielding vivid colours by transmutation, but none by reflection. In making this experiment, care must be taken to add the alkali very gradually; for if too much is put in at once to the red liquor, the intermediate colours between the red and the green will be wanting. To half an ounce of the red infusion it is proper to add, at once, only the smallest quantity that can be taken up on the point of a pen; repeating this addition slowly, until each of the colours be produced.

7. The flowers, after having been repeatedly macerated in acidulated water, loft their colouring matter, and became white.

8. Yellow flowers also communicated their colours to water and to spirit of wine. The infusions and tinctures of these flowers were subjected to the same experiments as had been employed in the examination of the liquors already mentioned; and appeared yellow by transmitted light, but did not reflect any colour.

9. White paper, linen, &c. may be tinged of any of these colours, by dipping them in the infusions; and the consideration of the manner in which the colours are imparted to the linen, affords much insight into the manner in which natural colours are produced. It has already been observed, that, when the colouring matter of plants is extracted from them, the solid fibrous parts, thus divulged of their covering, display their natural whiteness. White linen, paper, &c. are formed of such fibrous vegetable matter; which is bleached by dissolving and detaching the heterogeneous colouring particles. When these are dyed or painted with vegetable colours, it is evident that they do not differ in their manner of acting on the rays of light from natural vegetable bodies; both yielding their colours by transmitting, through the transparent coloured matter, the light which is reflected from the white ground. This white matter frequently exists, without any confiderable mixture, in plants, while they are in a state of vegetation; as cotton, white flowers, the pith, wood, seeds, roots, and other parts of several kinds of vegetables. When decayed trees, &c. have been long exposed to the atmosphere, their coloured juices are sometimes so perfectly extracted, that the fibres appear white. This white matter is not distinct from the vegetable earth to which plants are reduced by burning. Mr. Delaval has rendered ashes intensely white, by carefully calcining them, and afterwards grinding with a small proportion of nitre, and exploiting them to such a degree of heat as would cause the nitre deflagrate with the remaining quantity of phlogiston. Lastly, the ashes were digested with marine acid, in order to dissolve the ferruginous matter diffused through them, and repeatedly washing the remainder in water. Mixing ashes thus purified with borax, and applying a vitrifying heat, an opaque enamel is obtained, remarkable for its whiteness.

Hence it appears, that the earth which forms the white substance of plants is white, and separable from that of other plants, the only substance in these which gives to each its peculiar colour; that whenever it is pure and unmixed, or diffused through colourless media, it shows its native whiteness; and is the only vegetable matter endowed with a reflecting power. It may be discovered, however, by other means than that of burning; thus, roses may be whitened by expounding them to the vapour of burning sulphur; an effect which cannot be attributed to the vitriolic acid, but to the phlogiston contained in that vapour. This was proved to be the case, by expounding several kinds of red and purple flowers to the phlogistic vapour issuing from hepatic sulphur; and by this every one of them was whitened; their colour being afterwards restored by the addition of an acid either mineral or vegetable.

"Thus (says Mr. Delaval) it appears, that the colouring matter of the flowers is not discharged or removed, but only dissolved by the phlogiston; and dissolved thereby divided into particles too minute to exhibit any colour. In this state, together with the vegetable juice in which they are diffused, they form a colourless transparent covering, through which the white matter of the flowers is seen untinged. The colouring particles of plants consist principally of inflammable matter; and their solubility in phlogiston, and union with it, are analogous to the action of other inflammable bodies upon each other. Thus, ether dissolves all essential and expressed oils, animal empirical oils, and resins. Sulphur, camphor, and almost all substances abounding in phlogiston, are soluble in oils, ardent spirits, or other inflammable matters. The manner in which the red colour of vegetable flowers is restored, appears to be explicable from known chemical laws. When acids are applied to the whitened flowers, they unite with the phlogiston which the sulphur had communicated, and disengage from the colouring particles; which, being thus extracted, resume their original magnitude and hue. A change of the same kind is also produced by fixed alkali, which, like the acid, has a strong attraction for phlogiston, always changes the whitened flowers to blue, purple, or green colour.

4. In like manner, the action of the rays of light operate on coloured bodies. Thus, dyed silk, or other fibres by substances of that kind, when exposed to the sun's light, are deprived of their colour in every part on which the rays are allowed to act; whilst those prefered their colour which are defended from the light by the fibres of the cloth, or interposition of any opaque body. The colours, thus impaired, may be restored if acids are applied while the injury is recent; but they are afterwards apt to fly off, on account of that volatility which is constantly imparted by inflammable matter to any other with which it is united."

Our ather now proceeds, at considerable length, to prove the identity of the solar light and phlogiston: but as recent experiments have shown that these two are essentially distinct, we omit his argumentation upon his head. The effect of his theory in this respect, however, does not in the least affect the doctrine concerning colours above laid down: on the contrary, the latest
latest experiments have determined, that phlogiston, in its grosser form, viz. that of common charcoal, manifests a surprising power of whitening various substances; which, according to Mr Delaval's theory, proceeds from the power it has of dissolving the colouring matter with which they are impregnated. This solvent power, according to our author, is manifested in many other instances besides those already mentioned. Silk is whitened by the phlogistic vapours of sulphur; and this operation does not appear to differ from the change effected on flowers by the same vapour. The light of the sun is found to be a necessary and essential agent in bleaching linen, wax, and various other substances; some part of the colouring matter which impairs the whiteness of these bodies not yielding to any other solvent. Red flowers are whitened by the electric spark, of whose inflammable nature we cannot entertain the least doubt; for the spark itself is a bright flame, and yields the fame smell which all other phlogistic matters impart. The electric spark, in like manner, changes the blue infusion of turmeric to red (a). The effects which it produces on the turmeric, and on red flowers, do not differ from each other, except in degree only. For when vegetable matter is dissolved, it is changed from blue to red; and, when further dissolved, it is divided into particles too minute to exhibit any colour.

Solutions effected by means of phlogiston frequently are wrongly attributed to the operation of supposed acid menstrua, as several kinds of substances are capable of being dissolved indiscriminately both by acids and phlogiston. For the purpose of distinguishing, therefore, in any case between the action of the acid solvent and that of the inflammable menstruum, it is proper to examine the nature of the matter by which either of these principles are furnished. It appears from various chemical processes, that alkalis are rendered mild, and capable of crystallization, in proportion as they are united to phlogiston. The phlogisticated alkaline lixivium, when lathered, is perfectly mild; and by a slight evaporation is reduced to a concrete crystalline mass, which does not deliquesce or imbibe the leaf moisture from the air, and no longer retains any alkaline property. M. Beaumé, by an elegant and ingenious experiment, has proved the presence of phlogiston in mild alkalis, and has shown that their power of crystallizing depends upon their union with that principle. He heated in a silver vessel a lixivium of mild alkali, which imparted to the silver a covering or coating of inflammable matter, by which its surface was tarnished and became black. The lixivium was several times poured out of the silver vessel; and after the surface of the metal had been freed from the tarnish, the lixivium was replaced in it, and again heated, by which the tarnish was renewed; and this was repeated till the lixivium no longer communicated any stain to the silver. The causticity of the lixivium was increased in proportion as it imparted its phlogiston to the silver; and at the end of the process the alkali became perfectly caustic, and incapable of crystallizing.

Our author now goes on to prove, that fixed air is not an acid, nor a compound of air and phlogiston, as is now generally believed, but rather entirely of a phlogistic nature. For an account of his arguments in favour of this opinion, see the article Fixed Air: here we shall only consider his further experiments on colours.

"From the preceding experiments (says he) it appears, that the colouring particles of flowers and leaves are soluble in acid, alkaline, and phlogistic menstrua. The other parts of vegetables consist of materials similar to those which are contained in their flowers and leaves, and undergo the same changes from the same causes. Having extracted from logwood its colouring particles by repeatedly boiling it in water, the wood was thus deprived of its yellow colour, and assumed a brown hue similar to that of oak-wood. Some pieces of it thus deprived of its colour were then macerated in aquafortis; and after they had undergone the action of that acid, they were washed in a sufficient quantity of water. The wood was thus reduced to whiteness."

Here our author observes, that though most authors logwood who treat of colouring substances describe logwood as affords on of a red colour, he was never able to procure any other colour from it but yellow. It imparts yellow and orange colours to distilled water. Other waters extract a red tinge from it by means of the alkali which they contain. These observations are also applicable to the other dyecing woods, kernes, and various other articles of the materia tintoria. By a familiar treatment, sulplic wood also lost its colouring matter, and became white.

The results of all the experiments above related are, that the colouring matter of plants does not exhibit any colour by reflection, but by transmission only; that their solid earthy substance is a white matter; and that it is the only part of vegetables which is endowed with a reflective power; that the colours of vegetables are produced by the light reflected from this white matter, and transmitted from thence through the coloured coat or covering which is formed on its surface by the colouring particles; that whenever the colouring matter is either discharged or divided by solution into particles too minute to exhibit any colour, the solid earthy substance is exposed to view, and displays that whiteness which is its distinguishing characteristic.

Mr Delaval next proceeds to examine the coloured parts of animal substances, and finds them exactly similar, with regard to the manner in which the colour is produced, to the vegetable bodies already treated of. The tinctures and infusions of cochineal and of kernes yield their colours when light is transmitted through them, but show none by reflection. On diluting fresh ox-gall with water, and examining it in the phials already mentioned, that part of it which was in the neck of the phial, and viewed by transmitted light, was yellow; but the anterior surface was black, and reflected no colour. Flesh derives its colour entirely from the blood, and when deprived of it the fibres and vellies are perfectly white; as are likewise the membranes.

(a) This effect of the electric spark is now known to be produced, not by its phlogistic nature, but by the generation of an acid.
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Of the colour of blood.

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On examining blood diluted with water in one of the phials formerly described, it transmitted a red colour, and the anterior surface was almost, but not entirely, black; for it received a slight hue of brown from some coagulated particles that were suspended in the liquor. In order to procure blood sufficiently diluted, and at the same time equally and perfectly dissolved, he mixed as much crux with spirit of sal ammoniac as imparted a bright colour to it. The liquor being then viewed in the phial, that part which was contained in the neck, and transmitted the light, appeared of a fine red; but the anterior part reflecting no light, was intensely black. Hence it appears, that the florid red colour of the flesh arises from the light which is reflected from the white fibrous substance, and transmitted back through the red transparent covering which the blood forms on every part of it.

Blood, when recently drawn, does not assume the appearance common to transparent coloured liquors; for these, when too maily to transmit light from their farther surfaces, always appear black; but blood, when recently drawn, always shows a fine red colour, in whatever way it be viewed. This is occasioned by a white matter diffused through the blood; and which is easily separated from the crux, by dividing it after coagulation into a number of thin pieces, and washing in a sufficient quantity of pure water. Thus the water acquires a red colour, and ought to be changed daily.

In a few days it will acquire no more tinge, and the remaining masses of the crux are no longer red, but white.

In like manner, the red colour of the shells of lobsters, after boiling, is no more than a mere superficial covering spread over the white calcareous earth of which the shells are composed, and may be easily removed from the surface by scraping or filing. Before the application of heat, this superficial covering is much denser; inasmuch that, in some parts of the shell, it appears quite black, being too thick to admit the passage of the light to the shell like before; but where this transparent blue colour of the unboiled lobster is thinner, it constantly appears like a blue film. In like manner, the colours of the eggs of certain birds are entirely superficial, and may be scraped off, leaving the white calcareous earth exposed to view.

The case is the same with feathers, which owe their colours entirely to a very thin layer of some transparent matter upon a white ground. Our author ascertained this by scraping off the superficial colours from certain feathers which were strong enough to bear the operation; and thus separated the coloured layers from the white ground on which they had been naturally spread. The last fibres of the feathers cannot endure to have their surfaces separated in this manner; but their texture, when viewed by a microscope, seems to indicate, that the colours are produced on them by no other means than those already related. In the examination of some animal subjects where the colouring matter could not be separated by chemical means, our author had recourse to mechanical division; but this can only be employed when the principal part of the white substance is unmixed with the coloured coat or covering which is spread upon its surface. All of them, however, by whatever means their colours could be separated, showed that they were produced in the same manner, namely, by the transmission of light from a white ground through a transparent coloured medium.

The coloured substances of the mineral kingdom are very numerous, and belong principally to two classes, viz. earths and metals. The former, when pure, are all perfectly white, and their colours arise from phlogitic or metallic mixtures. Calcareous earths, when indurated, constitute marble, and may be tinged with various colours by means of metallic solutions; all which are similar in their nature to the dyes put upon silk, cotton, or linen, and invariably proceed from the same cause, viz. the transmission of light through a very thin and transparent coloured medium. Flints are formed from siliceous earth, and owe their colour to phlogiston. When sufficiently heated, they are rendered white by the loss of the inflammable matter which produced their colour. When impregnated with metals, they form agates, cornelians, jasper, and coloured crystals. The coloured gems also receive their different hues from metals; and all of them may be imitated by glasses tinged with such phlogistic or metallic matters as enter into the composition of the original substances.

Thus our author concludes, that the coloured earths, gems, &c. exhibit their various tints in the same manner with other substances; viz. by the transmission of light reflected from a white ground. Our author, however, proceeds farther; and affirms, that even the colours of metals themselves are produced in the same manner.

"Gold (says he) exhibits a white light, which is tinged with yellow. I have used this expression, because it appears from experiment that gold reflects a white light, and that its yellow colour is a tinge superadded to its whiteness. The experiment is thus set forth by Sir Isaac Newton. Gold in this light (that is, a beam of white light) appears of the same yellow colour as in day light; but by intercepting at the lens a due quantity of the yellow-making rays, it will appear white like silver, and I have affirmed, which follows, that its yellowness arises from the excess of the intercepted rays, tinging that whiteness with their colour when they are let pass.

"I have already shown, by numerous experiments, in what manner coloured tinges are produced; and it uniformly appears, from all these experiments, that colours do not arise from reflection, but from transmission only. A solution of silver is pellucid and colourless. A solution of gold transmits yellow, but reflects no colour. This metal also, when united with glass, yields no colour by reflection, but by transmission only. All these circumstances seem to indicate, in a manner similar to that of the yellow colour of gold, which arises from a yellow transparent matter, which is a confluent part of that metal; that it is equally mixed with the white particles of the gold, and transmits the light which is reflected by them, in like manner as when silver is gilt, or foils are made by covering white metals with transparent colours. But these fictitious coverings are only superficial; whereas the yellow matter of gold is diffused throughout the whole substance of the metal, and
and appears to envelope, and cover each of the white particles. In whatsoever manner the yellow matter of gold is united to its white substance, it exists in a rare state; for it bears only the same proportion to the white particles of the gold as that of the yellow-making rays which were intercepted bears to all the other rays comprised in the white light of the sun.

Sir Isaac Newton has shewn, that when spaces or interstices of bodies are replenished with media of different densities, the bodies are opaque; that those superficies of transparent bodies reflect the greatest quantity of light which intercede media that differ most in their refractive densities; and that the reflections of very thin transparent substances are considerably stronger than those made by the same substances of a greater matter.

Hence the minute portions of air, or of the rarer medium, which occupies spaces void of other matter, reflect a vivid white light whenever their surfaces are contiguous to media whose densities differ considerably from their own; so that every small mass of air, or of the rarer medium, which fills the pores or interstices of dense bodies, is a minute white substance. This is manifest in the whiteness of froth, and of all pelliculour bodies; such as glaizes, crystal, or fables, reduced to powder, or otherwise flawed; for in all these instances a white light is reflected from the air or rarer medium which intercedes the particles of the denser substances whose interstices they occupy.

From these principles our author takes occasion to explain the reason why the particles of metals which yield no colour by incident light when suspended in their solvents, are disposed to exhibit colours when separated from them. Hence also we see why opaque white substances are rendered pelliculour by being reduced to uniform masses whose component parts are everywhere nearly of the same density; for as all pelliculour substances are rendered opaque and white by the admixture of pelliculour colourless media of considerably different densities, they are again deprived of their opacity by extricating these media which kept their particles at a distance from each other: thus froth or snow, when resolved into water, lose their whiteness, and assume their former pelliculour appearance.

In like manner, by proper fluxes, the opaque white earths are reduced to pelliculour glaizes; because all reflections are made at the surfaces of bodies differing in density from the ambient medium, and in the confines of equally dense media there is no reflection.

As the calces of metals are enabled to reflect their colours by the intervention of the particles of air; so, when mixed with oil in the making of paints, they always assume a darker colour, because the excess of the density of oil over that of air forms a sensible difference when comparatively considered with respect to the specific gravity of the rarer metals. From this cause perceptibly less light is reflected from the molecule of oil than from the whole of air, and consequently the mass appears darker. The colour, however, is different with such paints as are formed of the denser metals; as vermillion, minium, &c.: for though oil differs very considerably from air in its specific density, yet it also differs very much in this respect from the denser metallic powders; and the molecule of oil which divides their particles acts upon the light so strongly, that the reflection occasioned by them cannot be distinguished from those which are caused by rarer media. Hence, though we mix vermilion or minium with oil, the colour is not sensibly altered.

This part of our author's theory, however, seems liable to objection: for though it be true that the calces of some metals are denser than others, yet that is, of me-

compared speaking, but in a very small proportion; nor is even the difference of density between oil and the calces of the heavier metals all comparable to that between the density of air and oil. Thus, tho' the calx of iron may be 10 or 11 times more dense than oil; yet, as the latter is between 300 and 600 times denser than air, the small difference between the oil and metallic calx ought to be imperceptible. In this respect, indeed, there are considerable differences with regard to the oils employed, which cannot be supposed to arise from the mere circumstance of density.

Thus the colour of vermilion, when mixed with turpentine-varnish, is much brighter than with linseed-oil; and yet the difference between the densities of linseed-oil and turpentine-varnish is very trifling. The mere action of heat like-wis has a surprising effect in this case. Thus the red calx of iron, called foyret okeer, by being only heated a certain degree, appears of a very dark purple, retaining its red colour when cold; and this variation may be induced as often as we please by only heating it over the fire in a hollow. In like manner, by gradually heating red lead, it may be made to assume a most beautiful crimson colour; which growing gradually darker, becomes at last almost quite black. On cooling, if the heat has not been raised too high, it gradually returns through the same shades of colour, until at last it fixes in its original hue. These immense differences in colour cannot by any means be attributed either to the expulsion of air or to an alteration in density. The fire indeed does certainly expand these calces as well as other bodies; but as the medium interfered between their particles is thus also expanded, the colour ought at least to remain the same, if not to become lighter, on account of the superior expansion of air to that of metal by the same degree of heat. It would seem, therefore, that the action of the element of fire itself has a considerable share in the production of colours; and indeed its share in the operations of nature is so great, that we might well think it strange if it should be entirely excluded from this.

With regard to semipellucid substances, which appear of one colour by incident and another by transmitted light, our author likewis endeavours to show, that no reflection is made by the coloured matter, but only by the white or colourless particles. They consist of pellucid media, throughout which white or colourless opaque particles are dispersed. The latter are disposed at such distances from each other, that some of the incident rays of light are capable of passing through the intervals which intercede them, and thus are transmitted through the semipellucid masses. Some rays penetrate through such masses, while others which differ from them in their refrangibility are reflected by the white or colourless particles; and from thence are transmitted through the pelliculour part of the medium which intervenes between the reflecting particles and the anterior surface of the mass. On the same principle our author explains the blue colour of the
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the sky, the green colour of the sea, and other natural phenomena; and from his numerous experiments on this subject at least concludes, that the power by which the several rays of light are transmitted through different media is inherent in the particles themselves, and therefore is not confined to the surfaces of such media. For if the transmissive force was exerted at the surface only, the thinner plates of coloured substances would act upon the rays as powerfully as thicker plates. But it appears from experiment, that in passing through the particles of transparent coloured substances, they exhibit colours differing not only in degree, but frequently in species also.

The sun's light, by which bodies are illuminated, consists of all the rays by which a white light is compounded. These rays, in their entire and undivided state, are incident upon the opaque particles of semipellucid substances, and upon the colouring particles of transparent-coloured substances, whenever these media are exposed to the light. When the rays accede to the opaque particles of semipellucid substances, some of the rays are reflected back from the anterior surface of those particles: the other sorts of rays which are not reflected back, are diverted from the direction which is opposite to the anterior surface of the opaque particles, and passing through the intervals between the particles, are transmitted through the media.

When the rays are incident upon the particles of transparent coloured bodies, none of them are reflected back; because the colouring particles are not endowed with any reflective power: but some of the rays are either stopped at the anterior surface of the particles, or are diverted into such directions as render them incapable of passing towards the farther side of the media; and consequently such rays cannot be transmitted. The rays which are not thus intercepted or dispersed, are transmitted in the same manner as those which pass through semipellucid media. Thus it is evident, that the coloured rays which are transmitted through semipellucid substances are reflected by the opaque particles: and those which are transmitted through transparent-coloured substance are reflected by the colouring particles. From the preceding observations likewise it appears, that the particles of coloured media infect the several sorts of rays according to the several sizes and densities of the particles; also in proportion to the inflammability of the media which owe their colour to them; and it is manifest that the transmutation of coloured rays depends upon their refraction. All these observations are conformable to Sir Isaac Newton's doctrine, that the rays of light are refracted, reflected, and infected, by one and the same principle acting variously in various circumstances.

The most remarkable part of Mr. Delaval's doctrine is that concerning the metals; for the better understanding of what we shall premise a short account of his general doctrine concerning white bodies, and the manner in which light is reflected by them. All the earths (he observes), which in their natural state are of pure white, constitute transparent colourless media when vitrified with proper fluxes, or when dissolved in colourless menstrua; and the saline masses obtainable from their solutions are transparent and colourless while they retain the water which is essential to their crystallization, and are not flawed or reduced to powder; but after their pores and interfaces are opened in such a manner as to admit the air, they become then white and opaque by the entrance of that rare medium. The earthy particles which form the solid parts of bodies generally exceed the others in density; consequently these particles, when contiguous to the rare medium already mentioned, must reflect the rays of light with a force proportionate to their density. The refractive power of bodies does not depend merely upon their outer coats, but also upon their difference of density, with respect to the surrounding media. Transparent colourless particles, whose density is greatly inferior to that of the medium they come between, also powerfully reflect all sorts of rays, and thereby become white. Of this kind are the air or other rare fluids which occupy the interfaces of liquors; and in general of all denser media into whose interfaces such rare particles are admitted.

Hence we may conclude, that white opaque bodies are constituted by the union or contiguity of two or more transparent colourless media differing considerably from each other in their refractive powers. Of these substances we have examples in froth, emulsions, or other imperfect combinations of pellucid liquors, milk snow, calcined or pulverized fats, gla$. or crystal reduced to powder, white earths, paper, linen, and even those metals which are called white by mineralogists and chemists: for the metals just mentioned do not appear white unless their surfaces be rough; as in that case only there are interfaces on their surface sufficient to admit the air, and thus make a reflection of a white and vivid light.

But the polished surfaces of metallic mirrors reflect the incident rays evenly and regularly, according to their several angles of incidence; so that the reflected rays do not interfere with each other, but remain separate and unmixed, and therefore distinctly exhibit their several colours. Hence it is evident, that white surfaces cannot act upon the light as mirrors: because all the rays which are reflected from them are blended in a promiscuous and disorderly manner.

The abovementioned phenomena give much instruction into the nature and cause of opacity; as they cause of clear circumstances. In the same way, that even the rarest transparent colourless substances, when their surfaces are adjacent to media differing greatly from them in refractive power, may thereby acquire a perfect opacity, and may assume a refraction and hue so similar to that of white metals, that the rarer pellucid substances cannot by the light be distinguished from the dense opaque metals. And this similarity to the surface of metals occurs in the rare pellucid substances, not only when, from the roughness of their surfaces, they resemble unpolished metals in whiteness, but also when, from their smoothness, they resemble the polished surfaces of metals.

Metals seem to consist entirely of transparent matter, and to derive their apparent opacity and lustre solely from the copious reflection of light from their surfaces. The analogy between the metals and transparent media, as far as respects their optical properties, will appear from the following considerations.

1. All metals dissolved in their proper menstrua are transmitted light, and therefore have no part in the reflection we observe in polished metallic surfaces. They are entirely different from the metallic elements which form the solid parts of opaque bodies, for they do not reflect the rays of light with the force necessary to reflect the rare medium which constitutes the surface of white bodies.
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Entertaining Experiments, founded on the preceding Principles.

I. Out of a single coloured ray of light to produce seven others, which shall paint, on a white body, the seven primary colours of nature.

Procure of an optician a large glass prism DEF, Plate well polished, two of whose sides must contain an angle of about sixty-four degrees. Make a room quite dark, fig. 1 and in the window shutter AB, cut a round hole, about one-third of an inch in diameter, at C, through which a ray of light LI passing, falls on the prism DEF; by that it is refracted out of the direction IT, in which it would have proceeded into another GH; and, falling on the paper MNSX, will there form an oblong spectrum PQ, whose ends will be semicircular, and its sides straight; and if the distance of the prism from the paper be about eighteen inches, it will be ten inches long, and two inches wide. This spectrum will exhibit all the primary colours: the rays between P and V, which are the most refracted, will paint a deep violet; those between V and I, indigo; those between I and B, blue; those between B and G, green; those between G and Y, yellow; those between Y and O, orange; and those between O and R, being the least refracted, an intense red. The colours between these spaces will not be everywhere uniform, but will incline to the neighbouring colour: thus the part of the orange next to R, will incline to a red; that next to Y, to a yellow; and so of the rest.

II. From two or more of the primary colours, to compose others that shall, in appearance, resemble those of the former.

By mixing the two homogeneous colours red and yellow, an orange will be produced similar in appearance to that in the series of primary colours; but the light of the one being homogeneal, and that of the other heterogeneous, if the former be viewed through a prism it will remain unaltered, but the other will be resolved into its component colours red and yellow. In like manner other contiguous homogeneous colours may compound new colours: as by mixing yellow and green, a colour between them is formed; and if blue be added, there will appear a green that is the middle colour of those three. For the yellow and blue, if they are equal in quantity, will draw the intermediate green equally toward them, and keep it, at it were, in equilibrio, that it verge not more to the one than to the other. To this compound green there may be added some red and violet; and yet the green will not immediately cease, but grow less vivid; till by adding more red and violet it will become more dulled; and at last by the prevalence of the added colours, it will be overcome, and turned into some anomalous colour.

If the sun's white, composed of all kinds of rays, he added

(c) From hence it arises, that black bodies, when exposed to the sun, become sooner heated than all others.
ad. to any homogenous colour, that colour will not vanish, nor change its species, but be diluted; and by adding more white, it will become continually more diluted. Lastly, if red and violet be mixed, there will be generated, according to their various proportions, various purples, such as are not like, in appearance, to the colour of any homogenous light; and of these purples, mixed with blue and yellow, other new colours may be composed.

III. Out of three of the primary colours, red, yellow, and blue, to produce all the other prismatic colours, and all that are intermediate to them.

Provide three panes of glass of about five inches square; and divide each of them, by parallel lines, into five equal parts. Take three sheets of very thin paper; which you must paint, lightly, one blue, another yellow, and the third red. Then paste on one of the glasses five pieces of the red paper; one of which must cover the whole glass, the second only the four lower divisions, the third the three lower, the fourth the two lowest, and the fifth the last division only. On the other two glasses five pieces of the blue and yellow papers must be pasted in like manner. You must also have a box of about six inches long, and the same depth and width as the glasses; it must be black on the inside; let one end be quite open, and in the opposite end there must be a hole large enough to see the glasses completely. It must also open at the top, that the glasses may be placed in it conveniently.

When you have put any one of these glasses in the box, and the open end is turned toward the sun, you will see five distinct shades of the colour it contains. If you place the blue and yellow glasses together, in a similar direction, you will see five shades of green distinctly formed. When the blue and red glasses are placed, a bright violet will be produced; and by the red and yellow, the several shades of orange.

If, instead of placing these glasses in a similar position, you place the side AB of the yellow glass against the side BD of the blue, you will see all the various greens that are produced by nature (e); if the blue and red glasses be placed in that manner, you will have all the possible varieties of purples, violets, &c.; and, lastly, if the red and orange glasses be so placed, there will be all the intermediate colours, as the marygold, aurora, &c.

IV. By means of the three primary colours, red, yellow, and blue, together with light and shade, to produce all the gradations of the prismatic colour.

On seven square panes of glass, paste papers that are painted with the seven prismatic colours, in the same manner as in the last experiment. The colours for the orange, green, indigo, and violet, may be made by mixing the other three. Then with bistre (r), well diluted, shade a sheet of very thin paper, by laying it light on both its sides. With pieces of this paper cover four-fifths of a glass, of the same size with the others, by laying one piece on the four lowest divisions, another on the three lowest, a third on the two lowest, and the fourth on the lowest division only, and leaving the top division quite uncovered. When one of the coloured glasses is placed in the box, together with the glass of shades, so that the side AB of the one be applied to the side BC of the other, as in fig. 3. the several gradations of colours will appear shaded in the same manner as a drapery judiciously painted with that colour.

It is on this principle that certain French artists have proceeded in their endeavours to imitate, by designs printed in colours, paintings in oil: which they do by four plates of the same size, on each of which is engraved the same design. One of these contains all the shades that are to be represented, and which are painted either black or with a dark grey. One of the other plates is coloured with blue, another with red, and the third with yellow; each of them being engraved in those parts only which are to represent that colour (c); and the engraving is either stronger or weaker, in proportion to the tone of colour that is to be represented (n).

These four plates are then passed alternately under the press, and the mixture of their colours produces a print that bears no small resemblance to a painting. It must be confessed, however, that what has been hitherto done of this kind falls far short of that degree of perfection of which this art appears susceptible. If they who engrave the best in the manner of the crayon were to apply themselves to this art, there is reason to expect.

(p) Water-colours must be used for this purpose: the blue may be that of Prussia, and very bright; the red, carmine; and the yellow, gamboge, mixed with a little saffron. These colours must be laid very light and even, on both sides of the paper.

(e) In the first position of the glasses, the quantity of blue and yellow being equal, the same sort of green was constantly visible: but by thus inverting the glasses, the quantity of the colours being constantly unequal, a very pleasing variety of tints is produced.

(r) The bistre here used must be made of root, not that in flene.

(c) When a red drapery is required, it is engraved on the plate assigned to that colour; and so of yellow and blue: but if one of the other colours be wanting, sapphire violet, it must be engraved on those plates that print the red and blue; and so of the rest. The plates of this kind have been hitherto engraved in the manner of mezzotinto; but these, unless they are skilfully managed, soon become smutty. Engravings in the manner of the crayon will perhaps answer better.

(n) The principal difficulty in this sort of engraving arises from a want of a skilful management, in giving each plate that precise degree of engraving which will produce the tone of colour required. If a bright green is to be represented, there should be an equal quantity of graving on the red and yellow plates: but if an olive green, the yellow plate should be engraved much deeper than the red.
expect they would produce far more finished pieces than we have hitherto seen.

V. To make figures appear of different colours successively.

Make a hole in the window-shutter of a dark room, through which a broad beam of light may pass, that is to be refracted by the large glass prism \( \text{ABC} \), which may be made of pieces of mirrors cemented together, and filled with water. Provide another prism \( \text{DEF} \), made of three pieces of wood; through the middle of this there must pass an axis on which it is to revolve. This prism must be covered with white paper; and each of its sides cut through in several places, so as to represent different figures, and those of each side should likewise be different. The inside of this prism is to be hollow, and made quite black, that it may not reflect any of the light that passes through the sides into it. When this prism is placed near to that of glass, as in the figure, with one of its sides \( \text{EF} \) perpendicular to the ray of light, the figures on that side will appear perfectly white: but when it comes into the position \( \text{gh} \), the figures will appear yellow and red; and when it is in the position \( \text{kl} \), they will appear blue and violet. As the prism is turned round its axis, the other sides will have a similar appearance. If instead of a prism, a four or five sided figure be here used, the appearances will be still further diversified.

This phenomenon arises from the different refrangibility of the rays of light. For when the side \( \text{EF} \) is in the position \( \text{gh} \), it is more strongly illuminated by the least refrangible rays; and wherever they are predominant, the object will appear red or yellow. But when it is on the position \( \text{kl} \), the more refrangible rays being then predominant, it will appear tinged with blue and violet.

VI. The solar magic lantern.

 procure a box, of about a foot high, and eighteen inches wide, or such other similar dimensions as you shall think fit; and about three inches deep. Two of the opposite sides of this box must be quite open; and in each of the other sides let there be a groove, wide enough to pass a stiff paper or pasteboard. This box must be fastened against a window on which the sun's rays fall directly. The rest of the window should be closed up, that no light may enter. Provide several sheets of stiff paper, which must be blacked on one side. On these papers cut out such figures as you shall think proper; and placing them alternately in the grooves of the box, with their blacked sides towards you, look at them through a large and clear glass prism; and if the light be strong, they will appear to be painted with the most lively colours in nature. If you cut on one of these papers the form of the rainbow, about three quarters of an inch wide, you will have a lively representation of that in the atmosphere.

This experiment may be further diversified, by pasting very thin papers, lightly painted with different colours, over some of the parts that are cut out: which will appear to change their colours when viewed through the prism, and to stand out from the paper, at different distances, according to the different degrees of refrangibility of the colours with which they are painted. For greater convenience, the prism may be placed in a stand on a table, at the height of your eye, and made to turn round on an axis, that when you have got an agreeable prospect, you may fix it in that position.

VII. The prismatic camera obscura.

Make two holes \( \text{F}, \text{f} \), in the shutter of a dark Fig. 5. chamber, near to each other; and against each hole place a prism \( \text{ABC} \), and \( \text{a} \ & \text{c} \), in a perpendicular direction, that their spectrums \( \text{NM} \) may be cast on the paper in a horizontal line, and coincide with each other; the red and violet of the one being in the same part with those of the other. The paper should be placed at such a distance from the prisms that the spectrum may be sufficiently dilated. Provide several papers nearly of the same dimensions with the spectrum, cross these papers, and draw lines parallel to the divisions of the colours. In these divisions cut out such figures as you shall find will have an agreeable effect, as flowers, trees, animals, &c. When you have placed one of these papers in its proper position, hang a black cloth or paper behind it, that none of the rays that pass through may be reflected and confine the phenomenon. The figures cut on the paper will then appear strongly illuminated with all the original colours of nature. If while one of the prisms remains at rest, the other be revolved on its axis, the continual alteration of the colours will afford a pleasing variety; which may be further increased by turning the prism round in different directions.

When the prisms are so placed that the two spectrums become coincident in an inverted order of their colours, the red end of one falling on the violet end of the other; if they be then viewed through a third prism \( \text{DH} \), held parallel to their length, they will no longer appear coincident, but in the form of two distinct spectrums, \( \text{p} \ & \text{n} \) (Fig. 6.), crossing one another in the middle, like the letter \( \text{X} \): the red of one spectrum and the violet of the other, which were coincident at \( \text{NM} \), being parted from each other by a greater refraction of the violet to \( \text{p} \) and \( \text{m} \), than that of the red to \( \text{n} \) and \( \text{t} \).

This experiment may be further diversified by adding two other prisms, that shall form a spectrum in the same line, and contiguous in the other; by which not only the variety of figures, but the vividness of colours, will be considerably augmented.

The diatonic scale of colours.

The illustrious Newton, in the course of his investigations of the properties of light, discovered that the length of the spaces which the seven primary colours possess in the spectrum, exactly corresponds to those of chords that found the seven notes in the diatonic scale of music. As is evident by the following experiment.

On a paper in a dark chamber, let a ray of light be Fig. 7. largely refracted into the spectrum \( \text{AFTMGPS} \), and mark the precise boundaries of the several colours, as \( \text{a} \ & \text{b} \ & \text{c} \ & \text{e} \ & \text{c} \). Draw lines from those points perpendicular to the opposite side, and you will find that the spaces \( \text{M} \ & \text{F} \), by which the red is bounded: \( \text{g} \ & \text{e} \), by which the orange is bounded: \( \text{g} \ & \text{p} \ & \text{d} \), by which the yellow is bounded: \( \text{e} \ & \text{c} \). will be in exact proportion.
to the divisions of a musical chord for the notes of an octave; that is, as the intervals of those numbers $1$, $\frac{3}{2}$, $\frac{5}{2}$, $\frac{7}{2}$, $\frac{9}{2}$.

IX. Colorific music.

FATHER CASTEL, a Frenchman, in a curious book he has published on chromatics, supposes the note A to answer to blue in the prismatic colours; the note C to yellow, and Mi to red. The other tones he refers to the intermediate colours; from whence he constructs the following gamut of colorific music:

<table>
<thead>
<tr>
<th>Note</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ut</td>
<td>Blue</td>
</tr>
<tr>
<td>Ut sharp</td>
<td>Sea-green</td>
</tr>
<tr>
<td>Re</td>
<td>Bright green</td>
</tr>
<tr>
<td>Re sharp</td>
<td>Olive green</td>
</tr>
<tr>
<td>Mi</td>
<td>Yellow</td>
</tr>
<tr>
<td>Fa</td>
<td>Aurora</td>
</tr>
<tr>
<td>Fa sharp</td>
<td>Orange</td>
</tr>
<tr>
<td>Sol</td>
<td>Red</td>
</tr>
<tr>
<td>Sol sharp</td>
<td>Crimson</td>
</tr>
<tr>
<td>La</td>
<td>Violet</td>
</tr>
<tr>
<td>La sharp</td>
<td>Blue Violet</td>
</tr>
<tr>
<td>Si</td>
<td>Sky blue</td>
</tr>
<tr>
<td>Ut</td>
<td>Blue</td>
</tr>
</tbody>
</table>

This gamut, according to his plan, is to be continued in the same manner for the following octaves; except that the colours are to be more vivid.

He supposes these colours, by striking the eye in the same succession as the sounds (to which he makes them analogous) do the ear, and in the same order of time, they will produce a correspondent sensation of pleasure in the mind. It is on these general principles, which F. Castel has elucidated in his treatise, that he has endeavoured, though with little success, to establish his ocular harpsichord.

The construction of this instrument, as here explained, will show that the effects produced by colours by no means answer those of sounds, and that the principal relation there is between them consists in the duration of the time that they respectively affect the senses.

Between two circles of pasteboard, of ten inches diameter, AB and CD, inclose a hollow pasteboard cylinder E, 18 inches long. Divide this cylinder into spaces half an inch wide, by a spiral line that runs round it from top to bottom, and divide its surface into six equal parts by parallel lines drawn between its two extremities; as is expressed in the figure.

Let the circle AB, at top, be open; and let that at bottom, CD, be closed, and supported by an axis or screw, of half an inch diameter, which must turn freely in a nut placed at the bottom of a box we shall presently describe. To the axis just mentioned adjust a wooden wheel G, of two inches and a half in diameter, and that has 12 or 15 teeth, which take the endless screw H. Let this cylinder be inclosed in a box ILMN (fig. 9.) whose base is square, and at whose bottom there is a nut in which the axis turns. Observe that the endless screw H should come out of the box, that it may receive the handle O, by which the cylinder is to be turned.

This box being closed all round, place over it a tin covering A, which must be perforated in different parts; from this cover there must hang three or four lights, so placed that they may strongly illuminate the inside of the cylinder. In one side of this box (which should be covered with pasteboard) cut eight apertures, a, b, c, d, e, f, g, h, of half an inch wide, and $\frac{1}{2}$ of an inch high; they must be directly over each other, and the distance between them must be exactly two inches. It is by these openings, which here correspond to the musical notes, that the various colours analogous to them are to appear; and which being placed on the pasteboard cylinder, as we have shown, are reflected by means of the lights placed within it.

It is easy to conceive, that when the handle O is turned, the cylinder in consequence rising half an inch, if it be turned five times round, it will successively show, at the openings made in the side of the box, all the notes that are in the cylinder itself, and which are ranged according to the direction of the inclined lines drawn on it. It is therefore according to the duration of the notes which are to be expressed, that the apertures on the cylinder are to be cut. Observe, that the space between two of the parallel lines drawn vertically on the cylinder, is equal to one measure of time; therefore, for every turn of the cylinder, there are six measures, and thirty measures for the air that is to be played by this instrument.

The several apertures being made in the side of the cylinder, in conformity to the notes of the tune that is to be expressed, they are to be covered with double pieces of very thin paper, painted on both sides with the colours that are to represent the musical notes.

This experiment might be executed in a different manner, and with a much greater extent; but as the entertainment would not equal the trouble of expense, we have thought it sufficient to give the above piece, by which the reader will be enabled to judge how far the analogy supposed by F. Castel really exists.

Furthermore, Mr Robertson's doubts and observations respecting the authenticity of the Parian Chronicle, one or two publications have since appeared in answer, but none of them calculated to remove the objections or materially to affect the arguments that had been stated with so much learning and ingenuity against it. The following stricture, however, with which the Monthly Reviewers have concluded their critique of Mr Robertson's performance, seem to merit consideration.
Chronicle. On Objection 1. That the characters have no certain or unequivocal marks of antiquity, the Reviewers remark, that this seems rather to be an answer to a defender of the inscription, than an objection. If a zealous partisan of the marble should appeal to its characters and orthography, as decisive proofs of its being genuine, it would be proper enough to answer, that these circumstances afford no certain criterion of authenticity. But in this word certain feeks an unlucky ambiguity. If it means demonstrative, it must be allowed that no inscription can be proved to be certainly genuine from these appearances; but if it means no more than highly probable, many inscriptions possess sufficient internal evidence to give their claims this degree of certainty. The true question is, Has not the Parian Chronicle every mark of antiquity that can be expected in a monument claiming the age of 2000 years? The letters ร and แ are, by Mr R’s own confession, such as occur in genuine inscriptions; and to say in answer, that an imposter might copy the forms of these letters from other inscriptions, is already to suppose the inscriptions forged, before it is rendered probable by argument. The learned author of the Dissertation somewhat betrays some doubt of his own conclusion; for he adds, p. 56, "that the antiquity of an inscription can never be proved by the mere form of the letters, because the most ancient characters are as easily counterfeited as the modern." But this objection is equally applicable to all other ancient inscriptions; and is not to the purpose, if the present inscription has any peculiar marks of imposture in its characters and orthography. "The characters do not resemble the Sigean, the Nemean, or the Delian inscriptions." Mr R. answers this objection himself, by adding, "which are supposed to be of a more ancient date." The opposite reason to this will be a sufficient answer to the other objection, "that they do not resemble the Parthian pillars or the Alexandrian MS." If "they differ in many respects from the Marmor Sandvicenæ," they may be presumed to agree in many. "They seem to resemble, more than any other, the alphabet taken by Montfaucon from the Marmor Cyzicensum." Thus it appears that the Parian Chronicle most nearly resembles the two inscriptions, to whose age it most nearly approaches.

When Mr R. adds, that the letters "are such as an ordinary stone-cutter would probably make, if he were employed to engrave a Greek inscription, according to the alphabet now in use," he must be understood. The engraver of a fac simile generally omits some nice and minute touches in taking his copy; but, even with this abatement, we dare appeal to any adept in Greek calligraphy, whether the specimen facing p. 56, will justify our author’s observation? "The small letters อ, ง, น intermixed among the larger, have an air of affectation and artifice." Then has the greater part of ancient inscriptions an air of affectation and artifice. For the อ is perpetually engraved in this diminutive size; and น being of a kindred found, and ง of a kindred shape, how can we wonder that all three should be represented of the same magnitude? In the inscription which immediately follows the marble in Dr Chandler’s edition, N° xxiv, these very three letters are never so large as the rest, and often much smaller; of which there are instances in the three first lines. See also Chronicle, two medals in the second part of Dorville’s Sica, Tab. xvi. Numb. 7, 9.

"From the archaism, such as ร and แ, etc, etc, no conclusion can be drawn in favour of the authenticity of the inscription." Yet surely every thing common to it with other inscriptions, confidedly genuine, creates a reasonable presumption in its favour. "But what reason could there be for these archaism in the Parian Chronicle? We do not usually find them in Greek writers of the same age, or even of a more early date." The reason is, according to our opinion, that such archaism were then in use: this we know from other inscriptions, in which such archaism (or, as our author afterward calls them, barbarisms) are frequent. Nothing can be inferred from the Greek writers, unless we had their autographs. The present system of orthography in our printed Greek books is out of the question. As to, "The inscription sometimes adopts and sometimes neglects these archaism, as in lines 4, 12, 27, 52, 63, 67." This inconsistency either is no valid objection, or if it be valid, will demolish not only most every other inscription, but almost every writing whatever. For example, in the inscription just quoted, N° xxiv. we find ร and แ, and น in p. 54. A little farther, N° xxvi. l. 31, we have ร and แ, p. 57. 73. 81. ร and แ, and น, น and แ, p. 106. 108. ร and แ, p. 106. The Corycian inscription (Montfaucon, Diar. Ital. p. 420) promiscuously uses ร and แ, and น and แ, น. In English, who is surprised to find has and hath, a hand and an hand, a useful and an useful, in the works of the same author? We could produce instances of this inaccuracy from the same page, nay from the same sentence.

"The authenticity of those inscriptions, in which these archaism appear, must be established, before they can be produced in opposition to the present argument." This is, we cannot help thinking, rather too severe a refutation. If no inscription may be quoted before it be proved genuine, the learned author of the Dissertation need not be afraid of being confuted; for nobody will engage with him on such conditions. Perhaps the reverse of the rule will be thought more equitable; that every inscription be allowed to be genuine, till its authenticity be rendered doubtful by probable arguments. We will conclude this head with two short observations. In Selden’s copy, l. 26, was written ร and แ, which the later editors have altered to ร and แ, but without reason, the other being the more ancient way of writing, common in MSS, and sometimes found on inscriptions. (See G. Koen’s Notes on Gregoryus de Diadeta, p. 30.) In l. 83, the marble has ร and แ, for which Palmer wished to substituate ร and แ. Dr Taylor retires him from the Marmor Sandvicenæ, observing at the same time, that this orthography occurs in no other place whatever except in these two monuments. Is it likely that two engravers should by chance coincide in the same mistake, or that the forger of the Parian Chronicle (if it be forged) should have seen the Marmor Sandvicenæ, and taken notice of this peculiarity with the intention of afterward employing it in the fabrication of an imposture?

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CHR.

The Reviewers next proceed to consider, but more briefly, the other objections.

II. It is not probable that the Chronicle was engraved for private use. 1. Because it was such an expense, as few learned Greeks were able to afford. If only a few were able to afford it, some of their few might be willing to incur it. But let Mr. R. consider how likely it is that a modern, and probably a needy Greek, should be more able to afford it in the last century, than a learned Greek 2000 years ago. 2. A manuscript is more readily circulated. Do men never prefer cumbrous splendor to cheapness and convenience? And if this composition, instead of being engraved on marble, had been committed to parchment, would it have had a better chance of coming down to the present age? Such a flying sheet would soon be lost; or, if a copy had, by miracle, been preserved to us, the objections to its being genuine would be more plausible than any that have been urged against the inscription. What Mr. R. says about the errors to which an inscription is liable, &c. will only prove that chronological inscriptions ought not to be engraved; but not that they never were engraved. We allow that the custom of writing in the reign of Ptolemy Philadelphia was not on stones. But it was common enough to occur to the mind of any person who wished to leave behind him a memorial at once of his learning and magnificence.

III. This objection, that the marble does not appear to be engraved by public authority, we shall readily admit, though Bentley (Diff. on Phalaris, p. 257.) leans to the contrary opinion. In explaining this objection, the learned dissertator observes, that though the expression, περιστατικα της Παρους, would lead us to suppose that the inscription related to Paros, not a single circumstance in the history of that island is mentioned. But this expression only shows that the author was an inhabitant of Paros, and intended to give his readers a clue, or παραγεμα, by the aid of which they might adjust the general chronology of Greece to the dates of their own history. "It is as absurd as would be a marble in Jamaica containing the revolutions of England." We see no absurdity in supposing a book to be written in Jamaica containing the revolutions of England. The natives of Paros were not uninterested in events relating to the general history of Greece, particularly of Athens; and how can we tell whether the author were an inhabitant of the island; whether he thought it a place beneath his care; or whether he had devoted a separate inscription to the chronology of Paros?

IV. It has been frequently observed, that the earlier periods of the Grecian history are involved in darkness and confusion. Granted. It follows then, that "an author who should attempt to settle the dates of the earlier periods would frequently contradict preceding, and be contradicted by subsequent, writers: he would naturally fall into mistakes: and at best could only hope to adopt the most probable system. But the difficulty of the task, or the impossibility of success, are not sufficient to prove that no man has been rash or mad enough to make the attempt." On the contrary, we know that many have attempted it. What a number of different periods has Mr. R. himself given us from the ancients concerning the age of Homer? This consideration will in part obviate another objection, that the Parian Chronicle does not agree with any ancient author. The fact is, that while the ancients contradicted one another, how could it follow more than one of them? and why might not the author, without any imputation of ignorance or rackless, sometimes depart from them all? If indeed he disagrees with them when they are unanimous, it might furnish matter for infelicity; though even this would be far from a decisive argument, unless the ancients were extremely unlike the moderns, as never to be found of singular and paradoxical positions.

V. This Chronicle is not one mentioned by any writer of antiquity. How many of those inscriptions, which are preferred to the present day, are mentioned by classical authors? Verres' Places composed a Roman calendar, which, as a monument of his learning and industry, was engraved on marble, and fixed in the most public part of Preneile. Fragments of this very calendar were lately dug up at Preneile, and have been published by a learned Italian. Now, if the paflage of Suetonius, which informs us of this circumstance, had been lost, would the silence of the Latin writers prove that the fragments were not genuine remains of antiquity? It may be said that the copies are paralleled; for not a single author mentions the Parian Chronicle, whereas Suetonius does mention Verres' Roman calendar. To this we answer. It is dangerous to deny the authenticity of any monument on the slender probability of its being casually mentioned by a single author. We shall also observe, that this fact of the Hemicycloium of Verres will answer some part of the Dissertator's second objection: «The Parian Chronicle is not an inscription that might have been concealed in a private library." Why not? It is of no extraordinary bulk; and might formerly have been concealed in a private library, or in a private room, with as much care as many inscriptions are now concealed in very narrow space. But unless the monument were placed in some conspicuous part of the island, and obviated itself on the notice of every traveller, the wonder will in great measure cease why it is never quoted by the ancients. Of the nine authors named in p. 109, had any one ever visited Paros? If Paupanias had travelled thither, and published his description of the place, we might perhaps expect to find some mention of this marble in so curious and inquitive a writer. But though the inscription existed, and were famous at Paros, there seems no necessity for any of the authors whose works are still extant to have known or recorded it. If there be, let this learned antiquit point out the place where this mention ought to have been made. If any persons were bound by a stronger obligation than others to speak of the Parian inscription, they must be the professed chronologers; but alas! we have not the entire works of so much as a single ancient chronologer: it is therefore impossible to determine whether this Chronicle were quoted by any ancient. And supposing it had been seen by some ancient, whose writings still remain, why should he make particular mention of it? Many authors, as we know from their remains, very freely copied their predecessors without naming them. Others, finding only a collection of facts, events in the inscription, without historical proofs or critics, naturally neglect it, as deserving no credit. Mr. R. seems to lay much stress on the precise, exact, and particular
Objection VII. With respect to the paraphrasmits that Mr. R. produces, we shall without hesitation grant, that the author of the inscription may have committed some mistakes in the chronology, as perhaps concerning Phidias, whom he seems to have confounded with another of the same name, &c. But these mistakes will not conclude against the antiquity of the inscription, unless we at the same time reject many of the principal Greek and Roman writers, who have been convicted of similar errors. We return therefore to Objection VI. Some of the facts seem to have been taken from authors of a later date. We have endeavoured impartially to examine and compare the passages quoted in proof of this objection; but we are obliged to confess, that we do not perceive the faintest traces of theft or imitation. One example only deserves to be excepted to which we shall therefore pay particular attention.

"The names of six; and, if the lacunae are properly supplied, the names of twelve cities, appear to have been engraved on the marble, exactly as we find them in Pausanias's Various History. But there is not any imaginable reason for this particular arrangement. It does not correspond with the time of their foundation, with their situation in Ionia, with their relative importance, or with the order in which they are placed by other eminent historians."

The chance of six names, says Mr. R. being placed by two authors in the same order, is as 1 to 720; of 12, as 1 to 479,901,600. "It is therefore utterly improbable that these names would have been placed in this order on the marble, if the author of the inscription had not transcribed them from the historian."

On this argument we shall observe, 1. That the very contrary conclusion might possibly be just, that the historian transcribed from the inscription. Yet we shall grant that in the present case this is improbable, especially if the author of the Various History be the same Pausanias, who, according to Philostratus, Vit. Soph., II. 31, never quitted Italy in his life. But an intermediate writer might have copied the marble, and Pausanias might have been indebted to him. 2dly, We see no reason to allow, that the lacunae are properly supplied. Suppose we should affirm, that the names stood originally thus: Miletus, Ephesus, Erythrae, Clazomenae, Lebedos, Chios, Phoca, Colophon, Myus, Priene, Samos, Teos. In this arrangement, only four names would be together in the same order with Miletus; and from these Miletus must be excepted, because there is an obvious reason for mentioning that city first. Three only will then remain; and surely that is too slight a resemblance to be considered into an imitation. For Pausanias and Paterculus, quoted by our author, p. 154, have both enumerated the twelve cities, and both agree in placing the five last in the same order; nay, the six first, if Voluitt's conjecture that TEUM ought to be inserted in Paterculus after Myam & EM be as true as it is plausible. But who imagines that Pausanias had either opportunity or inclination to copy Paterculus? 3dly, Allowing that the names were engraved on the marble exactly in the order that Pausanias has chosen, is there no way of solving the phenomenon but by supposing that one borrowed from the other? Seven authors at least (Mr. R. seems to say more, p. 154, 5.) mention the colonization of the same cities: how many authors now left may we reasonably conjecture to have done the same? If therefore the compiler of the Chronicle and Pausanias lightened on the same author, the former would probably preserve the same arrangement that he found, because in transferring a list of names, he could have no temptation to deviate; and the latter would certainly adhere faithfully to his original, because he is a notorious and fertile plagiarist. Mr. R. indeed thinks, p. 158, that if a succeeding writer had borrowed the words of the inscription, he would not have suppressed the name of the author. This opinion must fail to the ground, if it be shown that Pausanias was accustomed to suppress the names of the authors to whom he was obliged. Pausanias has given a list of fourteen celebrated gluttons; and, elsewhere, another of twenty-eight drunkards (from which, by the way, it appears, that people were apt to eat and drink rather too freely in ancient as well as modern times); and both these lists contain exactly the same names in the same order with Atheneus. Now, it is improbable that fourteen names may be transposed 8,717,291,200 different ways, and that twenty-eight names admit of 304,885,134,861,713,901,504,000,000 different transpositions, &c. &c. Pausanias therefore transcribed them from Athenaeus? yet Pausanias never mentions Athenaeus in his Various History. So that whether Pausanias copied from the marble, or only drew from a common source, he might, and very probably would, conceal his authority.

VIII. The history of the discovery of the Marbles is obscure and unsatisfactory. In p. 169, it is said to be "related with suspicious circumstances, and without any of those clear and unequivocal evidences which always discriminate truth from falsehood." The question then is finally decided. If the inscription has not any of those evidences which truth always possesses, and which falsehood always wants, it is most certainly forged. The learned diffluent seeks for a moment to have forgotten the necessity of a doubt, and to permutate the dogmatist. But waving this, we shall add, that as far as we can see,
Much truth is observable in this remark. But the Chronicles of sundry authors are applied to particular cases. In the first place, it must be observed, that no forged books will exactly suit Sir R.'s purpose, but such as pretend to be the author's own handwriting; nor any inscriptions, but such as are still extant on the original materials, or such as were known to be extant at the time of their pretended discovery. Let the argument be bounded by these limits, and the number of forgeries will be very much reduced. We are not in possession of Cicero's Anonitius's book; but if we were governed by authority, we should think that the testimony of Reinsius in his favour greatly overbalances all that Augtinus has said to his prejudice. The opinion of Reinsius is of the more weight, because he inspects Urinus of publishing counterfeit monuments. We likewise find the most eminent critics of the present age quoting Cicero without suspicion (Fid. Ruuihui. in Timaeu Lex. Plat. p. 10. apud Cen. ad Gregor. p. 140. ) The doctrine advanced in the Introduction from Hardouin is exactly conformable to that writer's usual paradoxes. He wanted to destroy the credit of all the Greek and Latin writers. But inscriptions hung like a millstone about the neck of his project. He therefore resolved to make fore work, and deny the genuineness of as many as he could conveniently; to effect which purpose, he introduces himself in a general accusation. If the author of the dissertation had quoted a few more paragraphs from Hardouin, in which he endeavours, after his manner, to throw the forgery of some inscriptions, he would at once have administered the poison and the antidote. But to the reverses of that learned madman, respecting Greek spurious compositions of this nature, we shall content ourselves with opposing the sentiments of a modern critic, whose judgment on the subject of spurious inscriptions will not be disputed.

Maffi, in the introduction to the third book, c. t. p. 51. of his admirable, though unfinished, work de Arte Critica Lapidaria, uses these words: Inscriptiores Graeci, aequitatem communitiis, sic cum Latini comparabantur, reprehendi posuerat, nonque enim manu saevo es, in tanta debacchantium falsiarum libidinis, monumentis esse, in quod ille, nisiDic nonce peruenire. Argumenta esse, paucisimas, atque in hanc dim ab eruditissimis, et in hoc literarum generi plurimum vasis nostris refutamina esse, falsae damnatas.

Books of Chronicles, a canonical writing of the Old Testament. It is uncertain which were written first, The Books of Kings, or The Chronicles, since they each refer to the other. However it be, the latter is often more full and comprehensive than the former. Whereas the Greek interpreters call these two books Paralipomena, Supplements, Additions, because they contain some circumstances which are omitted in the other historical books. Th. J. S. make but one book of the Chronicles, under the title of Libros Hiatamim, i.e. Journals or Annals. Ezra is generally believed to be the author of these books. It is certain they were written after the end of the Babylonian captivity and the first year of the reign of Cyrus, whom mention is made in the last chapter of the second book.

The Chronicles, or Paralipomena, are an abridge-
CHRONOLOGY.

TREATS of time, the method of measuring its parts, and adapting the same, when distinguished by proper marks and characters, to past transactions, for the illustration of history. This science therefore consists of two parts. The first treats of the proper measurement of time, and the adjustment of its several divisions; the second of fixing the dates of the various events recorded in history, and ranging them, according to the several divisions of time, in the order in which they happened.

Chronology, comparatively speaking, is but of modern date. The ancient poets appear to have been entirely unacquainted with it; and Homer, the most celebrated of them all, mentions nothing like a formal calendar in any part of his writings. In the most early periods, the only measurement of time was by the seasons, the revolutions of the sun and moon; and many ages must have elapsed before the mode of computation by dating events came into general use. Several centuries intervened between the era of the Olympic games and the first historians; and several more between these and the first authors of chronology. When time first began to be reckoned, we find its measures very indeterminate. The succession of Judea’s priests at Argos served Helenicus for the regulation of his narrative; while Ephorus reckoned his generations. Even in the history of Herodotus and Thucydides, we find no regular date for the events recorded; nor was there any attempt to establish a fixed era, until the time of Ptolemy Philadelphus, who attempted it by comparing and correcting the dates of the Olympiads, the kings of Sparta, and the succession of the priests of Juno at Argos. Eratosthenes and Apollodorus digested the events recorded by them according to the succession of the Olympiads and of the Spartan kings.

The uncertainty of the measures of time in the most early periods renders the histories of those times equally uncertain; and even after the invention of dates and eras, we find the ancient historians very inattentive to them, and inaccurate in their computations. Frequently their eras and years were reckoned differently without their being sensible of it, or at least without giving the reader any information concerning it; a circumstance which has rendered the fragments of their works now remaining of very little use to posterity. The Chaldean and Egyptian writers are generally acknowledged to be fabulous; and Strabo acquaints us, that Diodorus Siculus, and the other early historians of Greece, were ill informed and credulous. Ancient historians not being able to explain satisfactorily the events recorded by them according to their genealogies; nor was there any attempt to establish a fixed era, until the time of Ptolemy Philadelphus, who attempted it by comparing and correcting the dates of the Olympiads, the kings of Sparta, and the succession of the priests of Juno at Argos. Eratosthenes and Apollodorus digested the events recorded by them according to the succession of the Olympiads and of the Spartan kings.

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From these observations it is obvious how necessary a utility of chronology must be for the right understanding of history, and likewise how very difficult it must be to establish such a system. In this, however, several learned men have excelled, particularly Julius Africanus, Eusebius of Caesarea, George Cypselus, John of Patmos, Dennis, Peron, Clavius, Calvin, Usher, Simson Martiam, Blair, and Playfair. It is founded, 1. On astronomical observations, particularly of the eclipses of the sun and moon, combined with the calculations of the stars and planets of different nations. 2. The testimonies of credible authors. 3. Those epochs in history which are so well attested and determined, that they have never been controverted. 4. Ancient medals, coins, monuments, and inscriptions. None of these, however, can be sufficiently intelligible without an explanation of the first part, which we have already observed, confessing the divisions of time, and of which therefore we shall treat in the first place.

The most obvious division of time is derived from the apparent revolutions of the celestial bodies, particularly of the sun, which by the vicissitudes of day and night becomes evident to the most barbarous and ignorant nations. In strict propriety of speech the word day signifies only that portion of time during which the sun diftincts light on any part of the earth; but in the most comprehensive sense, it includes the night also, and is called by chronologists a civil day; by astronomers a natural, and sometimes an artificial, day.
By a civil day is meant the interval between the sun's departure from any given point in the heavens and next return to the same, with as much more as answers to its diurnal motion eastward, which is at the rate of 59 minutes and 8 seconds of a degree, or 3 minutes and 57 seconds of time. It is also called a *solar* day, and is longer than a *sidereal* one, inasmuch that, if the former be divided into 24 equal parts or hours, the latter will be but just over 23 hours. From this apparent inequality in the sun's motion, likewise arising from the obliquity of the ecliptic, produces another inequality in the length of the days: and hence the difference between real and apparent time, so that the apparent motion of the sun cannot always be a true measure of time. Those inequalities, however, are capable of being reduced to a general standard, which furnishes an exact measure throughout the year; whence arises the difference between real and apparent time, as is explained under the article Astronomy.

There have been very considerable differences among nations with regard to the beginning and ending of their days. The beginning of the day was called by the Jews, at sunrise; by the Babylonians, Syrians, Persians, and Indians. The civil day of the Jews was begun from sunrise, and their sacred one from sunset; the latter mode of computation being followed by the Athenians, Arabs, ancient Gauls, and other European nations. According to some, the Egyptians began their day at sunset, while others are of opinion that they computed from noon or from sunrise; and Pliny informs us that they computed their civil day from one midnight to another. It is probable, however, that they had different modes of computing in different provinces or cities. The Assemblies, the most ancient inhabitants of Italy, computed the day from midnight; and the astronomers of Cathay and Hindostan reckoned in their manner. This mode of computation was adopted by Hipparchus, Copernicus, and other astronomers, and is now in common use among ourselves. The *astronomical* day, however, as it is called, on account of its being used in astronomical calculations, commences at noon, and ends at the same time the following day. The Mahometans reckon from one twilight to another. In Italy, the civil day commences at some indeterminate point after sunset: whence the time of noon varies with the season of the year. At the summer solstice, the clock strikes 15 at noon, and 19 at the time of the winter solstice. Thus also the length of each day differs by several minutes from that immediately preceding or following it. This variation requires a considerable difficulty in adjusting their time by clocks. It is accomplished, however, by a sudden movement which corrects the difference when it amounts to a quarter of an hour; and this it does sometimes at the end of eight days, sometimes at the end of 15, and sometimes at the end of 40.

Information of all this is given by a printed calendar, which announces, that from the 16th of February, for instance, to the 24th, it will be noon at a quarter past 18; from the 24th of February to the 6th of March, it will be noon at 19 o'clock precisely; from the first of June to the 13th of July, the hour noon will be at 16 o'clock; on the 13th of July it will be at half an hour after 16; and so on throughout the different months of the year. This method of measuring the day continues, notwithstanding several attempts to supplant it, throughout the whole of Italy, a few provinces only excepted.

The subdivisions of the day have not been left various than the computations of the day itself. The most subdivisions obvious division, and which could at no time, nor in the day, no age, be mistaken, was that of morning and evening. In process of time the two intermediate points of noon and midnight were determined; and this division into quarters was in use long before the invention of hours.

From this subdivision probably arose the method used by the Jews and Romans of dividing the day and night into four vigils or watches. The first began at sun-rising, or six in the morning; the second at nine; the third at twelve; and the fourth at three in the afternoon. In like manner the night was divided into four parts; the first beginning at six in the evening, the second at nine, the third at twelve, and the fourth at three in the morning. The first of these divisions the third hour of the day; the second the sixth; the third the ninth; and the fourth the twelfth, and sometimes the *eleventh*. Another division in use, not only among the nations above-mentioned, but the Greeks also, was that which reckoned the first quarter from sunset to midnight; the second from midnight to sunset; the third, or morning watch, from morning to noon; and the fourth from noon to sunset.

It is uncertain at what time the more minute subdivision of the day into hours first commenced. If does not appear from the writings of Moses that he was acquainted with it, as he mentions only the morning, midday, evening, and night. Hence we may conclude, that the Egyptians at that time knew nothing of it, as Moses was well skilled in their learning. According to Herodotus, the Greeks received the knowledge of the twelve hours of the day from the Babylonians. It is probable, however, that the division was actually known and in use before the name *hour* was applied to it; as Censorinus informs us that the term was not made use of in Rome for 300 years after its foundation; nor was it known at the time the twelve tables were constructed.

The eastern nations divide the day and night in a very singular manner: the origin of which is not easily discovered. The Chinese have five watches in the night, which are announced by a certain number of strokes on a bell or drum. They begin by giving one stroke, which is answered by another; and this is repeated at the distance of a minute or two, until the second watch begins, which is announced by two strokes; and so on throughout the rest of the watches. By the ancient Tartars, Indians, and Persians, the day was divided into eight parts, each of which contained seven hours and a half. The Indians on the coast of Malabar divide the day into six parts, called *najika*; each of these six computations is subdivided into 60 others, called *veenas*; the first *veena* into 60 *birpe*; the *birpe* into 10 *kanka*; the *kanka* into four *mathies*; the *mathis* into eight *karnas* or *caignades*; which divisions, according to our mode of computation, stand as follows.

Najika...
The modern divisions of the hour in use among us are into minutes, seconds, thirds, fourths, &c., each being a sixtieth part of the former subdivision. By the Chaldeans, Jews, and Arabians, the hour is divided into 1080 scorpules; so that one hour contains 60 minutes, and one minute 18 scorpules. The ancient Persians and Arabs were likewise acquainted with this division; but the Jews are so fond of it, that they pretend to have received it in a supernatural manner. “Hecateus (say they) ascended into heaven, and brought from thence 1080 parts for the benefit of the nation.”

The division of the day being ascertained, it soon became an object to indicate in a public manner the expiration of any particular hour or division; as without some general knowledge of this kind, it would be in a great measure impossible to carry on business. The methods of announcing this have been likewise very different. Among the Egyptians it was customary for the priests to proclaim the hours like watchmen among us. The same method was followed at Rome; nor was there any other method of knowing the hours until the year 303 B.C. when Papirius Cursor first set up a sun-dial in the Capitol. A similar method is practised among the Turks, whose priests proclaim from the top of their mosques, the cock-crowing, day-break, mid-day, three o’clock in the afternoon, and twilight, being their appointed times of worship.

As this mode of proclaiming the hour could not but be very inconvenient as well as imperfect, the introduction of an instrument which every one could have in his possession, and which might answer the same purpose, must have been considered as a valuable acquisition. One of the first of these was the clepsydra or water clock. Various kinds of these were in use among the Egyptians at a very early period. The invention of the instrument is ascribed to Thoth or Mercury, and it was afterwards improved by Cleobius of Alexandria. It was a common measure of time among the Greeks, Indians, and Chaldeans, as well as the Egyptians, but was not introduced into Rome till the time of Sulpicius Naicus. The Chaldean astronomers have long made use of it; and by its means divided the zodiac into twelve parts; but it is a very inaccurate measure of time, varying, not only according to the quantity of water in the vessel, but according to the state of the atmosphere.

The clepsydra was succeeded by the gnomon or sun-dial.—This, at first, was no more than a little erected perpendicularly to the horizon; and it was a long time before the principles of it came to be thoroughly understood. The invention is with great probability attributed to the Babylonians, from whom the Jews received it before the time of Ahaz, when we know that a sun-dial was already erected at Jerusalem. The Chaldeans and Egyptians also were acquainted with the use of the dial at a very early period, and it was considerably improved by Anaximander or Anaximenes; one of whom is for that reason looked upon to be the inventor. Various kinds of dials, however, were invented and made use of in different nations long before their introduction at Rome. The first erected in that city, as has been already mentioned, was that by Papirius Cursor; and 50 years after, Valerius Mutila brought one from Sicily, which was used in Rome for no less than 99 years, though constructed for a Sicilian latitude, and consequently incapable of showing the hours exactly in any other place; but at last another was constructed by L. Philippus, capable of measuring time with greater accuracy.

It was long after the invention of dials before mankind began to form any ideas of clocks; nor is it well known at what period they were first invented. A clock was sent by Pope Paul I. to Pepin king of France, which at that time was supposed to be the only one in the world. A very curious one was also sent to Charles the Great from the Khalif Haroun Ar-Rashid, which the historian of the time speaks of with surprise and admiration; but the greatest improvement was that of Mr Huygens, who added the pendulum to it. Still, however, the instruments for dividing time were found to be inaccurate for nice purposes. The expansion of the materials by heat, and their contraction by cold, would cause a very perceptible alteration in the going of an instrument in the same place at different times of the year, and much more if carried from one climate to another. Various methods have been contrived to correct this; which indeed can be done very effectually at land by a certain construction of the pendulum; but at sea, where a pendulum cannot be used, the inaccuracy is of consequence much greater; nor was it thought possible to correct the errors arising from these causes in any tolerable degree, until the late invention of Mr Harrison’s time-piece, which may be considered as making perhaps as near an approach to perfection as possible.

Having thus given an account of the more minute divisions of time, with the methods of measuring them, we must now proceed to the larger; which more properly belong to chronology, and which must be kept on record, as no instrument can be made to point them out. Of these the division into weeks of seven days is one of the most ancient, and probably took place from the creation of the world. Some, indeed, are of opinion, that the week was invented some
Some time after for the more convenient notation of time; but whatever may be in this, we are certain that it is of the highest antiquity, and even the most rude and barbarous nations have made use of it. It is singular indeed that the Greeks, notwithstanding their learning, should have been ignorant of this division; and M. Goguet informs us, that they were almost the only nation who were so. By them the month of 30 days was divided into three times ten, and the days of it named accordingly. Thus the 15th day of the month was called the second fifth, or fifth of the second tenth; the 24th was called the third fourth, or the fourth day of the third tenth. This method was in use in the days of Hebræod, and it was not until several ages had elapsed, that the use of weeks was received into Greece from the Egyptians. The inhabitants of Cathay, in the northern part of China, were likewise unacquainted with the week of seven days, but divided the year into six parts of 60 days each. They had also a cycle of 15 days, which they used as a week. The week was likewise unknown to the ancient Persians and to the Mexicans; the former having a different name for every day of the month, and the latter making use of a cycle of 13 days. By almost all other nations the week of seven days was adopted.

17 Of holidays. It is remarkable, that one day in the week has always been accounted as sacred by every nation. Thus Saturday was consecrated to pious services, and to religious feasts, and authors are of opinion, that the origin of our Feria or Feriati, that is, holy, or sacred days; and in process of time the days of other weeks came to be distinguished by the same appellation, for the two following reasons: 1. Because every day ought to be holy in the estimation of a Christian. 2. Because all days are holy to ecclesiastics, whose whole time ought to be entirely devoted to religious worship. The term week is sometimes used to signify seven years, not only in the prophetic writings, but likewise by profane authors; thus Varro, in his book inscribed Hebdonades, informs us, that he had then entered the 12th week of his years.

18 Of months. The next division of time superior to weeks, is that of months. This appears to have been, if not coeval with the creation, at least in use before the flood. As this division is naturally pointed out by the revolution of the moon, the months of all nations were originally lunar; until after some considerable advances had been made in science, the revolutions of that luminary were compared with the sun, and thus the limits of the month fixed with greater accuracy. The division of the year into 12 months, as being founded on the number of full revolutions of the moon in that time, has also been very general; though Sir John Chardin informs us, that the Persians divided the year into 24 months; and the Mexicans into 18 months of 20 days each. The months generally contained 30 days, or 29 and 30 days alternately; though this rule was far from being without exception. The months of the Latins consisted of 16, 18, 22, or 30 days; and Romulus gave his people a year of 10 months and 304 days. The Kamichalades divide the year into 10 months; reckoning the time proper for labour to be nine months, and the winter feasts, when they are obliged to remain inactive, only as one month.

It has been a very ancient custom to give names to the different months of the year, though this appears to have been more modern than the departure of the Israelites out of Egypt, as they would otherwise undoubtedly have carried it with them; but for a considerable time after their settlement in Canaan, they distinguished the months only by the names of frist, second, &c. After their return from the Babylonish captivity, they adopted the names given to the months by the Chaldeans. Other nations adopted various names, and arranged the months themselves according to their fancy. From this last circumstance arises the variety in the dates of the months; for as the year has been reckoned from different signs in the ecliptic, neither the number nor the quantity of months have been the same, and their situation has likewise been altered by the intercalations necessary to be made.

These intercalations became necessary on account of the excess of the solar above the lunar year, and the months composed of intercalary days are likewise called embolismal. These embolismal months are either natural or civil. By the former, the solar and lunar years are adjusted to one another; and the latter arises from the defect of the civil year itself. The ador of the Jews, which always consists of 30 days, is an example of the natural embolismal month.

The Romans had a method of dividing their months into kalends, none, and ides. The first was derived from an old word calt, "to call"; because, at every new moon, one of the lower clafs of priests assembled the people, and called over, or announced, as many days as intervened between that and the nones, in order to notify the difference of times and the return of festivals. The 20, 2d, 4th, 5th, 6th, and 7th of March, July, and October, were the nones of those months; but in the other months were the 2d, 3d, 4th and 5th days only. Thus the 5th of January was its nones; the 4th was pride nonarum; the third, tertio nonarum, &c. The ides contained eight days in every month, and were nine days distant from the nones. Thus the 15th day of the four months already mentioned was the ides of them; but in the others the 15th was accounted as such; the 12th was pride iduum, and the 10th tertio iduum. The ides were succeeded by the kalends; the 14th of January, for instance, being the 19th kalend of February; the 15th was the 18th kalend; and so on till the 31st of January, which was pride kalendarium; and February 1st was the kalends.

Among the European nations the month is either astronomical or civil. The former are measured by the motion of the heavenly bodies; the civil consists of a certain number of days specified by the laws, or by the civil institutions of any nation or society. The astronomical months, being for the most part regulated by the motions of the sun and moon, are thus divided into solar and lunar, of which the former is sometimes also called civil. The astronomical solar month is the time
time which the sun takes in passing through a sign of the ecliptic. The lunar month is periodical, syno-
dical, sidereal, and civil. The sidereal lunar month is the time that passes between any conjunction of the moon with the sun and the conjunction following. It omits the motion of the moon during the same time; so that a mean lunar confluence consists of 29d. 12h. 4m. 2s. 921s. The sidereal lunar month is the time of the mean revolution of the moon with regard to the fixed stars. As the equinoctial points go backwards about 4° in the space of a lunar month, the moon must, in consequence of this retrocession, arrive at the equinox sooner than at any fixed star, and consequently the mean sidereal revolution must be longer than the mean periodical one. The latter consists of 27d. 7h. 43m. 95s. 6850. The civil lunar month is computed from the moon, to answer the ordinary purposes of life; and as it would have been inconvenient, in the computation of lunar months, to have reckoned odd parts of days, they have been composed of 30 days, or of 29 and 30 alternately, as the nearest round numbers. When the month is reckoned from the first appearance of the moon after her conjunction, it is called the month of illumination. The Arabs, Turks, and other nations, who use the era of the Hegira, follow this method of computation. As twelve lunar months, however, are 11 days less than a solar year, Julius Caesar ordained that the month should be reckoned from the course of the sun, and not of the moon; and that they should consist of 30 and 31 days alternately. February only excepted, which was to consist of 28 days commonly, and of 29 in leap-years. The highest natural division of time is into years. At first, however, it is probable that the course of the sun through the ecliptic would not be observed, but that all nations would measure their time by the revolutions of the moon. We are certain, at least, that the Egyptian year consisted originally of a single lunation; though at length it included two or three months, and was determined by the fixed returns of the feacions. As the eastern nations, however, particularly the Egyptians, Chaldeans, and Indians, applied themselves in very early periods to astronomy, they found, by comparing the motions of the sun and moon together, that one revolution of the former included nearly 12 of the latter. Hence a year of 12 lunations was formed, in every one of which were reckoned 30 days; and hence also the division of the ecliptic into 360 degrees. The lunisolar year, consisting of 360 days, was in use long before any regular intercalations were made; and historians inform us, that the year of all ancient nations was lunisolar. Herodotus relates, that the Egyptians first divided the year into 12 parts by the assistance of the stars, and that every part consisted of 30 days. The Thebans corrected this year by adding 5 intercalary days to it. The old Chaldean year was also reformed by the Medes and Persians; and of some of the Chinese missionaries we have informed us, that the lunisolar year was also corrected in China: and that the solar year was ascertained in that country to very considerable exactness. The Latin year, before Numa’s correction of it, consisted of 360 days, of which 304 were divided into ten months; to which were added two private months not mentioned in the calendar.

The imperfection of this method of computing time is now very evident. The lunisolar year was about 5 days shorter than the true solar year, and as much longer than the lunar. Hence the months could not long correspond with the seacons, and even in future time as 54 years, the winter months would have changed places with those of summer. From this rapid variation, Mr Playfair takes notice that a passage in Herodotus, by which the learned have been excessively puzzled, may receive a satisfactory solution, viz. that “in the time of the ancient Egyptian kings, the sun had twice arisen in the place where it had formerly set, and twice set where it had arisen.” By this he supposes it is meant, “that the beginning of the year had twice gone through all the signs of the ecliptic; and that the sun had risen and set twice in every day and month of the year.” This, which some have taken for a proof of most extravagant antiquity, he further observes, might have happened in 138 years only; as in that period there would be a difference of nearly two years between the solar and lunar year. Such evident imperfections could not but produce a reformation everywhere; and accordingly we find that there was no nation which did not adopt the method of adding a few intercalary days at certain intervals. We are ignorant, however, of the person who was the first inventor of this method. The Theban priests attributed the invention to Mercury or Thoth; and it is certain that they were acquainted with the year of 365 days at a very early period. The length of the solar year was represented by the celebrated golden circle of Osymandyas of 365 cubits circumference; and on every cubit of which was inscribed a day of the year, together with the heliacal risings and settings of the stars. The monarch is supposed to have reigned in the 11th or 13th century before the Christian era.

The Egyptian solar year being almost six hours greater than the true one, this inaccuracy, in process of time produced another revolution; for some circum-
stances attending which serve to fix the date of the dif-
certical cy-
covery of the length of the solar year, which from the above description of the golden circle, we may suppose to have been made during the reign of Osymandyas. The inundation of the Nile was annually announced by the heliacal rising of Sirius, to which the reformers of the calendar adjourned the beginning of the year, supposing that it would have remained immovable. In a number of years, however, it appeared that their suppositions in this were ill-founded. By reason of the inequality abovementioned, the heliacal risings of Sirius gradually advanced nearly at the rate of one day in four years; so that in 1461 years it completed a revolution, by arising on every succeeding day of the year, and returning to the point originally fixed for the beginning of the year. This period, equal to 1460 Julian years, was termed the great Egyptian year, or cir- cular cycle. From the accounts we have of the time that the circular cycle was renewed, the time of its original commencement may be gathered with to considerable certainty. This happened, according to Cen.

The accounts have of the time that the cicular cycle was renewed, the time of its original commencement may be gathered with certainty. This happened, according to Cen.
solfice, which happened on July 5th. The Egyptians used no intercalation till the time of Augustus, when the corrected Julian year was received at Alexandria by his order; but even this order was obeyed only by the Greeks and Romans who resided in that city, the superstitious natives refusing to make any addition to the length of a year which had been so long established among them.

We are not informed at what precise period the true year was observed to consist of nearly six hours more than the 365 days. Though the priests of Thebes claim the merit of the discovery, Herodotus makes no mention of it; neither did Thales, who introduced the year of 365 days into Greece, ever use any intercalation. Plato and Eudoxus are said to have obtained it as a secret from the Egyptians about 80 years after Herodotus, and to have carried it into Greece; which showed, that the knowledge of this form of the year was at that time recent, and only known to a few learned men.

The year of the ancient Jews was lunisolar; and we are informed by tradition, that Abraham preferred in his family, and transmitted to posterity, the Chaldean form of the year, consisting of 360 days; which remained the same without any correction until the date of the era of Nabonassar. The solar year was adopted among them after their return from the Babylonish captivity; but when subjected to the successors of Alexander in Syria, they were obliged to admit the lunar year into their calendar. In order to adjust this year to the course of the sun, they added a month to Adar, formerly mentioned, and called it Ve Adar. They composod also a cycle of 19 years, in seven of which they intercalated the intercalary month. This correction was intended to regulate the months in such a manner, as to bring the 15th of Nisan to the equinoctial point; and likewise the courses of the feasons and feasts in such a manner, that the corn might be ripe at the passover as the law required.

We shall not take up the reader's time with any further account of the years made use of by different nations, all of which are resolved at last into the lunisolar, it will be sufficient to mention the improvement made by the two great reformers of it, Julius Caesar, and Pope Gregory XIII. The institution of the Roman year by Romulus has been already taken notice of; but it is evident that Numa, on his advancement to the throne, undertook to reform it. With a deligh to make a complete lunar year of it, he added 50 days to the 304 of Romulus; and from every one of his months, which consisted of 31 and 30 days, he borrowed one day. Of these additional days he composed two months; calling the one January, and the other February. Various other corrections and adjustments were made; but when Julius Caesar obtained the sovereignty of Rome, he found that the months had considerably receded from the seasons to which Numa had adjusted them. To bring them forward to their places, he formed a year of 15 months, or 445 days; which, on account of its length, and the delay with which it was formed, has been called the year of confusion. It terminated on the first of January 45 B.C. and from this period the civil year and months were regulated by the course of the sun. The year of Numa being ten days shorter than the solar year, two months were added by Julius to every one of the months of January, August, and December; and, or to April, June, September, and November. He ordered likewise, that an intercalary day should be added every fourth year to the month of February, by reckoning the 24th day, or sixth of the kalends of March, twice over. Hence this year was styled bissextil, and also leap-year, from its leaping a day more than a common year.

The Julian year has been used by modern chronologists, as being a measure of time extremely simple and sufficiently accurate. It is still, however, somewhat imperfect; for as the true solar year consists of 365 5/6 days, it appears that in 131 years after the Julian correction, the sun must have arrived one day too soon at the equinoctial point. During Caesar's reign the vernal equinox had been observed by Soigne on the 25th of March; but by the time of the Nicene council it had gone backward to the 21st. The cause of the error was not then known; but in 1582, when the equinox happened on the 11th of March it was thought proper to give the calendar its last correction. Pope Gregory XIII having invited to Rome a considerable number of mathematicians and astronomers, employed ten years in the examination of their several formulae, and at last gave the preference to that of Alphio and Antoninus Lucius, who were brothers. Ten days were now cut off in the month of October, and the 4th of that month was reckoned the 15th. To prevent the feasons from receding in time to come, he ordained that one day should be added every fourth or bissextile year as before; and that the 1600th year of the Christian era, and every fourth century thereafter, should be a bissextile or leap year. One day therefore is to be intercalated in the years 2000, 2400, 2800, &c. but in the other centuries, as 1700, 1800, 1900, 2100, &c. it is to be suppressed, and there are to be reckoned as common years. Even this correction, however, is not absolutely exact; but the error must be very inconsiderable, and scarce amounting to a day and a half in 5000 years.

The commencement of the year has been determined by the date of some memorable event or occurrence, such as the creation of the world, the universal deluge, a conjunction of planets, the incarnation of our Saviour, &c. and of course has been referred to different points in the ecliptic. The Chaldeans and the Egyptian years were dated from the autumnal equinox. The ecclesiastical year of the Jews began in the spring; but in civil affairs, they retained the epoch of the Egyptian year. The ancient Chinese reckoned from the new moon nearest to the middle of Aquarius; but, according to some recent accounts, the beginning of their year was transferred (B.C. 1749) to the new moon nearest to the winter solstice. This likewise is the date of the Japanese year. Densifch, or Gemisch, king of Persea, observed, on the day of his public entry into Persepolis, that the sun entered into Aries. In commemoration of this fortunate event and coincidence, he ordained the beginning of the year to be removed from the autumnal to the vernal equinox. This epoch was denominated Neurex, viz. new-year, and is still celebrated with great pomp and festivity.
CHRONOLOGY.

(See Epochs). The ancient Swedish year commenced at the winter solstice, or rather at the time of the sun's appearance in the horizon, after an absence of about 40 days. The feast of this epoch was solemnized on the 20th day after the solstice. Some of the Greek states computed from the vernal, some from the autumnal equinox, and others from the former tropic. The year of Romulus commenced in March, and that of Numa in January. The Turks and Arabs date the year from the 16th of July and the American Indians reckon from the first appearance of the new moon of the vernal equinox. The church of Rome has fixed new-year's-day on the Sunday that corresponds with the full moon of the same feast. The Venetians, Florentines, and Pilans in Italy, and the inhabitants of Treves in Germany, begin the year at the vernal equinox. The ancient clergy reckoned from the 25th of March; and this method was observed in Britain, until the introduction of the new style (A.D. 1752), after which the year commenced on the 1st day of January.

Besides the natural divisions of time arising immediately from the revolutions of the heavenly bodies, there are others formed from some of the less obvious consequences of these revolutions, which are called cycles, from the Greek κύκλος, a circle. The most remarkable of these are the following:

1. The cycle of the sun is a revolution of 28 years, in which time the days of the months return again to the same days of the week; the sun's place to the same signs and degrees of the ecliptic on the same months and days, so as not to differ one degree in 100 years; and the leap-years begin the same course over again with respect to the days of the week on which the days of the months fall. The cycle of the moon, commonly called the golden number, is a revolution of 19 years; in which time the conjunctions, oppositions, and other aspects of the moon, are within an hour and a half of being the same as they were on the same days of the months 19 years before. The indiction is a revolution of 15 years, used only by the Romans for indicating the times of certain payments made by the subjects to the republic: It was established by Constantine, A.D. 312.

To find the year of any vulgar cycle.

The year of our Saviour's birth, according to the vulgar calendar, was the 9th of the solar cycle, and the 31st year after his birth was the first year of the Roman indiction. Therefore, to find the year of the solar cycle, add 9 to any given year of Christ, and divide the sum by 28, the quotient is the number of cycles elapsed since his birth, and the remainder is the cycle for the given year; if nothing remains, the cycle is 0. To find the lunar cycle, add one to the given year of Christ, and divide the sum by 19; the quotient is the number of cycles elapsed in the interval, and the remainder is the cycle for the given year: if nothing remains, the cycle is 19. Lastly, subtract 312 from the given year of Christ, and divide the remainder by 15; and what remains after this division is the indiction for the given year: if nothing remains, the indiction is 15.

Although the above deficiency in the lunar circle of an hour and an half every 19 years be but small, yet in time it becomes so sensible as to make a whole natural day in 310 years. So that, although this cycle be of use, when the golden numbers are rightly placed against the days of the months in the calendar, as in the Common Prayer Books, for finding the days of the mean conjunctions or oppositions of the sun and moon, and consequently the times of Easter: it will only serve for 310 years, old style. For as the new and full moons anticipate a day in that time, the golden numbers ought to be placed one day earlier in the calendar for the next 310 years to come. These numbers were rightly placed again the days of new moon in the calendar, by the council of Nice, A.D. 325; but the anticipation, which has been neglected ever since, is now grown almost into 5 days: And therefore all the golden numbers ought now to be placed five days higher in the calendar for the old stil than they were at the time of the said council; or 6 days lower for the new style, because at present it differs 11 days from the old.

In the first of the following tables the golden numbers to find the under the months stand against the days of new moon in golden number.

The cycle of Easter, also called the Dionysian period, Dionysian is a revolution of 522 years, found by multiplying the period, or solar cycle 28 by the lunar cycle 19. If the new moons of this cycle did not anticipate upon this cycle, Easter-day would al-
always be the Sunday next after the first full moon which follows the 21st of March. But, on account of the above anticipation, to which no proper regard was had before the late alteration of the style, the ecclesiastic Easter has several times been a week different from the true Easter within this last century; which inconvenience is now remedied by making the table, which is used to find Easter for ever, in the Common Prayer Book, of no longer use than the lunar difference from the new style will admit of.

The earliest Easter possible is the 22d of March, the latest the 25th of April. Within these limits are 35 days, and the number belonging to each of them is called the number of direction; because thereby the time of Easter is found for any given year.

The first seven letters of the alphabet are commonly placed in the annual almanacs, to shew on what days of the week the days of the months fall throughout the year. And because one of those seven letters must necessarily stand against Sunday, it is printed in a capital form, and called the dominoal letter; the other six being inserted in small characters, to denote the other six days of the week. Now, since a common Julian year contains 365 days, if this number be divided by 7 (the number of days in a week) there will remain one day. If there had been no remainder, it is plain the year would constantly begin on the same day of the week: but since one remains, it is plain, that the year must begin and end on the same day of the week; and therefore the next year will begin on the day following. Hence, when January begins on Sunday, A is the dominoal or Sunday letter for that year: then, because the next year begins on Monday, the Sunday will fall on the seventh day, to which is annexed the seventh letter G, which therefore will be the dominoal letter for all that year: and as the third year will begin on Tuesday, the Sunday will be on the sixth day: therefore F will be the Sunday letter for that year. Whence it is evident, that the Sunday letters will go annually in a retrograde order, thus, G, F, E, D, C, B, A. And, in the course of seven years, if they were all common ones, the same days of the week and dominoal letters would return to the same days of the months. But because there are 366 days in a leap-year, if this number be divided by 7, there will remain two days over and above the 52 weeks of which the year consists. And therefore, if the leap-year begins on Sunday, it will end on Monday; and the next year will begin on Tuesday, the first Sunday whereof must fall on the sixth of January, to which is annexed the letter F, and not G, as in common years. By this means, the leap-year: returning every fourth year, the order of the dominoal letter is interrupted; and the series cannot return to its first state till after four times seven, or 28 years; and then the same days of the months return in order to the same days of the week as before.

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**TABLE I.**
TABLE II.

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<th>TABLE, showing the Golden Number, (which is the same both in the Old and New Stile), from the Christian Era, to A.D. 4000.</th>
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| 0 1900 3800       | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 10 2000 3900      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 20 2100 4000      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 30 2200 &c.       | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 40 2300           | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 50 2400           | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 60 2500           | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 70 2600           | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 80 2700           | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 90 2800           | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 100 2900          | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 110 3000          | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 120 3100          | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| 130 3200          | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| 140 3300          | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
| 150 3400          | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
| 160 3500          | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| 170 3600          | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| 180 3700          | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| 190 3800          | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |

From the multiplication of the solar cycle of 28 years into the lunar cycle of 19 years, and the Roman indiction of 15 years, arises the great Julian period, consisting of 7980 years, which had its beginning 764 years before Strachio's supposed year of the creation (for no later could all the three cycles begin together), and it is not yet completed. And therefore it includes all other cycles, periods, and eras. There is but one year in the whole period that has the same numbers for the three cycles of which it is made up: And therefore, if historians had remarked in their writings the cycles of each year, there had been no dispute about the time of any action recorded by them.

The Dionysian or vulgar era of Christ's birth was about the end of the year 4713, and consequently the first year of his age, according to that account, was the 4714th year of the said period. Therefore, if to the current year of Christ we add 4713, the sum will be the year of the Julian period. So the year 1789 will be found to be the 6502d year of that period. Or, to find the year of the Julian period answering to any given year before the first year of Christ, subtract the number of that given year from 4471, and the remainder will be the year of the Julian period. Thus, the year 585 (before the first year of Christ) which was the 584th before his birth) was the 4129th year of the said period. Lastly, to find the cycles of the fun, moon, and indiction for any given year of this period, divide the given year by 28, 19, and 15; the three remainders will be the cycles sought, and the quotients the numbers of cycles run since the beginning of the period. So in the above 4714th year of the Julian period, the cycle of the fun was 10, the cycle of the moon 2, and the cycle of the indiction 4; the solar cycle having run through 168 courses, the lunar 248, and the indiction 314.

The vulgar era of Christ's birth was never settled till the year 527, when Dionysius Exiguus, a Roman Chrift's abbot, fixed it to the end of the 4713th year of the birth when Julian period, which was four years too late; for our settled. Saviour was born before the death of Herod, who sought to kill him as soon as he heard of his birth. And, according to the testimony of Josephus [B. xvii. ch. 8.), there was an eclipse of the moon in the time of Herod's last illnesses; which eclipse appears by our astronomical tables to have been in the year of the Julian period 4716, March 13th, at 3 hours past midnight, at Jerusalem. Now, as our Saviour must have been born some months before Herod's death, since in the interval he was carried into Egypt, the latest time in which we can fix the true era of his birth is about the end of the 4709th year of the Julian period.

As there are certain fixed points in the heavens from Eras or Em which astronomers begin their computations, so there posts are
are certain points of time from which historians begin to reckon; and these points or roots of time are called eras or epochs. The most remarkable eras are, those of the Creation, the Greek Olympiads, the building of Rome, the era or Nabonassar, the death of Alexander, the birth of Christ, the Arabian Hegira, and the Persian Jafetegird: All which, together with several others of less note, have their beginnings fixed by chronologers to the years of the Julian period, to the age of the world at those times, and to the years before and after the year of Christ's birth.

Having thus treated, as fully as our limits will admit, of the various divisions of time, we must now consider the second part of chronology, viz. that which more immediately relates to history, and which has already been observed to have the four following foundations: 1. Astronomical observations, particularly of eclipses. 2. The testimonials of credible authors. 3. Epochs in history universally allowed to be true. 4. Ancient medals, coins, monuments, and inscriptions. We shall consider these four principal parts in the order they here stand.

I. Of eclipses of the sun and moon.

It is with great reason that the eclipses of the sun and moon, and the aspects of the other planets, have been called public and celestial characters of the times, as their calculations afford chronologers infallible proofs of the precise epochs in which a great number of the most signal events in history have occurred. So that in chronological matters we cannot make any great progress, if we are ignorant of the use of astronomic tables, and the calculation of eclipses. The ancients regarded the latter as prognostics of the fall of empires, of the loss of battles, of the death of monarchs, &c. And it is to this superstition, to this wretched ignorance, that we happily owe the vast labour that historians have taken to record so great a number of them. The most able chronologers have collected them with still greater labour. Calvillus, for example, founds his chronology on 144 eclipses of the sun, and 127 of the moon, that he says he had calculated. The grand conjunction of the two superior planets, Saturn and Jupiter, which, according to Kepler, occurs once in 800 years in the same point of the zodiac, and which has happened only eight times since the creation (the last time in the month of December (1603)), may also furnish chronology with incontestable proofs. The same may be said of the transit of Venus over the sun, which has been observed in our days, and all the other uncommon positions of the planets. But among these celestial and natural characters of times, there are also some that are named civil or artificial, and which, nevertheless, depend on astronomic calculation.

Such are the solar and lunar cycles; the Roman indiction; the feast of Easter; the bimillenary year; the jubilees; the sabbatic years; the combats and Olympic games of the Greeks; and Hegira of the Mahometans, &c. And to these may be added the periods, eras, epochs, and years of different nations, ancient and modern. We shall only remark on this occasion, that the period or era of the Jews commenced with the creation of the world; that of the ancient Romans with the foundation of the city of Rome; that of the Greeks at the establishment of the Olympic games; that of Nebuchadnezzar, with the advancement of the first king of Babylon to the throne; the Yazdegerdian years, with the last king of the Persians of that name; the Hegira of the Turks with the flight of Mahomet from Mecca to Medina, &c. The year of the birth of Christ was the 4713th year of the Julian period, according to the common method of reckoning. Astronomical chronology teaches us to calculate the precise year of the Julian period in which each of these epochs happened.

II. The testimony of authors is the second principal of the second part of historic chronology. Though no man what- ever has a right to pretend to infallibility, or to authors being regarded as a sacred oracle, it would, however, be making a very unjust judgment of mankind, to treat them all as dupes or impostors; and it would be an injury offered to public integrity, were we to doubt the veracity of authors universally esteemed, and of facts that are in themselves right worthy of belief. It would be even a kind of infatuation to doubt that there have been such cities as Athens, Sparta, Rome, Carthage, &c. or that Xerxes reigned in Perlia, and Augustus in Rome; whether Hannibal ever was in Italy; or that the emperor Constantine built Constantinople, &c. The unanimous testimony of the most respectable historians will not admit any doubt of these matters. When an historian is allowed to be completely able to judge of an event, and to have no intention of deceiving by his relation, his testimony is irre- cusable. But to avoid the danger of adopting error for truth, and to be satisfied of a fact that appears doubtful in history, we may make use of the four following rules, as they are founded in reason.

1. We ought to pay a particular regard to the testimonies of those who wrote at the same time the events happened, and that have not been contradicted by any contemporary author of known authority. Who can doubt, for example, of the truth of the facts related by admiral Ancon, in the history of his voyage round the world? The admiral saw all the facts there mentioned with his own eyes, and published his book when two hundred companions of his voyage were still living in London, and could have contradicted him immediately, if he had given any false or exaggerated relations.

2. After the contemporary authors, we should give more credit to those who lived near the time the events happened, than those who lived at a distance.

3. Those doubtful histories, which are related by authors that are but little known, can have no weight if they are at variance with reason, or established tradition.

4. We must distrust the truth of a history that is related by modern authors, when they do not agree among themselves in several circumstances, nor with ancient historians, who are to be regarded as original sources. We should especially doubt the truth of those brilliant portraits, that are drawn at pleasure by such as never knew the persons they are intended for, and even made several centuries after their decease.

The most pure and most fruitful source of ancient history
history is doubtless to be found in the Holy Bible. Let
us here for a moment cease to regard it as divine, and
let us presume to consider it as a common history.
Now, when we regard the writers of the books of the
Old Testament, and consider them sometimes as au-
thors, sometimes as ocular witnesses, and sometimes
as respectable historians; whether we reflect on the
simplicity of the narration, and the air of truth that
is there constantly visible; or, when we consider the
care that the people, the governments, and the
learned men of all ages, have taken to preserve the
true text of the Bible; or that we have regard to the
happy conformity of the chronology of the holy scrip-
tures with that of profane history: or, if we observe
the admirable harmony that is between these books
and the most respectable historians, as Josephus and
others: and lastly, when we consider that the books
of the holy scripture furnish us alone with an accurate
history of the world from the creation, through the
line of patriarchs, kings, judges, and princes of the
Hebrews; and that we may, by its aid, form an al-
most entire series of events down to the birth of
Christ, or the time of Augustus, which comprehends a
space of about 4000 years, some small interruptions
excepted, and which are easily supplied by profane
history: when all these reflections are justly made, we
must constantly allow that the scriptures form a
book which merits the first rank among all the
sources of ancient history. It has been objected, that
this book contains contradictions; but the most able
interpreters have reconciled these seeming contra-
dictions. It has been said, that the chronology of the
Hebrew text and the Vulgate do not agree with the
chronology of the version of the Septuagint; but the
soundest critics have shown that they may be made to
agree. It has been observed, moreover, that the
scriptures abound with miracles and prodigies; but
they are miracles that have really happened: and
what ancient history is there that is not filled with
miracles, and other marvellous events? And do we for
that reject their authority? Cannot the true God be
supposed to have performed those miracles which
Pagan historians have attributed to their false divini-
ties? Must we pay no regard to the writings of
Livy, because his history contains many fabulous re-
lations?

III.

The epochs form the third principal part ofchrono-
ology. These are those fixed points in history that
have never been contested, and of which there can,
in fact, be no doubt. Chronologers fix on the events
that are to serve as epochs, in a manner quite arbi-
trary; but this is of little consequence, provided the
dates of these epochs agree, and that there is no con-
tradiction in the facts themselves. When we come
to treat expressly on history, we shall mention, in our
progress, all the principal epochs.

IV.

Medals, &c. Medals, monuments, and inscriptions, form the
fourth and last principal part of chronology. It is
scarce more than 130 years since close application has
been made to the study of these; and we owe to the
celebrated Spanheim the greatest obligations, for the
progress that is made in this method: his excel-
 lent work, De praecellentia et usu nummorum anti-
guorum, has shown the great advantages of it; and
it is evident that these monuments are the most au-
thentic witnesses that can be produced. It is by the
aid of medals that M. Vailant has composed his judi-
cious history of the kings of Syria, from the time of
Alexander the Great to that of Pompey: they have
been, moreover, of the greatest service in elucidating
all ancient history, especially that of the Romans; and
even sometimes that of the middle age. Their use is
more fully spoken of in the article Medals. What we
here lay of medals, is to be understood equally, in
its full force, of ancient inscriptions, and of all other
authentic monuments that have come down to us.

Every reader, endowed with a just discernment
will readily allow that these four parts of chronology
afford clear lights, and are excellent guides to con-
duct us through the thick darkness of antiquity. That
impartiality, however, which directs us to give a
faithful relation of that which is true and false, of the
certainty and uncertainty of all the sciences, obliges
us here freely to confess, that these guides are not in-
falible, nor the proofs that they afford mathematical
demonstrations. In fact, with regard to history in
general, and ancient history in particular, something
must be always left to conjecture and historic faith.
It would be an offence against common probity, were
we to suffer ourselves to pass over in silence those
objections which authors of the greatest reputation
have made against the certainty of chronology. We
shall extract them from their own works; and we
hope that their is no magistrate, theologian, or pub-
lie professor in Europe, who would be mean enough
to accuse us of a crime, for not unworthily discovering
the truth.

1. The prodigious difference there is between the
Septuagint Bible and the Vulgate, in point of chronol-
ogy, occasions an embarrassment, which is the more
difficult to avoid as we cannot positively say on which
side the error lies. The Greek Bible counts, for ex-
ample, from the creation of the world to the birth of
Abraham, 1500 years more than the Hebrew and La-
tin Bibles, &c. 2. How difficult is it to ascertain the
years of the judges of the Jewish nation, in the Bible?
What darkness is spread over the succession of the
kings of Judah and Israel? The calculation of time is
therefore inaccurate, that the scripture never marks if
they are current or complete years. For we cannot
suppose that a patriarch, judge, or king, lived ex-
actly 40, 90, 100, or 969 years, without any odd
months or days. 3. The different names that the
Assyrians, Egyptians, Persians and Greeks, have
given to the same prince, have contributed not a little
to embarrass all ancient chronology. Three or four
princes have borne the name of Assuerus, though they
had also other names. If we did not know that Na-
bucodonosor, Nabucodrofor, and Nabucolassar, were
the same name, or the name of the same man, we
should scarcely believe it. Sargon is Senacherib;
Ozias is Azarias; Sedecias is Mathanias; Joschas is
also called Selium; Astaraddon, which is pronounced
indifferently Estabarond and Asarhaddon, is called
Afenaphar by the Cuthians; and by an oddity of which
we do not know the origin, Sardanapalus is called
by
CHRONOLOGY.

4008 The creation of the world, and Adam and Eve. 4007 The birth of Cain, the first who was born of a woman.

3017 Enoch, for his piety, is translated to heaven.
3527 The old world is destroyed by a deluge which continued 377 days.
2247 The tower of Babel is built about this time by Noah's posterity; upon which God miraculously confounds their language, and thus disperses them into different nations.
2237 About this time, Noah is, with great probability, supposed to have parted from his rebellious offspring, and to have led a colony of some of the more tractable into the east, and there either he, or one of his successors, gave birth to the ancient Chinese monarchy.
2234 The celestial observations are begun at Babylon, the city which first gave birth to learning and the sciences.

1985 The covenant of God made with Abraham, when he leaves Haran to go into Canaan, which begin, the 430 years of sojourning.
1961 The cities of Sodom and Gomorrah are destroyed for their wickedness by fire from heaven.
1836 The kingdom of Argos, in Greece, begins under Inachus.
1822 Memnon, the Egyptian, invents the letters.
1715 Prometheus first strikes fire from flints.
1635 Joseph dies in Egypt.
1574 Aaron born in Egypt; 1490, appointed by God first high-priest of the Israelites.
1556 Mofes, brother to Aaron, born in Egypt, and adopted by Pharaoh's daughter, who educates him in all the learning of the Egyptians.
1556 Cecrops brings a colony of Saites from Egypt into Attica, and begins the kingdom of Athens in Greece.
1555 Mofes performs a number of miracles in Egypt; and departs from that kingdom, together with 600,000 Israelites, besides children, which completed the 430 years of sojourning. They miraculously pass through the Red Sea, and come to the desert of Sinai, where Mofes receives from God, and delivers to the people, the Ten Commandments, and the other laws, and sets up the tabernacle, and in it the ark of the covenant.

1546 Scamander comes from Crete into Phrygia, and begins the kingdom of Troy.
1515 The Israelites, after sojourning in the wilderness forty years, are led under Joshua into the land of Canaan, where they fix themselves, after having subdued the natives; and the period of the sabbatical year commences.
1503 The deluge of Deucalion.
1496 The council of Amphitheatrons established at Thermopylae.
1493 Cadmus carried the Phoenician letters into Greece and built the citadel of Thebes.
1490 Sparta built by Lacedemou.
Before Christ.

1485 The first slav that appeared in Greece was brought from Egypt by Danaus, who arrived at Rhodes, and brought with him his fifty daughters.
1480 Troy built by Dardanus.
1432 The Pentateuch, or five first books of Moses, are written in the land of Moab, where he died the year following, aged 110.
1406 Iron is found in Greece, from the accidental burning of the woods.
1344 The kingdom of Mycenae begins.
1326 The Ithmian games instituted at Corinth.
1325 The Egyptian eanecular year began July 2oth.
1307 The Olympic games instituted by Pelops.
1300 The Lupercalia instituted.
1294 The first colony came from Italy into Sicily.
1264 The second colony came from Italy into Sicily.
1252 The city of Tyrre built.
1243 A colony of Arcadians conducted by Evander into Italy.
1223 Carthage founded by the Tyrians.
1225 The Argonautic expedition.
1204 The rape of Helen by Paris, which gave rise to the Trojan war, ending with the destruction of the city in 1184.
1176 Salamis in Cyprus built by Teucer.
1152 Acanthis builds Alba Longa.
1150 The kingdom of Sicyon ended.
1124 Thebes built by the Boeotians.
1115 The mariner's compass known in China.
1104 The expedition of the Heraclidae into Peloponnesus; the migration of the Dorians thither; and the end of the kingdom of Mycenae.
1102 The kingdom of Sparta commenced.
1070 The kingdom of Athens ended.
1051 David besieged and took Jerusalem.
1044 Migration of the Ionian colonies.
1008 The Temple is solemnly dedicated by Solomon.
996 Solomon prepared a fleet on the Red Sea to send to Ophir.
986 Sames and Utica in Africa built.
979 The kingdom of Israël divided.
974 Jerusalem taken and plundered by Shishak king of Egypt.
901 The prophet Elijah flourished.
894 Money first made of gold and silver at Argos.
884 Olympic games restored by Iphitus and Lycurgus.
873 The art of sculpture in marble found out.
869 Scales and measures invented by Phidon.
864 The city of Carthage, in Africa, enlarged by queen Dido.
821 Nineveh taken by Arbaces.
814 The kingdom of Macedon begins.
801 The city of Capua in Campania built.
799 The kingdom of Lydia began.
786 The ships called Triremes invented by the Corinthians.
779 The race of kings in Corinth ended.
776 The era of the Olympiads began.
760 The Ephori established at Sparta.
758 Syracuse built by Archias of Corinth.
754 The government of Athens changed.
753 Era of the building of Rome in Italy by Romulus, first king of the Romans.
747 The era of Nabonassar commenced on the 26th of February, the first day of Thoth.
746 The government of Corinth changed into a republic.
743 The first war between the Messenians and Spartans.
724 Mycenae reduced by the Spartans.
723 A colony of the Messenians settled at Rhegium in Italy.
720 Samaria taken, after three years siege, and the kingdom of Israel finished by Salmanaser king of Assyria, who carries the ten tribes into captivity.
The first eclipse of the moon on record.
713 Gela in Sicily built.
703 Corycya, now Corfu, founder of the Corinthians.
702 Ecbatana in Media built by Doloes.
685 The second Messenian war under Aristomenes.
670 Byzantium (now Constantinople) built by a colony of Athenians.
666 The city of Alba destroyed.
648 Cyrene in Africa founded.
634 Cyaxares besieges Nineveh, but is obliged to raise the siege by an incursion of the Scythians, who remained masters of Asia for 28 years.
624 Draco published his inhuman laws at Athens.
610 Pharaoh Necho attempted to make a canal from the Nile to the Red Sea, but was not able to accomplish it.
607 By order of the same monarch, some Phenicians failed from the Red Sea round Africa, and returned by the Mediterranean.
606 The first captivity of the Jews by Nebuchadnezzar. Nineveh destroyed by Cyaxares.
600 Thales, of Miletus, travels into Egypt, consults the priests of Memphis, acquires the knowledge of geometry, astronomy, and philosophy; returns to Greece, calculates eclipses, gives general notions of the universe, and maintains that an only Supreme Intelligence regulates all its motions.
Maps, globes, and the signs of the zodiac, invented by Anaximander, the scholar of Thales.
598 Jehoiakin, king of Judah, is carried away captive, by Nebuchadnezzar, to Babylon.
594 Solon made Archon at Athens.
591 The Pythian games instituted in Greece, and tragedy first acted.
588 The first irruption of the Gauls into Italy.
586 The city of Jerusalem taken, after 1 siege of 16 months.
582 The last captivity of the Jews by Nebuchadnezzar.
581 The Ithmian games restored.
580 Money first coined at Rome.
571 Tyre taken by Nebuchadnezzar after a siege of 13 years.
566 The first census at Rome, when the number of citizens was found to be 84,000.
562 The first comedy at Athens acted upon a movable scaffold.
559 Tyrus the first king of Persia.
538 The kingdom of Babylon finished; that city being.
CHRONOLOGY.

151 The foundation of the temple laid by the Jews.
152 Learning is greatly encouraged at Athens, and a public library first founded.
153 The second edict to rebuild Jerusalem.
154 The second temple at Jerusalem is finished under Darius.
155 Hippasus bani Tlshed from Athens.
156 Tarquin, the seventh and last king of the Romans, is expelled, and Rome is governed by two consuls, and other republican magistrates, till the battle of Tarpeian, being a space of 461 years.
157 The first alliance between the Romans and Carthaginians.
158 The second census at Rome, 130,000 citizens.
159 Sardis taken and burnt by the Athenians, which gave occasion to the Persian invasion of Greece.
160 The first dictator appointed at Rome.
161 The Saranahiis instituted at Rome.
162 The number of citizens 150,700.
163 Tribunes created at Rome; or, in 488.
164 The battle of Marathon, September 29th.
165 Epicurus, the Greek poet, first gains the prize of tragedy.
166 Phœbus created at Rome.
167 Xerxes, king of Persia, begins his expedition against Greece.
168 The defence of Thermopylae by Leonidas, and the sea-fight at Salamis.
169 The number of Roman citizens reduced to 103,000.
170 The third Meffianian war.
171 The number of Roman citizens increased to 124,214.
172 Ezra is sent from Babylon to Jerusalem, with the captivity of the Jews and the vessels of gold and silver, &c. being seventy weeks of years, or 490 years before the crucifixion of our Saviour.
173 The battle of Marathon, September 29th.
174 The Ludi Seculares first celebrated at Rome.
175 The Romans send to Athens for Solon's laws.
176 The Decemvirs created at Rome, and the laws of the twelve tables compiled and ratified.
177 The Decemvirs bani Tlshed.
178 Military tribunes, with consul power, created at Rome.
179 Centors created at Rome.
180 The battering Ram invented by Artemon.
181 The Metonic cycle began July 15th.
182 The Peloponnesian war began, and lasted 27 years.
183 The history of the Old Testament finishes about this time.
184 A plague over the known world.
185 Malachi the last of the prophets.
186 The Athenians entirely defeated by Lyfander, which occasions the loss of the city, and ruin of the Athenian power.
187 The retreat of the 10,000 Greeks under Xe nophon. The 30 tyrants expelled from Athens, and democratic government reformed.
188 Socrates, the founder, of moral philosophy among the Greeks, believes the immortality of the soul, a state of rewards and punishments; for

which, and other sublime doctrines, he is put to death by the Athenians, who soon after repent, and erect to his memory a statue of brass.
189 The feast of Leësternian instituted. CatapalTae invented by Dionysius.
190 The Corinthian war begun.
191 Rome burnt by the Gauls.
192 The peace of Antalcidas between the Greeks and Persians.
193 The number of Roman citizens amounted to 158,583.
194 Dionysius begins the Punic war.
195 The Boetian war commences.
196 A general conspiracy of the Greek states against the Lacedemonians.
197 A great earthquake in Peloponnesus.
198 The Lacedemonians defeated by Epaminondas at Leuctra.
199 Prætors established in Rome. The Licinian law passed.
200 Epaminondas killed at the battle of Mantinea.
201 The obliquity of the ecliptic observed to be 33° 49' 10".
202 The Social war began.
203 Dionysius expelled from Syracuse.
204 A trinit of the moon over Mars observed.
205 The sacred war begun in Greece.
206 Birth of Alexander the Great.
207 Dionysius II. expelled from Syracuse.
208 Commencement of the Syracusian era.
209 Philip of Macedon gains the battle of Chaeronea, and thus attains to the Sovereignty of Greece.
210 Thebes taken and raged by Alexander the Great.
211 The Persians defeated at Granicus, May 22nd.
212 They are again defeated at Ifus in Cilicia, October.
213 Alexander takes Tyre and marches to Jerusalem.
214 Alexandria built.
215 Darius entirely defeated at Arbela.
216 Alexander takes Babylon, and the principal cities of the Persian Empire.
217 The Calippic period commences.
218 Alexander passes Mount Caucasus, and marches into India.
219 He defeats Porus, an Indian prince, and founds several cities.
220 The famous fedition of Corecyra.
221 His family exterminated, and his dominions part to his oícers.
222 Alexander the Great dies at Babylon.
223 Rhodes almost destroyed by an inundation.
224 The Appian way, aqueducts, &c. constructed at Rome.
225 The cities of Greece recovered their liberties for a short time.
226 Antioch, Seleucia, Laodicea, and other cities, founded by Seleucus.
227 Antigonus defeated and killed at Ipus.
228 The first barbers came from Iphus.
229 The number of effective men in Rome amounts to 270,000.
230 The first sun-dial erected at Rome by Papirins.
CHRONOLOGY.

191 Antiochus defeated by the Romans at Thermopylae.

190 The first Roman army enters Asia, and from the spoils of Antiochus brings the Asiatic luxury first to Rome.

188 The Spartans obliged to renounce the institutions of Lycurges.

179 A census at Rome. The number of citizens 273,244.

173 The Jewish high-priesthood fold by Antiochus Epiphanes.

170 Paper invented in China.

169 A census at Rome. The number of citizens 212,805.

168 Macedon reduced to the form of a Roman province.

167 The first library erected at Rome.

165 A census at Rome. The number of citizens 237,897.

164 A census at Rome. The number of citizens 237,024.

162 Hipparchus began his astronomical observations at Rhodes.

161 Philosophers and rhetoricians banished from Rome.

150 The third Punic war commenced.

146 Corinth destroyed.

Carthage, the rival to Rome, is raised to the ground by the Romans.

A remarkable comet appeared in Greece.

143 Hipparchus began his new cycle of the moon, consisting of 111,035 days.

141 The Numantine war commenced.

135 The history of the Apocrypha ends.

133 Numantia destroyed by Scipio.

124 A census at Rome. The number of citizens 290,736.

105 The Cimbri and Tuetones defeated the Romans.

102 The Tuentones and Ambrones defeated by Marius.

88 Rome besieged by the chiefs of the Marian faction.

82 Sylla created perpetual dictator at Rome.

69 A census at Rome. The number of citizens 450,000.

67 Catiline’s conspiracy.

55 Julius Cæsar makes his first expedition into Britain.

Craulis defeated and killed by the Parthians.

51 Gaul reduced to a Roman province.

50 A census at Rome. The number of citizens 230,000.

48 The battle of Pharsalia, between Cæsar and Pompey, in which the latter is defeated.

The Alexandrian library, consisting of 400,000 valuable books, burnt by accident.

45 The war of Africa, in which Cato kills himself.

The solar year introduced by Cæsar.

44 Cæsar, the greatest of the Roman conquerors, after having fought fifty pitched battles, and slain 1,192,000 men, is killed in the senate-house by conspirators.

42 The republicans defeated at Philippi.

31 The battle of Actium fought, in which Mark Antony...
CHRONOLOGY.

Before

Christ.

Anthony and Cleopatra are totally defeated by
Octavius, nephew to Julius Cæsar.
30 Alexandria, in Egypt, is taken by Octavius, upon
which Anthony and Cleopatra put themselves
to death, and Egypt is reduced to a Roman
province.
29 A census at Rome. The number of citizens
4,101,017.
27 Octavius, by a decree of the senate, obtains the
title of Augustus Cæsar, and an absolute ex-
emption from the laws, and is properly the
first Roman emperor.
The pantheon at Rome built.
19 Rome at the height of its glory.
The temple of Jerusalem rebuilt by Herod.
Agrippa contracted the magnificent aqueducts
at Rome.
8 A census at Rome. The number of citizens
4,233,000.
5 The temple of Janus is shut by Augustus, as an
emblem of universal peace, and
JESUS CHRIST is born, on Monday, December
25.
1 The Vulgar Christian era commenced from Ja-
uary, the Saviour of the world being then
five years of age.
8 Jesus Christ disputes with the doctors in the
temple.
14 A census at Rome, 4,037,000 citizens.
16 Mathematicians and magicians expelled from
Rome.
17 Twelve cities in Asia destroyed by an earth-
quake.
27 Pilate made governor of Judea.
29 Jesus baptized in Jordan by John.
33 He is crucified at Jerusalem.
35 St Paul converted.
39 St Matthew writes his Gospel.
Pontius Pilate kills himself.
A conjunction of Saturn, Jupiter, and Mars.
40 The name of Christians first given at Antioch
by the followers of Christ.
43 Claudius Cæsar’s expedition into Britain.
44 St Mark writes his Gospel.
45 London is founded by the Romans: 368, sur-
rrounded by ditches with a wall, some parts of
which are still observable.
51 Caractacus, the British king, is carried in chains
to Rome.
53 The council of the Apostles at Jerusalem.
55 St Luke writes his Gospel.
56 Rotterdam built.
59 The emperor Nero puts his Mother and brothers
to death.
———Persecutes the Druids in Britain.
60 Christianity introduced into Britain.
61 Boadicea, the British queen, defeats the Romans;
but is conquered soon after by Suetonius, go-
gernor of Britain.
62 St Paul is sent in bonds to Rome—writes his
epistles between 51 and 66.
A great earthquake in Asia.
64 Rome set on fire, and burned for six days; upon
which began (under Nero) the first persecu-
tion against the Christians.
65 Many prodigies occur about Jerusalem.
66 St Peter and St Paul put to death.
70 While the furious Jews are destroying one an-
other with mutual fury, Titus, the Roman ge-
neral, takes Jerusalem, which is raised to the
ground, and the plough made to pass over it.
73 The philosophers banished from Rome by Ver-
pal.
79 The cities of Pompeii and Herculaneum de-
stroyed by an eruption of Vesuvius.
80 The Capitol and Pantheon at Rome destroyed
by fire.
83 The philosophers expelled Rome by Domitian.
85 Julius Agricola, governor of South-Britain, to
protect the civilized Britons from the incurs-
ions of the Caledonians, builds a line of forts
between the rivers Forth and Clyde; defeats
the Caledonians under Galgacus on the Gram-
pian hills; and first falls round Britain, which
he discovers to be an island.
86 The Capitoline games instituted by Domitian.
88 The secular games celebrated at Rome.
93 The empire of the Huns in Tartary destroyed
by the Chinese.
96 St John the Evangelist wrote his Revelation—
his Gospel in 97.
103 Dacia reduced to a Roman province.
105 A great earthquake in Asia and Greece.
107 The third persecution of the Christians under
Trajan.
114 Armenia reduced to a Roman province.
An earthquake in China.
115 Assyria subdued by Trajan.
An insurrection of the Jews, who murder
200,000 Greeks and Romans.
A violent earthquake at Antioch.
120 Nicomedia and other cities swallowed up by an
earthquake.
121 The Caledonians reconquer from the Romans all
the southern parts of Scotland; upon which
the emperor Adrian builds a wall between
Newcastle and Carlisle; but this also proving
ineffectual, Pollius Urbicus, the Roman ge-
neral, about the year 134, repairs Agricola’s forts,
which he joins by a wall four yards thick.
130 Jerusalem rebuilt by Adrian.
132 The second Jewish war commenced.
135 The second Jewish war ends, when they were all
banished Jews.
139 Justin writes his first apology for the Christians.
141 A number of heresies appear about this time.
146 The worship of Serapis introduced at Rome.
152 The emperor Antoninus Pius drops the persecu-
tion against the Christians.
An inundation of the Tyber, and an earth-
quake at Rhodes.
163 The fourth persecution of the Christians, under
Marcus Aurelius Antoninus.
166 The Romans sent Ambassadors to China.
CHRONOLOGY.

168 A plague over the known world.
169 The Capitol at Rome destroyed by lightning.
170 A great part of Rome destroyed by fire.
173 The fifth persecution of the Christians, under Severus.
205 An earthquake in Wales.
206 Severus’s wall in Britain built.
218 Two comets appeared at Rome. The course of the most remarkable from east to west.
222 About this time the Roman empire begins to decline. The Barbarians begin their irruptions, and the Goths have annual tribute not to molest the empire.
225 Mathematicians allowed to teach publicly at Rome.
236 The sixth persecution of the Christians, under Maximin.
241 The Franks first mentioned in history.
250 The seventh persecution, under Decius.
252 A dreadful persecution broke out in Ethiopia, and spread over the world.
253 Europe ravaged by the Scythians and Goths.
258 The ninth persecution, under Valerian.
260 Valerian is taken prisoner by Sapor, king of Persia, and fed alive.
263 The Scythians ravaged the Roman empire.
264 The eighth persecution of the Christians.
267 The temple of Diana at Ephesius burnt.
268 A great plague throughout the Roman empire.
269 Earthquakes in Europe, Asia, and Africa, and three days of darkness.
270 The Romans took Palmyra.
274 Silk first brought from India; the manufactory of it introduced into Europe by some monks, first worn by the clergy in England, 1534.
276 Wines first made in Britain.
277 The Franks settled in Gaul.
284 The Diocletian era commenced August 29th, or September 17th.
287 Carausius proclaimed emperor of Britain.
289 A great comet visible in Mesopotamia for 29 days.
291 Two emperors and two Caesars march to defend the four quarters of the empire.
297 Alexandria destroyed by Diocletian.
303 The tenth persecution, under Diocletian.
306 Constantine the Great begins his reign.
308 Cardinals first began.
312 Peftilence all over the East.
313 Cycle of induction began.
314 The tenth persecution ends by an edict of Constantine, who favours the Christians, and gives full liberty to their religion.
315 Three bishops, or fathers, are sent from Britain to affit at the council of Arles.
315 Crucifixion abolished.
321 Observation of Sunday enjoined.
323 The first general council at Nice, when 318 fathers attended, against Arius, the founder of Arianism, where was composed the famous Nicene Creed, which we attribute to them.
329 Constantine removes the seat of empire from Rome to Byzantium, which is thereafter called Constantinople.
CHRONOLOGY.

452 The city of Venice founded.
455 The Saxons having expelled the Scots and Picts, invite over more of their countrymen, and begin to establish themselves in Kent, under Hengist.

476 The western empire is finished, 533 years after the battle of Pharsalia; upon the ruins of which several new states arise in Italy and other parts, consisting of Goths, Vandals, Huns, and other barbarians, under whom literature is extinguished, and the works of the learned are destroyed.

480 A great earthquake at Constantinople, which lasted 40 days.

506 The Jewish tumult published.

508 Prince Athar begins his reign over the Britons.

516 A bearded comit appears.

517 Five years drought and famine in Palestine.

519 A bearded comit appears.

529 The codex of Jullianus, the eastern emperor, is published.

534 The kingdom of the Vandals in Africa comes to an end, after having continued 105 years.

536 The manufacture of silk introduced at Constantinople by two Indian monks.

540 Antioch destroyed by the Persians.

541 Basilus the last comit elected at Rome.

542 Antioch rebuilt.

543 An earthquake all over the world.

550 An earthquake in Palestine and Syria. The kingdom of Poland founded.

551 An earthquake in Greece, attended with a great commotion in the sea.

573 The empire of the Goths in Italy destroyed by Narces. A great earthquake at Constantinople.

574 Another violent earthquake at Constantinople, Rome, &c. A terrible plague all over Europe, Asia, and Africa, which continues near fifty years.

608 The Lombards founded a kingdom in Italy.

619 The Turks first mentioned in history. The exarchate of Ravenna begins.

654 The first monarchy founded in Bavaria.

650 Antioch destroyed by an earthquake.

651 Latin ceased to be spoken about this time in Italy.

654 The origin of rebs in France.

658 The city of Paris destroyed by fire.

660 Rome overflowed by the Tiber.

668 The Goths established themselves in the country called by their name.

666 Justinian of Constantinople assumes the title of universal bishop.

673 Augustin the monk comes into England with forty monks.

599 A dreadful pestilence in Africa.

604 St. Paul's church in London founded.

605 The use of bells introduced into churches.

606 Here begins the power of the popes, by the concessions of Ptolemaeus, emperor of the East.

612 Mahomet, the false prophet, flies from Mecca to Medina, in Arabia, in the 444th year of his age, and sets up his ministry, when he laid the foundation of the Saracenic empire, and from whom the Mahometans princes to this day claim their descent. His followers compute their time from this era, which in Arabic is called hégira, i.e. "the Flight."

628 An academy founded at Canterbury.

632 The era of Edessæus commenced June 16th.

637 Jerusalem is taken by the Saracens or followers of Mahomet.

641 Alexandria in Egypt is taken by the Saracens, and the grand library there burnt by order of Omar their caliph or prince.

642 The temple of Jerusalem converted into a Mahometan mosque.

653 The Saracens now extend their conquests on every side, and retaliate the barbarities of the Goths and Vandals upon their posterity. They take Rhodes, and destroy the famous Colossus.

669 England invaded by the Danes.

670 Organs first used in churches.

673 Glaucin a bishop, and brought into England by a Benedictine monk.

676 Sicily invaded, and Syracuse destroyed by the Saracens.

682 Italy reduced by Theodoric king of the Goths.

692 Pope's temporal union.

700 The Britons, after a brave struggle of near 150 years, are totally expelled by the Saxons, and driven into Wales and Cornwall.

702 The Saracens take Carthage, and expel the Romans from Africa.

702 Cracow built, and the first prince of Poland elected.

704 The first province given to the Pope.

713 The Saracens conquer Spain.

715 France governed by Charles Martel.

718 The kindom of the Asturias in Spain founded by Pelagio.

719 Christianity promulgated in Germany.

726 The controversy about images begins, and occasions many irreconcileble in the eastern empire.

727 Tax of Peter's pence begun by Ina king of Wessex.

732 Charles Martel defeats the Saracens near Tours.

735 Institution of the office of Pope's Nuncio.

746 Three years pestilence in Europe and Asia.

748 The computing of years from the birth of Christ began to be used in history.

749 The race of Abbas become caliphs of the Saracens, and encourage learning.

752 The empire of the Saracens divided into three.

755 Commencement of the Pope's temporal dominion.

762 The city of Bagdad upon the Tigris, is made the capital for the caliphs of the house of Abbas.
### CHRONOLOGY

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>937</td>
<td>The Saracen empire is divided by usurpation into seven kingdoms.</td>
</tr>
<tr>
<td>941</td>
<td>Arithmetic brought into Europe.</td>
</tr>
<tr>
<td>961</td>
<td>Candida recovered from the Saracens.</td>
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<tr>
<td>967</td>
<td>Antioch recovered from the Saracens.</td>
</tr>
<tr>
<td>969</td>
<td>The race of Abbas extirpated in Egypt.</td>
</tr>
<tr>
<td>975</td>
<td>Pope Boniface VII. is deposed and banished for his crimes.</td>
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<tr>
<td>977</td>
<td>Greece, Macedon, and Thrace, ravaged by the Bulgarians for ten years.</td>
</tr>
<tr>
<td>1002</td>
<td>The emperor Henry assumed the title of king of the Romans.</td>
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<tr>
<td>1005</td>
<td>All the old churches are rebuilt about this time in a new manner of architecture.</td>
</tr>
<tr>
<td>1006</td>
<td>A plague in Europe for three years.</td>
</tr>
<tr>
<td>1007</td>
<td>A great eruption of Vefuvius.</td>
</tr>
<tr>
<td>1008</td>
<td>The obliquity of the ecliptic observed by Albatrunis to be 23° 35'.</td>
</tr>
<tr>
<td>1014</td>
<td>Sueño the Dane becomes master of England.</td>
</tr>
<tr>
<td>1015</td>
<td>Children forbidden by law to be sold by their parents in England.</td>
</tr>
<tr>
<td>1017</td>
<td>Rain of the colour of blood for three days in Aquitain.</td>
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<tr>
<td>1035</td>
<td>Togrel-Beg, or Tangrolipix, the Turkifh emperor Henry began to reign.</td>
</tr>
<tr>
<td>1040</td>
<td>The Danes, after several engagements with various succeds, are about this time driven out of Scotland, and never again return in a hostile manner.</td>
</tr>
<tr>
<td>1041</td>
<td>Smyrna destroyed by an earthquake.</td>
</tr>
<tr>
<td>1043</td>
<td>The Turks become formidable and take possession of Persia.</td>
</tr>
<tr>
<td>1054</td>
<td>Leo IX., the first pope that kept up an army.</td>
</tr>
<tr>
<td>1055</td>
<td>The Turks take Bagdad, and overturn the empire of the Saracens.</td>
</tr>
<tr>
<td>1057</td>
<td>Malcolm III., king of Scotland, kills the tyrant Macbeth at Duninnan, and marries the princes Margaret, sister to Edgar Atheling.</td>
</tr>
</tbody>
</table>

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### After Christ.

- Burials, which formerly used to be in highways, permitted in towns.
- The Hans extirpated by Charlemagne.
- Seventeen days of unusual darkness.
- Charlemagne, king of France, begins the empire of Germany, afterwards called the western empire; gives the present names to the winds and months; endeavours to restore learning in Europe, but mankind are not yet disposed for it, being solely engrossed in military enterprises.
- A great earthquake in France, Germany, and Italy.
- Jan. 31. Jupiter eclipsed by the moon. March 17. A large spot seen on the sun for eight days.
- The first descent of the Normans on France.
- The obliquity of the ecliptic observed by Benmula to be 23° 35'.
- Harold, king of Denmark, deposed by his subjects for being a Christian.
- The kingdoms of Navarre and Arragon founded.
- Painters banished out of the eastern empire.
- The Flemings trade to Scotland for fish.
- The Scots and Picts have a decisive battle, in which the former prevail, and both kingdoms are united by Kenneth, which begins the second period of the Scottish history.
- Germany separated from the empire of the Franks.
- An earthquake over the greatest part of the known world.
- Ruric the first prince of Raffia began to reign.
- The Danes begin their ravages in England.
- Christianty propagated in Bulgaria.
- Egypt becomes independent on the caliphs of Bagdad.
- Bells and clocks first used in Constantinople.
- Paris diffused by locusts and pestifence.
- Iceland peopled by the Norwegians.
- Scotland invaded by the Danes.
- A bearded comet appears in France.
- Alfred the Great, after subduing the Danifh invaders (against whom he fought 36 battles by sea and land), compofes his body of laws; divides England into counties, hundreds, things; in 890 erects county-courts, having founded the university of Oxford in 886.
- The obliquity of the ecliptic observed by Albategni to be 23° 35'.
- The Hungarians settled near the Danube.
- The first land-tax in England.
- The monastery of Cluny founded.
- A very remarkable comet appeared in China. Rome taken by the Normans.
- The obliquity of the ecliptic observed by Thibet to be 23° 33'.
- The Normans establish themselves in Normandy.
- The Danes become masters of England.
- The university of Cambridge founded.
- Fiefs established in France.
- Sigefroi elected first marquis of Brandenburgh.
- The marquise of Mefnia established.
The Peripatetic philosophy introduced into Germany.

The canon law collected by Gratian, a monk of Bologna.

Christianity introduced into Finland.

The city of Moscow in Russia founded.

The order of the Carmelites instituted.

London bridge, consisting of 19 small arches, first built of stone.


The order of the Dominicans and Knights Hospitallers founded.

The doctrine of transubstantiation introduced.

King Alexander and the whole kingdom of Scotland.
CHRONOLOGY.

Scotland excommunicated by the pope's legate.

1220 Astronomy and geography brought into Europe by the Moors.

1221 A great earthquake in Germany.

1222 A comet of extraordinary magnitude appeared in Denmark.

1226 A league formed against the Albigenses by the French king and many prelates and lords.

1227 The Tartars, under Genghis-Kan, emerge from the northern parts of Asia, over-run all the Saracen empire, and carry death and desolation wherever they march.

1228 The university of Toulouse founded.

1230 The kingdom of Denmark disinterested by perilence.

1231 The kingdom of Leon and Castile united.

1232 The Almagest of Ptolemy translated into Latin.

1233 The Inquisition, begun in 1204, is now trauled to the Dominicans.

1237 The houses of London, and other cities in England, France, and Germany, still thatched with straw.

1238 The university of Vienna founded.

1239 A writing of this year's date on paper made of rags still extant.

1241 The Hanseatic league formed.

1244 Tin mines discovered in Germany.

1245 A clear red star, like Mars, appears in Capricorn.

1246 Painting revived in Florence by Cimabue.

1251 Wales subdued, and Magna Charta confirmed.

1253 The famous astrological tables are composed by Alonzo king of Castile.

1256 The order of the Augustines established.

1258 The Tartars take Bagdad, which finishes the empire of the Saracens.

1260 The feast of Flagellantes appeared in Italy.

1263 Acho king of Norway invades Scotland with 160 sail, and lands 20,000 men at the mouth of the Clyde; but they are cut to pieces by Alexander III., who recovers the western isles.

1264 The commons of England first summoned to Parliament about this time.

1268 The Tartars invade China.

1269 The Hamburgh company incorporated in England.

1272 The academy of Florence founded.

1273 The empire of the present Austrian family begins in Germany.

1274 The first commercial treaty betwixt England and Flanders.

1279 King Edward renounced his right to Normandy. The mortmain act passed in England.

1282 Lewellyn, prince of Wales, defeated and killed by Edward I., who unites that principality to England.

1284 Edward II., born at Caernarvon, is the first prince of Wales.

1285 Alexander III., king of Scotland, dies, and that kingdom is disputed by twelve candidates, who submit their claims to the arbitration of Edward king of England; which lays the foundation of a long and desolating war between both nations.

1290 The university of Lisbon founded.

1291 Ptolemæus taken by the Turks. End of the crusades.

1293 There is a regular succession of English parliaments from this year, being the 22d of Edward I.

1294 Parliaments established in Paris.

1298 The present Turkish empire begins in Bithynia under Ottoman.

1299 An earthquake in Germany.

1300 Spectacles invented by a monk of Cologne.

1302 The mariner's compass invented, or improved, by Giovia, of Naples.

1307 The beginning of the Swiss cantons.

1309 Coal first used in England.

1310 The popes remove to Avignon in France for 70 years.

1319 The University of Dublin founded.

1320 Gold first coined in Christendom; 1344 ditto in England.

1324 An earthquake in England.

1325 A great eruption of Mount Etna.

1332 The first treaty of commerce betwixt England and Venice.

1332 Gunpowder invented by a monk of Cologne.

1334 The first treaty of commerce betwixt England and Venice.

1336 The pope accused of heresy.

1337 The first coton whole course is described with an astronomical exactness.

1340 Europe infested by locusts.

1340 Heralds college instituted in England.

1344 The first creation to titles by patents used by Edward III.

1345 Edward III. has four pieces of cannon, which gained him the battle of Crefly.

1347 The battle of Durham, in which David, king of Scots, is taken, prisoner.
CHRONOLOGY.

1349 The order of the Garter instituted in England by Edward III., altered in 1357, and consists of 26 knights.

1352 The Turks first enter Europe.

1353 Asia and Africa depopulated by locusts.

1354 The money in Scotland till now the same as in England.

1356 The battle of Poictiers, in which king John of France and his son are taken prisoners by Edward the Black Prince.

1357 Coals first brought to London.

1358 Arms of England and France first quartered by Edward III.

University of Cologne founded.

Tamerlane began to reign in Persia.

1362 The law pleadings in England changed from French to English as a favour of Edward III., to his people.

The military order of Jaunizaries established among the Turks.

1365 The universities of Vienna and Geneva founded.

1369 John Wicliffe an Englishman begins to call in question the doctrines of the church of Rome about this time, whose followers are called Lollards.

1370 The office of Grand vizir established.

1376 Invasion of the sea in Flanders.

1378 Greenland discovered by a Venetian.

1381 Bills of Exchange first used in England.

1384 The first act of navigation in England; no goods to be exported or imported by Englishmen in foreign bottoms.

1386 A company of linen weavers from the Netherlands established in London.

Windsor castle built by Edward III.

1387 The first Lord High Admiral of England instituted.

1388 The battle of Otterburn between Hotspur and the earl of Douglas.

Bombs invented at Venloo.

1391 Cards invented in France for the king's amusement.

1399 Westminster abbey rebuilt and enlarged—Westminster hall ditto.

Order of the bath instituted at the coronation of Henry IV. renewed in 1725; consisting of 38 knights.

1402 Tamerlane defeats and takes prisoner Bayazet the Turkish sultan.

1405 The Canary Islands discovered by Bathencourt a Norman.


Painting in oil-colours invented at Bruges by John Van Eyck.

1411 The university of St Andrew's in Scotland founded.

1412 Algebra brought from Arabia into Europe.

1415 The battle of Agincourt gained over the French by Henry V. of England.

1420 The island of Madeira discovered by the Portuguese.

1421 The revenue of England amounted to L. 55,754.

1428 The siege of Orleans, the first blow to the English power in France.

1431 A great earthquake at Lisbon.

1432 Great inundations in Germany.

1437 The obliquity of the ecliptic observed by Ulug Beg to be 23° 30' 17".

1440 Printing invented by L. Koeler at Haerlam in Holland; brought into England by W. Caxton, a mercer of London, 1471.

1446 The Vatican library founded at Rome.

The sea breaks in at Dort in Holland, and drowns 100,000 people.

1453 Constantinople taken by the Turks, which ends the eastern empire, 1123 years from its dedication by Constantine the great, and 2206 years from the foundation of Rome.

1454 The university of Glasgow in Scotland founded.

1457 Glass first manufactured in England.

1460 Engraving and etching on copper invented.

The obliquity of the ecliptic observed by Purbachius and Regiomontanus to be 25° 26'.

1472 The study of the Greek language introduced into France.

1477 The university of Aberdeen in Scotland founded.

1479 Union of the kingdoms of Arragon and Catalonia.

1482 The coast of Guinea discovered by the Portuguese.

A court of Inquisition erected in Seville.

1483 Richard III. king of England and head of the Plantagenets, is defeated and killed at the battle of Bosworth, by Henry (Tudor) VII., which puts an end to the civil wars between the houses of York and Lancaster, after a contest of 30 years, and the loss of 100,000 men.

1486 Henry establishes fifty yeomen of the guards, the first standing army.

1489 Maps and sea charts first brought to England by Barth. Columbus.

1490 William Groecyn introduces the study of the Greek language into England.

The Moors, hitherto a formidable enemy to the native Spaniards, are entirely subdued by Ferdinand, and become subjects to that prince on certain conditions, which are ill observed by the Spaniards, whose clergy use the Inquisition in all its tortures; and in 1609, near one million of the Moors are driven from Spain to the opposite coast of Africa, from whence they originally came.

1492 America first discovered by Columbus, a Genoese in the service of Spain.

The Moors expelled from Granada, which they had possessed upwards of 800 years.

1495 The venereal disease introduced into Europe.

1496 The Jews and Moors banished out of Portugal.

1497 The Portuguese first sail to the East Indies by the Cape of Good Hope.

South America discovered by Americus Vespucius, from whom it has its name.

1499 North America discovered, for Henry VII. by Cabot a Venetian.

1500 Maximilian divides the empire of Germany into six circles, and adds four more in 1512.

Brazial discovered by the Portuguese. Florida discovered by John Cabot, an Englishman.

Painting in chiaro obliquo discovered.

A great plague in England.

1505 Shillings first coined in England.
1507  The island of Madagascar discovered by the Portuguese.

1509  Gardening introduced into England from the Netherlands, from whence vegetables were imported hitherto.

1510  The obliquity of the ecliptic observed by Wernerus to be 23° 28' 20".

1513  The battle of Flodden, in which James IV. king of Scotland is killed, with the flower of his nobility.

1514  Cannon bullets of stone still in use.

1515  The first Polyglot Bible printed at Alcala. The kingdom of Navarre annexed to that of Castile by Ferdinand.

1516  The kingdom of Algiers feized by Barbarossa.

1517  Martin Luther began the Reformation. The kingdom of the Maniluces in Egypt overthrown by the Turks.

1518  Discovery of New Spain, and the Straits of Magellan.

1521  Henry VII. for his writings in favour of popery, receives the title of Defender of the Faith from his Holiness.

1522  Rhodes taken by the Turks. The first voyage round the world performed by a ship of Magellan’s squadron.

1526  The inquisition established in Portugal. Lutheranism established in Germany.

1527  Rome taken and plundered by the Imperial army.

1528  Popery abolished in Sweden.

1529  The name of Protestant takes its rise from the reformed protestting against the church of Rome, at the diet of Spire in Germany.

1530  Union of the Protestants at Smalcalde, December 22d. Secretary of State’s office established in England.

1531  A great earthquake at Lisbon.

1532  The Court of Session instituted in Scotland.

1533  Inquisition of the Anabaptists in Welfphalia.

1534  The reformation takes place in England, under Henry VIII. Barbarossa feized on the kingdom of Tunis.

1535  The Reformation introduced into Ireland. The society of Jesuits formed.

1539  The first English edition of the Bible authorized; the present translation finished 1611. About this time cannon began to be used in ships. Six hundred and forty-five religious houses suppressed in England and Wales.

1540  The variation of the compas discovered by Sebastian Cabor. The obliquity of the ecliptic observed by Copernic to be 23° 28' 8".

1543  Silk stockings first worn by the French king; first worn in England by queen Eliz. 1561; the steel frame for weaving invented by the Rev. Mr. Lee, of St. John’s College, Cambridge, 1589. Pins first used in England, before which time the ladies used scissors. Iron cannon and mortars made in England.

1544  Good lands let in England at one shilling per acre.

1545  The famous council of Trent begins, and continues 18 years.

1547  First law in England establishing the interest of money at 10 per cent.

1548  The Reformation gained ground in Poland.

1549  Lords lieutenants of counties instituted in England.

1550  Horse guards instituted in England. The bank of Venice established about this time.


1554  The kingdom of Africana conquered by the Russians.

1555  The Russian company established in England.

1558  Queen Elizabeth begins her reign.

1560  The reformation in Scotland completed by John Knox.

1561  Livonia ceded to Poland.

1563  Knives first used in England.

1565  Revolt of the Low Countries. Malta attacked by the Turks.

1566  The 39 articles of the church of England established.

1568  Queen Mary imprisoned in England. Liberty of exercising the reformed religion granted to the Low Countries.

1570  Royal Exchange first built.

1571  The island of Cyprus taken by the Turks. They are defeated at Lepanto.


1576  The exercise of the Protestant religion authorized in France. This toleration followed by a civil war.

1578  The first treaty of alliance between England and the States General, January 7th.

1579  The Dutch flake off the Spanish yoke, and the republic of Holland begins. English East-India company incorporated - established 1600. Turkey company incorporated.

1580  Sir Francis Drake returns from his voyage round the world, being the first English circumnavigator.

1587  Parochial registers first appointed in England. The kingdom of Portugal feized by Philip of Spain.

1581  Copper money first used in France.

1582  Pope Gregory introduces the New Stile in Italy; the 5th of October being counted 15.

1583  Tobacco first brought from Virginia into England.

1587  The first proposal of settling a colony in America.

1587  Mary queen of Scots is beheaded by order of Elizabeth, after 18 years imprisonment.

1588  The Spanish Armada destroyed by Drake and other English admirals. Henry IV. passes the edict of Nantes, tolerating the Protestants.
CHRONOLOGY.

After Christ.

1588 Duelling with small swords introduced into England.
1589 Coaches first introduced into England; hackney acts 1693; increased to 1000 in 1770.
1590 Band of pensioners instituted in England.
1602 Telescopes invented by Jansen, a spectaclemaker in Germany.
1591 Trinity college, Dublin, founded.
1593 A great plague in London.
1594 The Jesuits expelled from France.
1595 The same observed by Tycho-Brahe to be 23° 30'.
1596 A great earthquake at Japan.
1597 Watches first brought into England from Germany.
1598 The edict of Nantes by Henry IV. of France.
1599 Decimal arithmetic invented at Bruges.
1600 Queen Elizabeth (the last of the Tudors) dies, and nominates James VI. of Scotland as her successor; which unites both kingdoms under the name of Great Britain.
1605 The Gun-power-plot discovered at Welfminster; being a plot to blow up the king and both houses of Parliament.
1606 Oaths of allegiance first administered in England.
1607 Colonies sent from England to Virginia.
1609 The independence of the United States acknowledged by Spain.
1610 Galileo, of Florence, first discovers the satellites about the planet Jupiter, by the telescope lately invented in Germany.
1611 Baro nets first created in England by James I. May 22.
1612 The edict of Constanti nople; 200,000 persons died there of the plague.
1614 Napier of Merchiston, in Scotland, invents the logarithms.
1615 Sir Hugh Middleton brings the new river to London from Ware.
1616 The first permanent settlement in Virginia.
1617 W. Harvey, an Englishman, confirms the doctrine of the circulation of the blood, which had been first broached by Servetus, a French physician, in 1533.
1620 The broad silk-manufacture from raw silk, introduced into England.
1621 New England planted by the Puritans.
1622 The Palatinate reduced by the Imperialists.
1623 The knights of Nova Scotia instituted.
1624 Massacre of the English at Amboyna.
1625 King James dies, and is succeeded by his son Charles I.

1626 The island of Barbadoes, the first English settlement in the West Indies, planted.
1631 The transit of Mercury over the sun's disk, first observed by Gaffendi.
1632 A great eruption of Vesuvius.
1633 Galileo condemned by the inquisition at Rome.
1635 Province of Maryland planted by Lord Baltimore.
1636 Regular posts established from London to Scotland, Ireland, &c.
1639 A transit of Venus over the sun's disk first observed by Mr Horrox, November 24th. O. S. 3 h 15' P. M.
1640 King Charles disobliges his Scottifh subjects; on which their army, under general Leley, enters England, and takes Newcastle, being encouraged by the malecontents in England. The massacre in Ireland, when 40,000 English Protestants were killed.
1641 The independency of Portugal recovered by John duke of Braganza.
1642 King Charles impeaches five refractory members, which begins the civil wars in England.
1643 Excise on beer, ale, &c. first imposed by parliament.
1648 A new law observed in the case of the Whale by Fabricius.
1649 Charles I. beheaded by Cromwell at Whitehall, January 30, aged 49.
1651 The sect called Quakers appeared in England.
1652 The Dutch colony at the Cape of Good Hope established.
1654 Cromwell assumes the protectorship.
1655 The air-pump invented by Otto Gaericke of Magdeburg.
1656 The English, under Admiral Penn, take Jamaica from the Spaniards.
1657 One of Saturn's satellites observed by Huygens.
1658 Cromwell dies, and is succeeded in the protectorship by his son Richard.
1660 King Charles II. is restored by Monk, commander of the army, after an exile of twelve years in France and Holland.
1661 The obliquity of the ecliptic observed by Hevelius to be 23° 29' 7".
1662 The Royal Society established at London by Charles II.
1663 Carolina planted; 1728, divided into separate governments.
1664 The New Netherlands in North America conquered by the Dutch and the English.

5 E 2 1665 The
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Location</th>
<th>Person</th>
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</thead>
<tbody>
<tr>
<td>1665</td>
<td>The plague rages in London, and carries off 63,000 persons.</td>
<td>England</td>
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<tr>
<td>1666</td>
<td>The great fire of London began Sept. 2. and continued three days, in which were destroyed 13,000 houses and 400 streets.</td>
<td>England</td>
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<td>1667</td>
<td>The peace of Breda, which confirms to the English the New Netherlands, now the States of Pennsylvania, New York, and New Jersey.</td>
<td>Europe</td>
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<td>England</td>
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<td>1670</td>
<td>The English Hudson's Bay company incorporated.</td>
<td>Canada</td>
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<td>1672</td>
<td>Louis XIV. over-runs great part of Holland, when the Dutch opened their fances, being determined to drown their country, and retire to their settlements in the East Indies.</td>
<td>Europe</td>
<td></td>
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<td>1677</td>
<td>The micrometer invented by Kircher.</td>
<td>Europe</td>
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<td>1678</td>
<td>The peace of Nimegun.</td>
<td>Europe</td>
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<td>England</td>
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<td>1683</td>
<td>India Rock fold from 360 to 500 per cent.</td>
<td>Asia</td>
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<td>1685</td>
<td>Charles II. dies, aged 55, and is succeeded by his brother James III.</td>
<td>England</td>
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<td>1686</td>
<td>The palace of Versailles, near Paris, finished by Louis XIV.</td>
<td>France</td>
<td></td>
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<tr>
<td>1688</td>
<td>The Revolution in Great Britain begins Nov. 5. King James abdicates, and retires to France, Dec. 3. King William and Queen Mary, daughter and foil-in-law to James, are proclaimed February 16.</td>
<td>Europe</td>
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<td>1689</td>
<td>Episcopacy abolished in Scotland.</td>
<td>Scotland</td>
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<td>1690</td>
<td>The battle of the Boyne, gained by William against James, in Ireland.</td>
<td>Ireland</td>
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<tr>
<td>1691</td>
<td>The war in Ireland finished, by surrender of Limerick to William.</td>
<td>Ireland</td>
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<td>1692</td>
<td>The English and Dutch fleets, commanded by Admiral Raffel, defeat the French fleet off La Hogue.</td>
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<td>1695</td>
<td>The land-tax passed in England.</td>
<td>England</td>
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<td>1696</td>
<td>The peace of Ryswick.</td>
<td>Europe</td>
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<td>1697</td>
<td>The Scots settled a colony at the isle of Darien in America, and called it Caledonia.</td>
<td>Europe</td>
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<td>1698</td>
<td>Charles XII. of Sweden begins his reign.</td>
<td>Europe</td>
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<td>1699</td>
<td>Queen Mary dies at the age of 33, and William reigns alone.</td>
<td>England</td>
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<td>1700</td>
<td>Stamp duties instituted in England.</td>
<td>Europe</td>
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<tr>
<td>1701</td>
<td>King William dies, aged 52, and is succeeded by Queen Anne, daughter to James II. who, with the Emperor and States General, renew the war against France and Spain.</td>
<td>Europe</td>
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<tr>
<td>1702</td>
<td>The battle of Blenheim won by the Duke of Marlborough and allies against the French.</td>
<td>Europe</td>
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<td>1703</td>
<td>The obliquity of the ecliptic observed by Bianchini to be 23° 28' 25&quot;.</td>
<td>Europe</td>
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<td>1704</td>
<td>Gibraltar taken from the Spaniards by Admiral Rooke.</td>
<td>Europe</td>
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<tr>
<td>1705</td>
<td>The battle of Malplaquet won by the Duke of Marlborough and allies against the French.</td>
<td>Europe</td>
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<td>1706</td>
<td>The treaty of Union between England and Scotland, signed July 22.</td>
<td>Europe</td>
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<td>1707</td>
<td>The first British parliament.</td>
<td>England</td>
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<tr>
<td>1708</td>
<td>Minorca taken from the Spaniards by General Stanhope.</td>
<td>Europe</td>
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<tr>
<td>1709</td>
<td>Peter the Great, czar of Moscovy, defeats Charles XII. at Pultowa, who flies to Turkey.</td>
<td>Europe</td>
<td></td>
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<tr>
<td>1710</td>
<td>Queen Anne changes the whig ministry for others more favourable to the interest of her brother the late Pretender. The cathedral church of St Paul, London, rebuilt by Sir Christopher Wren in 37 years, at one million expence, by a duty on coals.</td>
<td>Europe</td>
<td></td>
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<tr>
<td>1712</td>
<td>Duke.</td>
<td>Royalty</td>
<td></td>
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</tbody>
</table>
1712 Duke of Hamilton and Lord Mohun killed in a duel in Hill-Park.

1713 The peace of Utrecht, whereby Newfoundland, Nova Scotia, New Britain, and Hudson's bay, in North America, were yielded to Great Britain; Gibraltar and Minorca, in Europe, were also confirmed to the said crown by this treaty.

1714 Queen Anne dies, at the age of 50, and is succeeded by George I.

1715 Interest in England reduced to five per cent.

1716 The Pretender married the princess Sobieska, grand-daughter of John Sobieski, late king of Poland.

1717 An act passed for septennial parliaments.

1718 Sardinia erected into a kingdom, and given to the duke of Savoy.

1719 The Mississippi scheme at its height in France. Lombe's silk-throwing machine, containing 26,586 wheels, erected at Derby in England: takes up one-eighth of a mile; one water-wheel moves the rest; and in 24 hours it works 318,054,660 yards of organzine silk thread.

1720 The south-fsea scheme in England begun April 7, was at its height at the end of June, and quite sunk about September 29.

A great earthquake in China.

1724 An earthquake in Denmark.

1727 King George dies, in the 68th year of his age; and is succeeded by his only son, George II.

1728 The Jesuits expelled from Paraguay.

1729 The order of the Knights of St. John is established in the Duchy of Cornwall.

1730 Kouli Khan upsurps the Persian throne, conquers the Mogul empire, and returns with two hundred thirty-one millions Sterling; several public-spirited gentlemen begin the settlement of Georgia in North America.

1731 The beginnings of the French Society of arts, manufactures, and commerce; instituted in London.

1732 Damien attempted to assassinate the French king. The King of Prussia invades Bohemia. Defeats the Austrians at Reichenberg, April 21st, and at Prague, May 6th. Repelled by Count Daun at Kolín, June 18th.

1733 The allies defeated by the French at Haslau-Beck, July 26th.

1734 A dreadful plague in Sicily.

1735 War declared against France. — Commodore Anson returns from his voyage round the world.

1736 The allies lose the battle at Fontenoy.

1737 The Pretender's army defeated by the Duke of Cumberland at Culloden, April 16, 1746.

1738 The British Linen Company erected.

1739 The battle of Dettingen won by the English and allies in favour of the Queen of Hungary.

1740 Lima destroyed by an earthquake.

1741 The Peace of Aix-la-Chapelle, by which a re-creation of all places taken during the war was to be made on all sides.

1742 The interest on the British funds reduced to 3 per cent.

1743 British herring-fishery incorporated.

1744 The colony of Nova Scotia founded.

1745 Earthquake in England.

1746 Frederic prince of Wales, father to his present majesty, died.

1747 The new filo introduced into Great Britain; the 3d of September being counted the 14th.

1748 The British museum erected at Montague-house.

1749 Society of arts, manufacturers, and commerce, instituted in London.

1750 A dreadful eruption of mount Etna.

1751 An earthquake at Constantinople, Cairo, &c. Sept. 2d.

1752 Quito in Peru destroyed by an earthquake, April 28th.

1753 Lisbon destroyed by an earthquake, Nov. 1st.

1754 The British fleet destroyed in the black hole at Calcutta in the East Indies by order of the Nabob, and 123 found dead next morning.

1755 Marine society established at London.

1756 Englishmen are confined in the black hole at Calcutta in the East Indies by order of the nabob, and 123 found dead next morning.

1757 Damien attempted to assassinate the French king. The King of Prussia invades Bohemia. Defeats the Austrians at Reichenberg, April 21st, and at Prague, May 6th. Repelled by Count Daun at Kolín, June 18th.

1758 The allies defeated by the French at Haslau-Beck, July 26th.

1759 Convention of Closter Seven, Sep. 8th.

1760 The king of Prussia defeats the French and Austrians at Rößbach, Nov. 5. The Prussians defeated near Breslaw, Nov. 22d. The Austrians defeated at Lissa, Dec. 5th.

1761 Senegal taken by the British, May 1st. They take Louisbourg, July 27th.


1763 General Wolfe is killed in the battle of Quebec, which is gained by the British. The French defeated by Prince Ferdinand at Bergen, April 13th.

1764 Guadaloupe taken by the British, May 1st. King of Prussia defeated by the Russians at Cournerkov, Aug. 12th.
CHRONOLOGY.

1759 The French fleet defeated by Admiral Hawke, Nov. 20th.
1760 King George II. dies October 25th, in the 77th year of his age, and is succeeded by his present majesty, who, on the 22d of September 1761, married the princess Charlotte of Mecklenburgh Strelitz.
1761 Pondicherry taken by Colo. Coote Jan. 15th.
1762 War declared against Spain.
1763 The definitive treaty of peace between Great Britain, France, Spain, and Portugal, concluded at Paris February 10th, which confirms to Great Britain the extensive provinces of Canada, East and West Florida, and part of Louisiana, in North America: also the islands of Granada, St Vincent, Dominicæ, and Tobago, in the West Indies.
1764 The parliament granted 10,000 l. to Mr Harrison for his discovery of the longitude by his time-piece.
1765 His majesty's royal charter passed for incorporating the society of artists.
1766 April 21st, a spot or macula of the sun, more than thrice the bigness of our earth, passed the sun's centre.
1767 The Jesuits expelled from Bohemia and Denmark.
1768 Academy of painting established in London.
1769 Paoli fled from Corsica June 13th. The island then reduced by the French.
1770 An earthquake at St Domingo.
1771 Dr Solander and Mr Banks, in his Britannic majesty's ship the Endeavour, Lieut. Cook, return from a voyage round the world, having made several important discoveries in the South seas. An emigration of 500,000 Tourgouths from the coasts of the Caspian Sea to the frontiers of China.
1772 The King of Sweden changes the constitution from autocracy to a limited monarchy.
1773 Captain Phipps is sent to explore the North Pole; but having made 81 degrees, is in danger of being locked up by the ice, and his attempt to discover a passage in that quarter proves fruitless.
1774 Peace is proclaimed between the Russians and the Turks.
1776 The American war commences. Action at Bunker's Hill June 7th.
1777 Philadelphia taken by the British Oct. 3d.
1778 Philadelphia evacuated by the British, June 18th.
1779 A most extraordinary eruption of Vesuvius August 8th.
1780
CHRONOLOGY.

1780 Jan. 14th, 6 h. A. M. the thermometer suspended in the open air at Glasgow, stood at 46° below.

The Spanish fleet defeated by Admiral Rodney Jan. 16th.

Charlestown surrendered to the British May 12th.

A dreadful incursion in London, and riots in many other places of the kingdom.

A great number of British ships taken by the combined forces of France and Spain.

Lord Cornwallis defeats the Americans at Camden.

A dreadful hurricane in the Leeward Islands.

Oct. 9th.

An extraordinary storm of wind in England.

War declared against the Dutch Dec. 20th.

A terrible engagement between the Dutch and British fleet near the Dogger Bank Aug. 5.

Lord Cornwallis with his army surrender to the unified forces of France and America Oct. 18th.

Minorca surrendered to the Spaniards February 4th.

The French fleet under De Grasse defeated and almost destroyed by Admiral Rodney April 12th.

The Spanish floating batteries before Gibraltar entirely destroyed Sept. 12th.

1783 Preliminaries of a peace signed. America declared independent Jan. 20th.

A dreadful earthquake, attended with many extraordinary circumstances, in Italy and Sicily. The sun obscured by a kind of fog during the whole summer.

A volcanic eruption in Iceland surpassing anything recorded in history. The lava spouted up in three places to the height of two miles perpendicular, and continued thus for two months; during which time it covered at least of 3600 square miles of ground, in some places more than 100 feet deep.

A large meteor appears to the northward of Shetland, and takes its direction southward, with a velocity little inferior to that of the earth in its annual course round the sun. Its track observed for more than 1000 miles.

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1787 General Convention meet at Philadelphia for the purpose of forming a new constitution, which was afterwards adopted by all the states.

1789 First Congress meet under the federal constitution. March 4th.

States General opened at Paris April 25th.

Battle demolished by the people July 14th.

Constitution of France framed August 6th.

CHRONOMETER, in general, denotes any instrument or machine used in measuring time; such are dials, clocks, watches, &c. See Dial, &c.

The term chronometer, however, is generally used in a more limited sense, for a kind of clock so contrived as to measure a small portion of time with great exactness, even to the sixteenth part of a second; of such a one there is a description in DeFagulier's experimental philosophy, invented by the late ingenious Mr George Graham; which must be allowed to be of great use for measuring small portions of time in astronomical observations, the time of the fall of bodies, the velocity of running waters, &c. But long spaces of time cannot be measured by it with sufficient exactness, unless its pendulum be made to vibrate in a cycloid; because, otherwise it is liable to err considerably, as all clocks are which have short pendulums that swing in large arches of a circle.

There have been several machines contrived for measuring time, under the name of chronometers, upon principles very different from those on which clocks and watches are constructed.

Plate CXXXVI. fig. 1, represents an air-chronometer, which is constructed in the following manner. Provide a glass tube of about an inch in diameter, and three or four feet long; the diameter of the inside of this tube must be precisely equal in every part; at the bottom must be a small hole, closely covered with a valve. In the tube place a piston E, fig. 2, which is made to fit it exactly, and must be oiled, that it may move in the tube with the greatest freedom: in this piston there is a cock that shuts quite close; and from the top of it there goes a cord F, which pulls through the handle G. The cock of the piston being closed, it is to be let down to the bottom of the tube, and being then drawn up to the top, the valve will then run in by the valve at the bottom of the tube, and support the piston. You are then to turn the cock, so as to make every small vent; and the air passing slowly through that vent, the piston will gradually descend, and show the hour, either by lines cut in the tube with a diamond, or marked with print, or by small slips of paper painted on the glass. If this chronometer should go too fast or two slow, it may be easily regulated by altering the position of the cock in the piston, as it is on that the whole depends.

If, instead of marking the tube, you would have the time shown by a dial, it may be easily effected by placing an axis to which the hand of the dial is fixed, directly over the tube, and winding the string to which the piston is joined round that axis; for then, as the piston descends, the axis will gradually turn the hand, and show the hour: but it must be observed, that as the descent of the piston is not constantly regular, on account of the decrease of resilience from the quantity of the subjacent air as the piston descends, the axis therefore must not be a regular cylinder, but conical like the fuse of a watch, as in fig. 3, by which means the motion of the hand of the dial will be constant and regular.

Fig. 4, represents a lamp-chronometer. It consists of a chamber lamp A, which is a cylindrical vessel about three inches high, and one inch diameter, placed in the stand B. The inside of this vessel must be every where exactly of the same diameter. To the stand B is fixed the handle C, which supports the frame DEF, about 12 inches high, and four wide. This frame is to be covered with oiled paper, and divided into twelve equal parts by horizontal lines; at the end of which are wrote the numbers for the hours, from 1 to 12, and between the horizontal lines are diagonals that are divided into halves, quarters, &c. On the handle B, and close to the glass, is fixed the stylus or gnomon H. Now, as the defance of the stylus from the flame of the lamp is only half an inch, if the distance of the frame from the style is only six inches, then, while the float that contains the light descends,
defends, by the decrease of the oil, one inch, the
shadow of the style on the frame will ascend twelve
inches, that is, its whole length, and show by its pro-
gression the regular increase of the hours, with their
several divisions. It is absolutely necessary, however,
that the oil used in this lamp be always of the same
fort and quite pure, and that the wick, also, be con-
stantly of the same size and substance, as it is on these
circumstances, and the uniform figure of the vessel,
that the regular, progress of the shadow depends.

Chronometers, among musicians, an instrument
invented by Loutte, a French musician, for the pur-
purpose of measuring time by means of a pendulum. The
form of the instrument, as described by him, is that of
an ionic piaffer, and is thus described by Malcolm in
his Treatise of Music, p. 407. — The chronometer
consists of a large ruler or board, six feet or 72 inches
long, to be set on end; it is divided into its inches,
and the numbers set so as to count upwards; and at
every division there is a small round hole, through
whose centre the line of division runs. At the top
of this ruler, about an inch above the division 72, and
perpendicular to the ruler, is inserted a small piece of
wood, in the upper side of which there is a groove,
hollowed along from the end that stands out to that
which is fixed in the ruler, and near each end of it a
hole is made: through these holes a pendulum cord is
drawn, which runs in the groove: at that end of the
cord which comes through the hole further from the
ruler, the ball is hung: and at the other end there is
a small wooden pin, which can be put in any of the
holes of the ruler: when the pin is in the uppermost
hole at 72, then the pendulum from the top to the centre
of the ball must be exactly 72 inches; and therefore,
whatever hole of the ruler it is put in, the pendulum
will be just so many inches as that figure at the hole
denotes. The manner of using the machine is this:
the composer lengthens or shortens his pendulum, till
one vibration be equal to the designated length of his
bar, and then the pin stands at a certain division,
which marks the length of the pendulum; and this
number being set with the cliff at the beginning of
the song, is a direction for other compasses to use.
In measuring the time according to the
composer's design: for with the number is set the
note, crotchet, or minim, whose value he would have
the vibration to be: which in brisk duple time is best
a minim or half bar, or even a whole bar, when that
is a minim; and in flow time a crotchet. In
triple time, it would do well to be the third part
or half, or fourth part of a bar; and in the simple triples
that are allegro, let it be a whole bar. And if,
every time that is allegro, the vibration is applied to
a whole or half bar, practice will teach us to subdi-
vide it justly and equally. Observe, that, to make this
machine of universal use, some canonical measure of the
divisions must be agreed upon, that the figure may give
a certain direction for the length of the pendulum.

Chrostasima, in natural history, a genus of
pellucid gems, comprehending all those which appear
of one simple and permanent colour in all lights; such
are the diamond, carbuncle, ruby, garnet, amethyst,
emerald, and the topaz. See Diamond, Carbuncle, &c.

Chrysa, (anc. geog.), a town of Mytilis, on the
sinus Adramyttium; extinct in Pliny's time: it had
a temple of Apollo Sinthinus (Homer, Strabo). The
country of the fair Chrysea, who gave first rite to
the quarrel between Agamemnon and Achilles.

Chrysalis, or Aurelia, in natural history, a
fable of red and seeming invisibility, which butterflies,
moths, and several other kinds of insects, must
pass through before they arrive at their winged or
mottled perfect state.

In this state, no creature afford to beautiful a va-
riety as the butterfly kinds, and they all pass through
this middle state without one exception. The figure
of the aurelia or chrysalis generally approaches to that
of a cone, or at least the hinder part of it is in this
shape; and the creature, while in this state, seems to
have neither legs nor wings, nor has any power of
walking. It seems indeed to have hardly so much as
life. It takes no nourishment in this state, nor has it
any organs for taking any; and indeed its posterior part
is all that seems animated, this having a power of giving
itself some motions. The external covering of the
chrysalis is cartilaginous, and considerably large, and
is usually smooth and glossy; but some few of them
have a few hairs; some are also as hairy as the cater-
pillars from which they are produced; and others
are rough, and, as it were, shagreened all over.

In all of these there may be distinguished two fides;
the one of which is the back, the other the belly of
the animal. On the anterior part of the latter, there
may always be distinguished certain little elevations
running in ridges, and resembling the fillets wound
about mummies: the part whence these have their
origin, is esteemed the head of the animal. The other
side, or back, is smooth, and of a rounded figure in
most of the chrysalides; but some have ridges on the
anterior part, and fides of this part; and these usually
terminate in a point, and make an angular appearance
on the chrysalis.

From this difference is drawn the first general dif-
tinction of these bodies. They are by this divided into
two classes: the round and the angular kinds. The
first are, by the French naturalists, called feer: from
this common custom to divide, the chrysalis of the folk-
worm, which is round, by this name.

There is something more regular in this distinction
than might at first be conceived; for the division is
continued from the fly-flate: the rounded chrysalides
being almost all produced by the phaline, or moths;
and the angular ones by the papilio, or day-flies.
There are several subordinate distinctions of these
kinds; but, in general, they are less different from
one another than the caterpillars from whence they are
produced.

The head of those of the first class usually termi-
nates itself by two angular parts, which stand separate
one from the other, and resemble a pair of horns.
On the back, eminences and marks are discovered,
which imagination may form into eyes, nofe, chin,
and other parts of the human face.

There is a great variety and a great deal of beauty
in the figures and arrangement of the eminences and
spots on the other part of the body of the chrysalides
of different kinds. It is a general observation, that those
chrysalides which are terminated by a single horn, af-
ford day-butterflies of the kind of those which have
buttoned
The general colour of the chrysalis of the common butterflies, however, is brown.

Some are also of a fine deep black; and of these many are so smooth and glossy, that they are equal to the snuff Indian japa. The common caterpillar of the fig-tree gives an instance of one of these most beautiful, glossy ones; the caterpillar of the vine affords another of these fine black chrysalis.

The round chrysalis do not afford any thing of that variety of coloring so Remarkably beautiful in the angular ones; they are usually of a dark yellow, in different shades, and are often variably spotted with black; but these, as well as all other chrysalis, before they arrive at their fixed colour, pass through several other temporary ones; some being of a different colour when first produced from the caterpillar, from what they are a few days afterwards; and some varying greatly, though only in degree, as not to be distinguishable, even by the most conversant eye, from what they were when first produced. The green rough caterpillar of the cabbage has a chrysalis which is green at first; and from that gradually goes through all the shades of green to faint yellow, which is its lasting colour; and one of the oak caterpillars yields a chrysalis beautifully spotted with red at its first appearance; but these spots change to brown for their fixed colour: the third day from their formation usually fixes their lasting colours; and if they are observed to turn black in any part after this time, it is a sign that they are dead or dying.

The several species of insects, as a fly, spider, and an ant, do not differ more evidently from one another in regard to appearance, than do a caterpillar, its chrysalis, and a butterfly produced from it; yet it is certain, that these are all the same individual egg; and nothing is more certain, than that the creature which was for a while a caterpillar, is, after a certain time, a chrysalis, and then a butterfly. These great changes produced in so sudden a manner, seem like the metamorphoses recorded in the fables of the ancients; and indeed it is not improbable that those fables first took their origin from such changes.

The parts being distinguishable in the chrysalis, we easily find the difference of the species of the fly that is to proceed from it. The naked eye shows whether it be one of those that have, or of those that have not, a trunk; and the assistance of a microscope shows the antennæ distinctly, that we are able to discern whether it belongs to the day or night class; and often to what genus, if not the very species: may, in the plume horned kinds, we may see, by the antennæ, whether a male or female phalaena is to be produced from the chrysalis; the horns of the female being in this state evidently narrower, and appearing less elevated above the common surface of the body, than those of the male.

All these parts of the chrysalis, however, though seen very distinctly, are laid close to one another, and seem to form only one mass; each of them is covered with its own peculiar membrane in this state, and all are surrounded together by a common envelope, only through these that we see them; or rather we see on these the figures of all the parts moulded within.
Chrysalis. and therefore it requires attention to distinguish them. The chrysalis is soft when first produced, and is wetted on the front with a viscous liquor; its skin, though very tender at first, dries and hardens by degrees: but this viscous liquor, which surrounds the wings, legs, &c. hardens almost immediately; and in consequence falls all those limbs, &c. into a mass, which were before loose from one another; this liquor, as it hardens, loses its transparency, and becomes brown; so that it is only while it is yet moist that these parts are to be seen distinct.

It is evident from the whole, that the chrysalis is no other than a butterfly, the parts of which are hid under certain membranes which darken them together; and, when the limbs are arrived at their due strength, they become able to break through these membranes, and then expand and arrange themselves in their proper order.

The first metamorphosis, therefore, differs nothing from the second, except that the butterfly comes from the body of the caterpillar in a weak state, with limbs unable to perform their offices, whereas it comes from the chrysalis perfect.

Reaumur has given us many curious observations on the structure and uses of the several coverings that attend the varieties of the caterpillar-kind in this state.

The creatures in general remain wholly immovable in this state, and seem to have no business in it but a patient attendance on the time when they are to become butterflies; and this is a change that can happen to them only as their parts, before extremely soft and weak, are capable of hardening and becoming firm by degrees, by the transpiration of that abundant humidity which before kept them soft: and this is proved by an experiment of M. Reaumur, who, inclosing some chrysalises in a glass tube, found, after some time, a small quantity of water at the bottom of it; which could have come there in no other way, but from the body of the inclosed animal. This transpiration depends greatly on the temperature of the air; it is increased by heat, and diminished by cold; but it has also its peculiarities in regard to the several species of butterfly to which the chrysalis belongs.

According to these observations, the time of the duration of the animal in the chrysalis state must be, in different species, very different; and there is indeed this wide difference in the extremes, that some species remain only eight days in this state, and others eight months.

We know that the caterpillar changes its skin four or five times during its living in that state; and that all these skins are at first produced with it from the egg, lying closely over one another. It parts with, or throws off all these one by one, as the butterfly, which is the real animal, all this time within, grows more and more perfect in the several first changes. When it throws off one, it appears in another skin exactly of the same form; but at its final change from this appearance, that is, when it throws off the last skin, as the creature within is now arrived at such a degree of perfection as to need no farther taking of nourishment, there is no farther need of teeth, or any of the other parts of a caterpillar. The creature, in this last change, proceeds in the very same manner as in all the former, the skin opening at the back, and the animal making its way out in this shape. If a caterpillar, when about to throw off this last skin, be thrown into spirits of wine, and left there for a few days, the membranes within will harden, and the creature may be afterwards carefully opened, and the chrysalis taken out, in which the form of the tender butterfly may be traced in all its lineaments, and its eyes, legs, &c. evidently seen. It is not necessary, however, to seize upon this exact method of proving the existence of the chrysalis or butterfly in the caterpillar: for if one of these animals be thrown into spirits of wine, or into vinegar, some days before that time, and left there for the skin to harden, it may afterwards be dissected, and all the lineaments of the butterfly traced out in it, the wings, legs, antennae, &c. being as evident here, and as large, as in the chrysalis.

It is very plain from this, that the change of the caterpillar into chrysalis, is not the work of a moment; but is carrying on for a long time before, even from the very hatching of the creature from the egg. The parts of the butterfly, however, are not disposed exactly in the same manner while in the caterpillar, as when first naked in the form of the chrysalis; for the wings are proportionally longer and narrower, being wound up in the form of a cord; and the antennae are rolled up on the head; the trunk is also twisted up and laid upon the head; but this in a very different manner from what it is in the perfect animal, and very different from that in which it lies within the chrysalis; so that the first formation of the butterfly in the caterpillar, by time arrives at a proper change of the disposition of its parts, in order to its being a chrysalis. The very eggs, hereafter to be deposited by the butterfly, are also to be found not only in the chrysalis, but in the caterpillar itself, arranged in their natural, regular order. They are indeed in this state very small and transparent; but after the change into the chrysalis, they have their proper colour.

As soon as the several parts of the butterfly, therefore, are arrived at a state proper for being exposed to the more open air, they are thrown out from the body of the caterpillar, surrounded only with their membranes; and as soon as they are arrived at this after a proper degree of strength and solidity, they labour to break through these thinner coverings, and to appear in their proper and natural form. The time of their duration in this state of chrysalis is very uncertain, some remaining in it only a few days, others several months, and some almost a year in appearance. But there is a fallacy in this that many are not aware of. It is natural to think, that as soon as the creature has inclosed itself in its shell, be that of what matter it will, it undergoes its change into the chrysalis state. And this is the case with the gener": yet there are some which are eight or nine months in the shell before they become chrysalises; so that their duration in the real chrysalis state is much shorter than it naturally appears to be. M. Reaumur carefully watched the auriculated caterpillar of the oak in its several changes, and particularly from its chrysalis, which is of this last kind, into the fly; and has given an account of the method of this as an instance
The membranes which envelope the creature in this chrysalis state are at first tough and firm, and immediately touch the several parts of the inclosed animal; but by degrees, as these parts harden, they become covered, some with hairs, and others with scales. These, as they continue to grow, by degrees fall off the several particular membranes which cover the parts on which they are placed, to a greater distance, and by degrees loosen them from the limbs. This is one reason of those membranes drying and becoming brittle. The middle of the upper part of the corselet is usually marked with a line which runs in a longitudinal direction; and this part is always more elevated than the rest, even in the conic kinds, which are no otherwise angular. This line is in some very bold and plain; in others it is so faint as not to be distinguishable without glafles; but it is always in the midst of that line that the shell begins to open. The motion of the head of the butterfly backwards first occasions this crack; and a few repetitions of the same motion open it the whole length of the line.

The clearing itself, however, entirely, is a work of more time in this case, than is the paling of the chrysalis out of the body of the caterpillar. In that case there is a crack sufficiently large in the skin of the back, and the whole chrysalis being loose comes out at once. But in this case, every particular limb, and part of the body, has its separate case; and these are almost inconceivably thin and tender, yet it is necessary that every part be drawn out of them before it appear naked to the open air. As soon as all this is effected, and the animal is at full liberty, it either continues some time upon the remains of its covering, or creeps a little way distant from it, and there refts. The wings are what we principally admire in this creature. These are at this time so extremely folded up, and placed in so narrow a compass, that the creature seems to have none at all: but they by degrees expand and unfold themselves; and, finally, in a quarter of an hour, or half an hour at the utmost, they appear at their full size, and in all their beauty. The manner of this sudden unfolding of the wings is this: the small figure they make when the creature first comes out of its membranes, does not prevent the observing that they are at that time ridiculously thick. This is owing to its being a large wing folded up in the nicest manner, and with folds so arranged as to be by no means sensible to the eye; for the wing is never seen to unfold; but, when observed in the most accurate manner, seems to grow under the eye to this extent. When the creature is first produced from the shell, it is everywhere most tender; even its wings have no strength or stiffness till they expand themselves; but they then do, by degrees, and, with the other parts, become rigid and firm. But if any accident prevents the wings from expanding at their proper time, that is, as soon as the creature is out of its shell, they never afterwards are able to expand themselves; but the creature continues to wear them in their contracted and wholly useless state and very often, when the wings are in no extended before such an accident happens, it stops them in a partial extension, and the creature must be contented to pass its whole life with them in that manner.

M. Reaumur has proved, that heat and cold make great differences in the time of hatching the butterfly from its chrysalis state: and he particularly tried with great accuracy and attention, by putting them in vesseis in warm rooms, and in ice-houses, and it seemed wholly owing to the hastening or retarding the evaporation of the abundant humidity of the animal in the chrysalis state, that it sooner or later appeared in the butterfly form. He varnished over some chrysaliss, in order to try what would be the effect of this wholly preventing their transpiration; and the consequence was, that the butterfly came forth from these two months later than their natural time. Thus was the duration of the animal in this state lengthened; that is, its existence was lengthened; but without any advantage to the creature, since it was in the time of its state of inaction, and probably of infensibility.

Though this was of no consequence, M. Reaumur deduces a hint from it; that seems to be of some ufe. He observes, that hens eggs, of which we make so many use, and eat in so many forms, are properly a fort of chrysalis of the animal; their germ, after they are impregnated by the cock, containing the young animal alive, and waiting only a due degree of warmth to be hatched, and appear in its proper form. Eggs transpire notwithstanding the hardness of their shells; and when they have been long kept, there is a road found near one of their ends, between the shell and the internal membrane; and it is a mark of their being flat, and is the effect of an evaporation of part of their humidity; and the same varnish which had been used to the chrysalis, being tried on eggs, was found to preserve them for two years, as fresh as if laid but the same day, and such as the nicest palate could not distinguish from those that were so. See Eggs.

It is not yet known how much farther this useful speculation might be carried, and whether it might not be of great ufe even to human life, to invent something that should act in the manner of this varnish, by being rubbed over the body, as the athlete did of old, and the fages of the Weft Indies do at this time, without knowing why and what beauty. The manner of this sudden unfolding of the wings is this: the small figure they make when the creature first comes out of its membranes, does not prevent the observing that they are at that time considerably thick. This is owing to its being a large wing folded up in the nicest manner, and with folds so arranged as to be by no means sensible to the eye, for the wing is never seen to unfold; but, when observed in the most accurate manner, seems to grow under the eye to this extent. When the creature is first produced from the shell, it is everywhere most tender; even its wings have no strength or stiffness till they expand themselves; but they then do by degrees, and, with the other parts, become rigid and firm. But if any accident prevents the wings from expanding at their proper time, that is, as soon as the creature is out of its shell, they never afterwards are able to expand themselves; but the creature continues to wear them in their contracted and wholly useless state; and very often, when the wings are in no extended before such an accident happens, it stops them in a partial extension, and the creature must be contented to pass its whole life with them in that manner.
Chrysanthemum

flowers. It grows to the height of three feet, with a single upright stalk divided into numerous branches, garnished with pinnated leaves, and crowned with elegant compound flowers of different colours and properties. The varieties are, single and double flowers of a cream-colour; yellow; yellow and white; brimstone-coloured; purplish, or quilled; or those with finely jagged leaves, and flowers of all the above colours and properties. All the varieties begin flowering in July: the flowers are exceedingly numerous, and exhibit a constant succession of full bloom till November; and both single and double are succeeded by abundance of seed. 1. The putecens is a native of the Canary islands. It rises with a shrubby stalk near two feet high, dividing into many branches, which are garnished with pretty thick succulent leaves, of a greyish colour, cut into many segments. The flowers come out from the wings of the leaves, growing upon naked footstalks singly, which greatly resemble those of chamomile. There is a confusion of flowers on the same plant for the greatest part of the year, for which it is chiefly esteemed. This plant will flower a month earlier bloom the following summer than those raised in the spring from seed; but when the pots are split, and two or three inches apart, give some water, and place them in the shade during the hot weather: by the end of October they will be rooted, when the pots are to be removed either into a greenhouse or garden-frame, for the winter; but the latter is the most eligible, where they may enjoy the full air in mild weather, and have occasional shelter from frost. In April they may be transplanted singly into borders and some in pots. The plants thus raised will flower early in six weeks sooner the succeeding summer than those raised in the spring from seed; but as they soon become barren, it is proper to have always a quantity of plants raised from the seed. The third fort may be raised either from seeds or cuttings, but requires to be sheltered in the greenhouse in winter.

CHRYSYES, the priest of Apollo, father of Alynome, called from him Chryseis. When Lycurgus was taken, and the spoils divided among the conquerors, Chryseis fell to the share of Agamemnon. Chryseis upon this went to the Grecian camp to solicit his daughter's restitution; and when his prayers were fruitless, he implored the aid of Apollo, who visited the Greeks with a plague, and obliged them to restore Chryseis.

CHRYSIPPUS, a Stoic philosopher, born at Solos in Cilicia, was disciple to Cleanthes, Zeno's successor. He wrote many books, several of which related to logic. None of the philosophers spoke in stronger terms of the fatal necessity of every thing, nor more pompously of the liberty of man, than the Stoics, Chrysippus in particular. He was so considerable among them, as to establish it into a proverb, that if it had not been for Chrysippus, the porch had never been. Yet the Stoics complained, as Cicero relates, that he had collected so many arguments in favour of the sceptical hypothesis, that he could not answer them himself; and thus had furnished Carneades, their antagonist, with weapons against them. There is an apodictism of this philosopher preferred, which does him honour. Being told that some perfons spoke ill of him, "It is no matter (said he), I will live so that they shall not be believed."

CHRYSIS, or GOLDEN-FLY, in natural history: A genus of insects belonging to the order of hymenoptera. The mouth is armed with jaws, but has no proboscis; the antennae are filiform, bent, and consist of 12 articulations; the abdomen is arched, with a scale on each side; the antennae are dilated, and armed with a flying; the wings lie plain; and the body appears as if gilt. There are several species; but the ignia, or flaming chrysis, is beautified with the most resplendent colours. The fore-part of its head is green and gold, and the hinder of a lovely azure. The thorax is likewise azured over, with a mixture of green, and terminates at its extremity with sharp points on both sides. The abdomen is green and gold before, and of a coppery-red behind, imitating molten copper highly polished. The whole insect is dotted on its upper part, which gives it a great resplendency of colour. The antennae are black, and legs green internmixed with gold. This species dwells in holes of walls between the stones, and in the mortar that cements them. It is often seen flying from such holes, where it nectiles and performs its work. The larve, which resemble those of the wasp, likewise inhabit the holes of decayed walls.

CHRYSITRIX, in botany: a genus of the diceria order, belonging to the polygama class of plants. In the hermaphrodite the flower is two-valved, the corolla from chaff numerous and brilily; many flaminia, one within each chaff; one pellillum. The male of the hermaphrodite: there is no pellillum.

CHRYSOBALANUS, COCOA PLANT: A genus of the monogama order, belonging to the ficandria class of plants; and in the natural method ranking under the 36th order, Pomeaeae. The calyx is quinquefoil, the petals five; plum-kernel five furrowed and five-valved. There is only one species, the icaco, which is a native of the Bahama islands and many other parts of America, but commonly grows near the fex. It rises with a shrubby stalk eight or nine feet high, fending out several side-branches, which are covered with a dark brown bark. The flowers are white, and are succeeded by plums like damsons; some blue, some red, and others yellow. The flower is shaped like a pear, and has five longitudinal furrows. The plums have a sweet luscious taste, and are brought to the tables of the inhabitants, by whom they are much esteemed.

CHRYSOCOMA, GOLDY-LOCKS: A genus of the polygama aequalis order, belonging to the syngenesis class of plants; and in the natural method ranking under the 49th order, Compositae. The receptacle is na-
CHRYSOLOGUS, in botany: A genus of the polygonia necessaria order, belonging to the syngeneia class of plants; and in the natural method ranking under the 49th order, Compositeae. The receptacle is paleaceous; the pappus monophyllous, and tridentated; the calyx pentaphyllous; the seeds wrapped up each in a tetraphyllous calycinus, or little cup.

CHRYSOLOGUS (Emanuel), one of those learned men in the 14th century who brought the Greek literature into the west. He was a man of rank; and defended an ancient family, said to have removed with Constantine from Rome to Byzantium. He was sent into Europe by the emperor of the east to compose the almanie of the Christian princes. He afterwards taught at Florence, Venice, Pavia, and Rome; and died at Constantinople, in 1415, aged 47. He wrote a Greek grammar, and some other small pieces.

CHRYSOLITE, or YELLOWISH-GREEN TOPAZ: A precious stone of a grafs green colour, found in the East Indies, Brazil, Bohemia, Saxony, Spain, in Auvergne and Bourbon in France, and in Derbyshire in England. Some are likewise found with volcanic lavas, as in the Vevarais, where some large humps have been seen of 20 or 30 pounds weight; but it is remarkable, that some of these chrysolites are partly decomposed into an argillaceous substance. All chrysolites, however, are far from being of the same kind. The oriental is the same with the peridot, and differs only by its green hue from the sapphires, topazes, and rubies of the same denomination. This becomes electric by being rubbed; has a prismatic form of six, or sometimes of five flattened faces; and does not lose its colour or transparency in the fire, which the common chrysolite often does; becoming either opaque, or melting entirely in a strong heat. The infiant it melts, it emits a phosphoric light like the basis of alum and gypsum spar; with borax it produces a thin colourless glass. Its specific gravity is between 3.6o0 and 3.7o0; according to Drifdon it is 2.7821, or 2.6923; and that of the Spanish chrysolite 3.0989.

The flourance of this precious stone is lamellated in the direction of the axis of its primitive form: but the chrysolite from Saxony is foliated in a perpendicular direction to the same axis. The chrysolite of the ancients was the same gem which is now called topaz, and the name of itself indicates that it ought to be so. Pliny says that the colour of the chrysolite is yellow like gold.

CHRYSOLITE-PASTE, a kind of glass made in imitation of natural chrysolite, by mixing two ounces of prepared crystal with ten ounces of red-lead, adding 12 grains of crocus martis made with vinegar; and then baking the whole for 24 hours, or longer in a well luted cucurbit.

CHRYSOMELA, in zoology, a genus of insects belonging to the order of coleoptera. The antennae are shaped like bracelets, and thicker on the outside; and neither the breast nor the elytra are margined. There are no less than 123 species enumerated by Linnaeus, principally distinguished by differences in their colour. They are to be found almost everywhere, in woods, gardens, &c. Their progressive motion is slow; and some when caught emit an oily liquor of a disagreeable smell. The glittering colours with which several species of Chrysoloe are adorned, and which seem to exhibit the brilliancy of gold and copper, have occasioned their bearing that pompous name. The larvae of these insects have in general an oval body, rather oblong and flat; on the fore-part of which are situated six feet, which are feety, as is also the head. They prey upon the substance of leaves, rejecting the fibrous part. Those of the leaping chrysoleme infest the cotyledons and tender leaves of plants. Of this genus is that very pernicious insect called by the country people the turnip fly, which infests turnips and many crops in the garden, destroying often whole fields while in their seeding leaves. In very hot summers they abound to an amazing degree, and, as you walk in a field or in a garden, make a pattering like rain, by jumping on the leaves of the turnips or cabbages. See Plate CXXX, p. 40.

CHRYSOPHYLLUM, or BULLY-TREE: A genus of the monogynia order, belonging to the pentandra class of plants; and in the natural method ranking under the 43d order, viz. Damiaceae. The corolla is campanulated, decussate, with the segments alternately a little patent. The fruit is a ten-seeded berry. There are two species, the cainiro and glabrum, both natives of the West Indies. The first attains 30 or 40 feet high, with a large trunk covered with a brown bark, and divides into many flexible slender branches, which generally hang downward, garnished with spear-shaped leaves, whose under sides are of a bright yellow colour. The flowers come out at the extremities of the branches, disposed in oblong branches, which are succeeded by fruit of the size of a golden pippin, that are very rough to the palate, and astringent; but when kept some time mellow, as is practised here with medlars, they have an agreeable flavour. The second sort never rises to the height of the first, nor do the trunks grow to half the size; but the branches are slender and garnished with leaves like those of the first. The flowers come out in clusters from the side of the branches, which are succeeded by oval smooth fruit about the size of a bergamot pear. This contains a white clammy juice when fresh; but after being kept a few days, it becomes sweet, soft, and delicious. Included are four or five black seeds about the size of thole of a pomkin. Both these plants are frequently preferred in gardens where there are large floyes, and are propagated by seeds, but the plants can never bear the open air in Britain.

CHRYSOPHLENIUM, in botany: a genus of the digynia order, belonging to the decandra class of plants; and in the natural method ranking under the 12th order, Succulentae. The calyx is quadrifid or quinquefid, and coloured; no corolla; the capsule bifidulate, unilocular and polypermous.

CHRYSOPRASUS, or CHRYSOPRASUS, the root of the precious stones mentioned in the Revelations, as forming
CHRYSOSTOM (St John), a celebrated patriarch of Constantinople, and one of the most admired fathers of the Christian church, was born of a noble family in Antioch about the year 347. He studied rhetoric under Libavins, and philosophy under Andragathus: after which he spent some time in solitude in the mountains near Antioch; but the anxieties he endured having impaired his health, he returned to Antioch, where he was ordained deacon by Meletius. Flavian, Meletius's successor, raised him to the office of prebendar five years after; when he distinguished himself so greatly by his eloquence, that he obtained the surname of Golden mouth. Nechtanis patriarch of Constantinople, dying in 397, St Chrysostom, whose fame was spread throughout the whole empire, was chosen in his room by the unanimous consent of both the clergy and the people. The emperor Arcadius confirmed this election, and caused him to leave Antioch privately, where the people were very unwilling to part with him. He was ordained bishop on the 25th of February 398; when he obtained an order from the emperor against the Eunomians and Montanists; reformed the abuses which subsisted amongst his clergy: retrenched a great part of the expenses in which his predecessors had lived, in order to enable him to feed the poor and build hospitals; and preached with the utmost zeal against the pride, luxury, and avarice of the great. But his pious liberty of speech procured him many powerful enemies. He differed with Theophilos of Alexandria, who got him deposed and banished; but he was soon recalled. After this, declining against the dedication of a statue erected to the empress, he banished him into Cucusia in Armenia, a most barren unhospitable place: afterwards, as they were removing him from Petrus, the soldiers treated him so roughly, that he died by the way, A.D. 407. The best edition of his works is that published at Paris in 1718, by Mouretson.

CHRISTAL. See Crystal.

CHUB, or CHUBB, in ichthyology. See Cyprinus.

The habits of this fish are easily found; for they are generally holes, overheard by trees, and this fish will often be seen floating in such a spot on the surface of the water in a hot day in great numbers. They are probably not a poor fish for the table, and are very full of bones; but they entertain the angler very much, and are of the number of those that are easily taken. The best manner of fishing for him is thus: prepare a very strong rod of a sufficient length; fix to the hook a glass hopper; place yourself so as to be perfectly out of sight of the fish, and drop in the bait about two feet from the place where a large chub lies; if he does not see the angler he very seldom fails biting, and is immediately taken; but he is so strong a fish that he should be taken carefully, after a great deal of playing, otherwise the tackle will be in danger; a beetle, or any large fly, will answer the purpose in the place of a glass hopper; and if none of them are to be had, the method of fishing must be altered, and the line be long enough for fishing at the bottom. In March and April this fish is to be caught with large red worms; in June and July with flies, flies, and cherries; but in August and September the proper bait is good cheese pounded in a mortar, with some saffron, and a little butter; some make a paste of cheese and Venice turpentine for the chub in winter, at which season this fish is better than at any other; the bones are less troublesome in this season, and the flesh is more firm and better tasted; the row is also well flavoured in general. The angler must keep this bait for this fish at the bottom in cold weather, and near the top in hot, and the fish will bite eagerly.

CHUBB (Thomas), a noted polemical writer, born at Elst Harnham, a village near Salisbury, England, in 1679. He was put apprentice to a glover at Salisbury, and afterwards entered into partnership with a tallow-chandler. Being a man of strong natural parts, he employed all his leisure in reading; and though a stranger to the learned languages, became tolerably versed in geography, mathematics, and other branches of science. His favourite study was divinity; and he formed a little society for the purpose of debating upon religious subjects, about the time that the Trinitarian controversy was so warmly agitated between Clarke and Waterland. This subject, therefore, filling under the coguience of Chubb's theological affi- mably, he at their request drew up and arranged his sentiments on it, in a kind of dissertation; which was published in 1706, with the title of The Supremacy of the Father asserted, &c. In this piece Mr. Chubb showed great talents in reasoning; and acquired so much
much reputation, that the late Sir Joseph Jekyll, ma-
ster of the rolls, took him into his family to enjoy his
conversation: but though he is said to have been
tempted to remain with him by the offer of a genteel
allowance, he did not continue with him many years;
but chose to return to his friends at Salisbury. He pub-
lished afterwards a 4to volume of tracts, which Mr Pope
informs his friend Gay, he “read through with admira-
tion of the writer, though not always with approba-
tion of his doctrine.” He died a single man in the
68th year of his age, and left behind him 2 vols. of
posthumous tracts, in which he appears to have had
little or no belief in revelation. But however licen-
tious his way of thinking may be deemed, nothing ir-
regular or immoral has been fairly imputed to him in
his life and actions.

CHUDLEIGH (Lady Mary), was born in 1656, and
married to Sir George Chudleigh, baronet, by whom
she had several children: her poems and essays
have been much admired for delicacy of style. She
died in 1716; and is said to have written several dra-
matic pieces, which, though not printed, are pre-
served in the family.

CHUPMESSAHITES, a sect among the Mahome-
tans, who believe that Jesus Christ is God, and the
ture Messiah, the Redeemer of the world; but with-
out rendering him any public or declared worship. The
word in the Turkish language signifies protector of the
Christians. Ricaut says, there are abundance of these
Chupmmessahites among the people of fashion in Tur-
key, and some even in the seraglio.

CHURCH, has different significations, according
to the different subjects to which it is applied.

1. It is understood of the collective body of Chris-
tians, or all those over the face of the whole earth
who profess to believe in Christ, and acknowledge him
to be the Saviour of mankind. This is what the an-
cient writers call the catholic or universal church.
Sometimes the word church is considered in a more ex-
tensive sense, and divided into several branches; as the
church militant is the assembly of the faithful upon
earth; the church triumphant, that of the faithful
already in glory; to which the Papists add the church
patient; which, according to their doctrines, is that
of the faithful in purgatory.

2. Church is applied to any particular congregation
of Christians, who associate together and concour in
the participation of all the institutions of Jesus Christ,
with their proper pastors and ministers. Thus we read
of the church of Antioch, the church of Alexandria,
the church of Thessalonica, and the like.

3. Church denotes a particular sect of Christians
distinguished by particular doctrines and ceremonies.
In this sense we speak of the Romish church, the
Greek church, the Reformed church, the church of
England, &c.

The Latin or Western church, comprehends all the
churches of Italy, France, Spain, Africa, the north,
and all other countries whither the Romans carried
their language. Great Britain, part of the Nether-
lands, of Germany, and of the North, have been se-
parated from hence ever since the time of Henry VIII.;
and continue what we call the Reformed church, and
what the Romanists call the western schism.

The Greek or Eastern church, comprehends the
churches of all the countries anciently subject to the
Greeks or eastern empire, and through which their lan-
guage was carried; that is, all the space extended from
Greece to Maphistania and Phœnis, and thence into
Egypt. This church has been divided from the Ro-
nan, ever since the time of the emperor Phœnas.

The Gallician church, denotes the church of France,
under the government and direction of their respective
bishops and pastors. This church has always enjoyed
several franchises and immunities; not as grants from
popes, but as derived from her from her first original,
and which she has taken care never to relinquish.

These liberties depend upon two maxims; the first,
that the pope has no authority or right to command
or order any thing either in general or in particular,
in which the temporalities and civil rights of the king-
dom are concerned; the second, that notwithstanding
the pope’s supremacy is owned in cafes purely spiritu-
al, yet in France his power is limited and regulated by the
decrees and canons of ancient councils received in the
realm.

4. The word church is used to signify the body of
ecclesiastics, or the clergy, in contradistinction to the
laity. See Clergy.

5. Church is used for the place where a particular
congregation or society of Christians assemble for
the celebration of divine service. In this sense churches
are variously denominated, according to the rank,
degree, discipline, &c. as Metropolitan church, Pa-
triarchal church, Cathedral church, Parochial church,
College church, &c. See Metropolitan, Patri-
arch, &c.

In ecclesiastical writers, we meet with grand church,
for the chief church of a place; particularly in the
Greek liturgy, for the church of St Sophia at Con-
fantineople, the see of the patriarch, founded by Con-
fantine, and consecrated under Julian. It was at
that time so magnificent, that Julian is said to have
cried out in the consecration thereof, Μετεπιστολή; I
have outdone thee, Solomon. The dome, which is
said to have been the first that was built, is 330 feet
diameter.

The first church publicly built by the Christians,
some authors maintain to be that of St Saviour at
Rome, founded by Constantine; others contend,
that several churches abroad, called by the name of
St Peter Virgin, were built in honour of that apostle
during his lifetime.

Church, with regard to architecture, Daviler de-
fines a large oblong edifice, in form of a ship, with
nave, choir, isle, chapel, belfry, &c. See each part
under its proper head.

Church, simple, is that which has only a nave and
a choir.

Church with Ises, that which has a row of porti-
cos, in form of vaulted galleries, with chapels in its
circumference.

Church in a Greek cross, that where the length of
the transept part is equal to that of the nave; so called
because most of the Greek churches are built in this
form.

Church in a Latin cross, that whose nave is longer
than the cross part, as in most of the Gothic churches.

Church in Rotunda, that whose plan is a perfect
circle, in imitation of the Pantheon.

For
For the form of the ancient Greek churches, when they had all their parts, it was as follows: first was a porch, or porico, called the *Naos-Hypostyle*, this was adorned with columns on the outside, and on the inside surrounded with a wall; in the middle whereof, was a door, through which they passed into a second portico. The first of these porticos was defined for the *Energumeni*, and penitents in the first stage of their repentance; the second was much longer, defined for penitents of the second class, and the catechumens, and hence called *stoa poricu*, because those placed in it began to be subject to the discipline of the church. These two porticoes took up about one-third of the space of the church. From the second portico, they passed into the nave, and, which took up near another third of the church. In the middle, or at one side of the nave, was the ambo, where the deacons and priests read the gospel, and preached. The nave was defined for the reception of the people, who here asisted at prayers.

Near the entrance of this was the baptistry or font. Beyond the nave was the choir, called, with seats, and round the bema, the altar, crowned with a baldachin, supported by four columns. Under each of the small apsidies, was a kind of table or cupboard, in manner of a beautil.

Though of the Greek churches now remaining, few have all the parts above described, most of them having been reduced to ruins or converted into mosques.

**High-Church** was a denomination originally given to those otherwise called Non-jurors, who refused to acknowledge the title of William III. to the crown of Great Britain, under a notion that James II. though exacled, was still their rightful sovereign. This appellation was given them, because they entertained high notions of the dignity and power of the church, and the extent of its prerogative and jurisdiction. And those who, contrary, were called low-church men, who disapproved of the secession and obitnity of the non-jurors, distingufhing themselves by their moderation toward dissenters, and were left ardent in extending the limits of church authority. The denomination of *high-church men* is now more generally applied to all who form pommous and ambitious conceptions of the authority and jurisdiction of the church, and who would raise it to an absolute independence on all human power.

**Church-Ale.** See Whitsun-Ale.

**Church-Reves.** the same with Church-Wardens.

**Church-Scot,** or Churchchet, a payment or contribution, by the Latin writers frequently called *primitia feminina*; being, at first, a certain measure of whealt, paid to the priest on St. Martin's day, as the first fruits of harvest. This was enjoined by the laws of king Malcom IV. and Canute, c. 10. But after this, Church-scot came to signify a revere of corn paid to the secular priests, or to the religious; and sometimes was taken in so general a sense as to include poultry, or any other provision that was paid in kind to the religious. See Tithes.
in twelve years of age. In 1666, he was made an ensign of the guards during the first Dutch war; and afterwards improved himself greatly in the military art at Tangier. In 1672, Mr. Churchill attended the duke of Monmouth who commanded a body of auxiliaries in the French service, and was soon after made a captain in the duke's own regiment. At the siege of Namur, which happened in that campaign, he distinguished himself so much that he was taken notice of by the celebrated marshal Turenne, who bestowed on him the name of handsome Englishman. In 1673 he was at the siege of Maastricht, where he gained such applause, that the king of France made him a public acknowledgment of his service; and the duke of Monmouth, who had the direction of the attack, told king Charles II. that he owed his life to Mr. Churchill's bravery. In 1681, he married Sarah daughter and co-heir of (with her sister the countess of Tyrconnel) of Richard Jennings, Esq. of Sandrich, in Hertfordshire. The duke of York recommended him in a very particular manner to the king; who, in 1682, created him baron Churchill, in the county of Berwick in Scotland, and made him colonel of the third troop of guards. A little after king James's accession, he was created baron Churchill of Sandrich in the county of Hertford, and made brigadier-general of his majesty's army in the west; where, when the duke of Monmouth came to surprize the king's army, while the earl of Ferriby and the majority of the officers were in their beds, he kept the enemy in play till the king's forces had formed themselves, and thereby saved the whole army. When James showed an intention of establishing the catholic religion in Britain, lord Churchill, notwithstanding the great obligations he owed him, thought it his duty to abandon the royal cause; but even then did not leave him without acquitting him by letter with the reason of his doing. Lord Churchill was graciously received by the prince of Orange; and was by him employed first to re-assemble the troop of guards at London, and afterwards to reduce some lately raised regiments, and to new-model the army; for which purpose he was invested with the rank and title of lieutenant-general. In 1689, he was sworn one of the privy council, and one of the gentlemen of the king's bed-chamber; and on the 9th of April following, was raised to the dignity of earl of Marlborough in the county of Wilts. He assisted at the coronation of their majesties; and was soon after made commander in chief of the English forces sent over to Holland; and here he first laid the foundation of that fame which was afterwards spread over all Europe. In 1690, he was made general of the forces sent to Ireland: where he made the strong garrisons of Cork and Kinsale prisoners of war. The year following, king William showed the good opinion he had of his conduct, by sending him to Flanders to put all things in readines, and to draw the army together against his arrival. In 1692, he was dismissed from all his employments: and, not long after, was with some other peers committed to the tower on an accusation of high treason; which, however, was afterwards found to be a false and malicious report, the authors of which were punished. Marlborough was soon restored to favour, and in 1698 was appointed governor to the earl of Gloucester; with this extraordinary compliment from king William, Churchill.

"My lord, make him but what you are, and my nephew will be all I wish to see him." The same day he was again sworn one of the privy council; and in July following was declared one of the lord justices of England for the admistration of the government, in which great trust he was three times successively in the king's absence. In 1701 he was appointed general of the foot, commander in chief of the English forces, and ambassador extraordinary and plenipotentiary to Holland. After several conferences about a war, he put himself at the head of the army, where all the other generals had orders to obey him. His exploits in the field have been taken notice of under the article BRITAIN, ii. 349-370: we shall therefore only take notice in this place, of the rewards and honours conferred upon him for these exploits. After this first campaign he was created marquis of Blandford and duke of Marlborough, with a pension of £5,000 per annum of the post-office, to devolve for ever upon those enjoying the title of Duke of Marlborough. In 1703, he met Charles III. late emperor, going to Spain, who presented him with a sword set with diamonds. In 1704, having forced the enemy's lines at Schellenberg, he received a letter of thanks from the emperor Leopold, written with his own hand; an honour seldom done to any but sovereign princes. After the battle of Blenheim, he received congratulatory letters from most of the potentates in Europe, particularly from the States General, and from the emperor, who desired him to accept of the dignity of a prince of the empire, which with the queen's leave was conferred upon him by the title of Prince of Mildenhain in the province of Swabia. After the campaign was ended, he visited the court of Prussia, where he laid such schemes as suspended the disputes with the Dutch about king William's estate; which wise conduct caused the whole confederacy to acknowledge that he had done the greatest service possible to the common cause. Upon his return to England, the queen, to perpetuate his memory, granted the interest of the crown in the honour and manor of Woodstock and hundred of Wotton to him and his heirs for ever. In 1705 he made a tour to Vienna, upon an invitation of the emperor Joseph; who highly carreified him, and made him a grant of the lordship of Mildenhain. After the campaign of 1708, theSpeaker of the house of commons was sent to Brabant on purpose to compliment him; and on his return to England he was again complimented in the house of lords by lord chancellor Cowper. All his services, however, and all the honours conferred upon him, were not sufficient to preserve him from being disgraced. After the change of the ministry in 1710, his interest daily declined; and in 1712, on the first day of the new year, he was removed from all his places. Finding all arts used to render him obnoxious in his native country, he visited his principality of Mildenhain, and several towns in Germany; after which he returned to England, and arrived there on the day of the queen's death. After being welcomed by the nobility and foreign ministers,
Churchill, he attended on king George I. in his public entry through London, who appointed him captain-general, colonel of the first regiment of foot-guards, one of the commissioners for the government of Chelsea hospital, and master-general of the ordnance. Some years before his death, he retired from public business. He died at Windsor-lodge in 1722, aged 73, leaving behind him a very numerous posterity, allied to the noblest and greatest families in the three kingdoms. Upon his demise all parties united in doing honour or rather justice to his merit, and his corpse was interred the 9th of August following, with all the solemnity due to a person who had deserved so highly of his country, in Westminster-abbey. The noble pile near Woodstock, which bears the name of Blenheim-houe, may be justly ascribed to his monument; but without pretending to the gift of prophecy, one may venture to foretell, that his glory will long survive that structure; and that so long as British histories remain, or indeed the histories of Europe, his memory will live and be the boast of Britain, which by his labours was raised to be the first of nations, as during the age in which he lived he was deservedly esteemed the first of men. If he had foible, as these are inseparable from human nature, they were so hidden by the glare of his virtues as to be scarcely perceived or were willingly forgotten. A certain parasite, who thought to please Lord Bolingbroke by ridiculing the avarice of the Duke, was flipt short by his Lordship; who said, "He was so very great a man, that I forget he had that vice."

Out of a variety of anecdotes and testimonies concerning this illustrious personage, collected in the new edition of the *Biographia Britannica*, the following selection may serve to illustrate more particularly his disposition and manners.

One of the first things which he did, when very young, was to purchase a box to put his money in; an indication thus of the economical, not to say avaricious, temper that accompanied him through life. Dr Joseph Warton relates, that, on the evening of an important battle, the Duke was heard to chide his servant for having been so extravagant as to light four candles in his tent when Prince Eugene came to confer with him. Mr Tyers, on the other hand, mentioned a circumstance which, if well founded, redounds to his grace's generosity, though in a different respect it is much to his discredit: It is, that during the rebellion 1715 he lent L 10,000 to the earl of Mar. We consider the story as only a traditional report, which has not in itself any great degree of probability; and therefore we are by no means convinced of its truth. The late Mr Richardson junior, the painter, hath recorded a pleasing instance of the Duke's calmness of disposition; for which, indeed, he was always remarkable. "The Duke of Marlborough (says the writer), riding out once with Commissary Marriot, near the commissary's house in the country, it began to rain, and the Duke called for his cloak; Marriot having his put on by his servant immediately. The Duke's servant not bringing the cloak, he called for it again; but the man was still puzzling about the straps and buckles. At last, it raining now very hard, the Duke called again, and asked him, 'What he was about that he did not bring his cloak?' You must fly (grumbles the fellow), if it rains cats and dogs, till I can get at it.' The Duke only turned to Marriot, and said, 'I would not be of that fellow's temper.'"

The Duke of Marlborough (adds Mr Richardson) did by nature and constitution, what Seneca judged by philosophy ought to be done. *Quid ef quare ego servus biarii, nisi profugius, et contempla eum in turbis, fugitivus et cepitque caput?*

Dr Swift, in one of his letters to Stella, relates the following particulars concerning the Duke of Marlborough. "I was early this morning with secretary St John, and gave him a memorial to get the queen's letter for the first-fruits, who has promised to do it in a very few days. He told me 'he had been with the Duke of Marlborough, who was lamenting his former wrong steps in joining with the Whigs, and said he was worn out with age, fatigue, and misfortunes.' I fear it pitted me; and I really think they will not do well in too much mortifying that man, although indeed it is his own fault. He is covetous as hell, and ambitious as the prince of it: he would have been the general for life, and has broken all endeavours for peace; to keep his debts, and get money. He told the Queen 'he was neither covetous nor ambitious.' She said, 'if the could have conveniently turned about, she should have laughed, and could hardly bear it in his face.' He fell in with all the abominable measures of the late ministry, because they gratified him for their own designs. Yet he has been a successful general, and I hope he will continue his command."

Various characters have been drawn of the Duke of Marlborough; most of which we shall omit, as either already sufficiently known, or as not meriting particular notice. That which is given of him by Dr Swift, in his "History of the four last years of the queen," has all the malignity and meanness of a party pamphlet. It is even so foolish as to intimate, that the Duke's military accomplishments were problematical, and that he was destitute of personal courage. Mr Macpherson's character of his grace is very elaborately composed, and displays no small degree of ability and penetration; though it is not, perhaps, entirely free from prejudice. The historian considers it as a taunt, that lord Churchill, at the time of the Revolution, had a design of placing his unfortunate master king James II. a prisoner in the hands of his rival the prince of Orange. But this story must be regarded as wholly unworthy of credit. It is founded upon suggestions and informations to groundless, and even ridiculous, that it cannot deliver a formal refutation. On the other hand, Mr Macpherson has done justice to the Duke of Marlborough's prosecution of the war in Flanders, and hath shown that he conducted it upon the principles of sound wisdom and good policy.

There are two testimonies to the honour of the Duke's memory, by two celebrated noble writers, which cannot be passed over. One is by lord Bolingbroke, in his letters on the Study and Use of History, speaking of the confirmation roused among the allies of the grand confederacy by the death of King William, and of the joy which that event gave to the French, his lordship observes, that 'a short time showed how vain the fears of some and the hopes of others were. By his death, the Duke of Marlborough was raised to the head of the army, and indeed of the
Churchill. confederacy: where he, as a new, a private man, a subject, acquired, by merit and by management, a more decided influence than high birth, confirmed authority, and even the crown of Great Britain, had, won to King William. Not only all the parts of that vast machine, the grand alliance, were kept more in repair, and even the crown of his lordship, in his zeal to extol the duke of Marlborough's external accomplishments, either forgets or deprecates the far greater talents of which he was possessed. There is an observation upon the subject in the British Biography, with which we entirely concur. "That the duke of Marlborough (says the writer) was eminently distinguished by the gracefulness of his manners, cannot be questioned: but the earl of Chesterfield appears to have attributed too much to their influence, when he ascribes—the better half of the duke of Marlborough's greatness and riches to those graces. That the uncommon gracefulness of his manner facilitated his advancement, and contributed to the success of his negotiations, may readily be admitted; but rarely it must have been to much higher qualities that he owed the esteem of King William and of Prince Eugene. He was the most agreeable, and his many victories and conquests. It was not by a polite exterior that he obtained his laurels at Schei- lenberg, at Oudenarde, at Ramillies, and at Blenheim.

How much the duke of Marlborough has been celebrated by our poets, is well known by Addison's "Campaign," and Philips "Blenheim." Mr Addison, in his Rosamond, has properly assumed another and voluntary occasion of paying a fine compliment to his grace's military exploits, and the glory by which they would be followed. Upon the duke's removal from his places, an ode was inscribed to him by Mr Somerville, animated with all the zeal of whiggish enthusiasm, and containing some passages that are truly poetical. Another ode, not much inferior in spirit, was addressed to his grace, on occasion of his embarking for Ostend in the year 1712.

The duke of Marlborough's Scots title of Baron Eynouth, being to heirs-male, died with himself; but his English title going to his daughters and their heirs-male went into the Spencer family, who retain their own surname of Spencer.

Churchill (Charles), a celebrated faultie, the son of Mr Charles Churchill curate and lecturer of St John's, Westminster, was educated at Westminster school, and received some applause for his abilities from his tutors in that famous seminary. His capacity, however, was greater than his application, so that he acquired the character of a boy that could do good if he would. As the slightest accounts of persons so noted are agreeable, it may not be amiss to observe, that having one day got an exercize to make, and from idleness or inattention having failed to bring it to the time appointed, his master thought proper to chastise him with some severity; and even reproached his stupidity; what the fear of stripes could not effect, the fear of shame soon produced, and he brought his exercize the next day, finished in such a manner, that he received the public thanks of all the masters. Still, however, his progress in the learned languages was a slow; nor is it to be wondered at, if we consider how difficult it was for a strong imagination, such as he was possessed of, to conform and walk tamely forward in the trammels of a school education: minds like...
His next performance was his Apology to the Critical Reviewers. This work is not without its peculiar merit; and as it was written against a set of critics whom the world was willing enough to blame, the public read it with their usual indulgence. In this performance he showed a particular happiness of throwing his thoughts, if we may so express it, into poetical paragraphs; so that the sentence swells to the break or conclusion, as we find in prose.

But while his writings amused the town, his actions disgusted it. He now quitted his wife, with whom he had cohabited many years; and resigning his gown and all clerical functions, commenced a complete man of the town, got drunk, frequented stews; and, giddy with false praise, thought his talents a sufficient atonement for all his follies. In some measure to palliate the absurdities of his conduct, he now undertook a poem called Night, written upon a general subject indeed, but upon false principles; namely, that whatever our follies are, we should never attempt to conceal them. This, and Mr Churchill's other poems, being shown to Mr Johnfon, and his opinion being asked, he allowed them but little merit; which being told to the author, he resolved to requite this private opinion with a public one. In his next poem, therefore, of the Ghost, he has drawn this gentleman under the character of Pomposo; and those who disliked Mr Johnfon allowed it to have merit. Mr Johnfon's only reply to Churchill's abuse was, "that he thought him a shallow fellow in the beginning; and could say nothing worse of him still."

The poems of Night and the Ghost had not the rapid sale the author expected; but his Prophecy of Famine soon made ample amends for the late paroxysm in his fame. In this piece, written in the spirit of the famous North Briton, he exerted his virulent pen against the whole Scotch nation; adopting the prejudices of the mob, and dignifying scurrility by the aid of a poetic imagination. It had a rapid and extensive sale, as the character of Mr Wilkes, who had been impeached by Mr Wilkes; who said, before his modification, that he was sure it must take, as it was at once personal, poetical, and political. After its appearance, it was even ascribed by his admirers, that Mr Churchill was a better Poet than Pope. This exaggerated adulation, as it had before corrupted his morals, began now to impair his mind; several succeeding pieces were published, which, being written without effort, are read without pleasure. His Gotham, Independence, The Times seem merely to have been written by a man who desired to avail himself of the avidity of the public curiosity in his favour, and are rather aimed at the pockets than the hearts of his readers. Mr Churchill died in 1764, of a military fever, which he had gone on a visit to Mr Wilkes. After his death his poems were collected and printed together in two volumes 8vo.

CHURCHING OF WOMEN AFTER CHILD-BIRTH, took its rise from the Jewish rise of purification. In the Greek church it was limited to the fortieth day after delivery; but in the western parts of Europe no certain time is observed. There is an office in the liturgy for this purpose.
CHURCHYARD, a piece of ground adjoining to a church, set apart for interment or burial of the dead. — In the church of Rome they are blessed or consecrated with great solemnity. If a churchyard, which has been thus consecrated, shall afterwards be polluted by any indecent action, or profaned by the burial of an infidel, an heretic, an excommunicated person, it must be re consecrated, and the ceremony of the reconciliation is performed with the same solemnity as that of the blessing or consecration.

CHURCHYARD (Thomas), a poet who flourished in the reigns of Henry VIII. Edward VI. Queen Mary and Queen Elizabeth, was born at Shrewsbury; and inherited a fortune, which he soon exhausted in a frivolous attendance on the court, by which he only gained the favour of being retained a domestick, in the family of Lord Surrey; when, by his lordship's encouragement, he commenced poet. Upon his patron's death, he bestowed himself to arms; was in many engagements; was frequently wounded, and was twice made prisoner. He published 12 pieces, which he afterwards printed together in one volume, under the title of Churchyard's Chips; and also the tragedy of Thomas Monbray duke of Norfolk. He died in 1570.

CHURLE, CEBRE, or Carter, in the Saxons times, signified a tenant at will, who held the thanes on condition of rent and service. They were of two sorts: one rented the estate like our farmers; the other tilled and maintained the demesnes, and were called ploughmen. See CEBRE.

CHURNING, in country affairs, the operation of making butter by agitating milk in a well-known vessel called a churn. For accelerating this operation, a correspondent in the Bath Society Papers recommends a little distilled vinegar to be poured into the churn; and the butter will be produced in an hour afterwards. He acknowledges, however, that his experiments have not as yet ascertained the exact quantity of the acid which is necessary to the proper effect, nor the precise time of its being mixed with the cream. But he apprehends a tablespoonful or two to a gallon of cream will be sufficient; nor would he recommend it to be applied till the cream has undergone some considerable agitation. His first trial was after the churning had been going forward half a day: whether he observed the same rule afterwards, he does not say; but all his trials proved successful, the butter being uniformly obtained in about an hour after the mixture.

CHUS, or Chief (Bible). It is a tradition of an ancient standing, that the Chus of the Scriptures denotes Ethiopia, and Chief an Ethiopian: the Septuagint and Vulgate constantly translate it so; and in this they are followed by most interpreters, and by Josephus and Jerome. And yet what Bochart urges to the contrary is of no considerable weight, from Ezekiel xxix. 10, in which the two opposite extremities of Egypt are designated: and therefore Chus, which is opposite to Syene, must be Arabia: but this is more strongly pointed out by Xenophon, by whom Ethiopia is said to be the fourth boundary of Cyrus's empire; and Herodotus distinctly gives the Ethiopians of Asia and Africa, conjoining the former with the Arabs.

CHYLE, in the animal economy, a milky fluid secreted from the aliment by means of digestion. See Anatomy, p. 734, 735.

CHYLIFICATION, the formation of the chyle, or the act whereby the food is changed into chyle. The chyle has by some authors been thought to have a great resemblance in its nature and chemical analysis to milk. The subject, however, hath not yet been but little inquired into. See the article MILK.

CHYME, or CHYMUS, in the common signification of the word, denotes every kind of humour which is intragated by concoccion; under which notion it comprehends all the humours fit or unfit for preserving and nourishing the body, whether good or bad. It frequently imports the finest part of the chyle, when separated from the faeces, and contained in the largest and thoracic duct.

CHYMISTRY. See CHEMISTRY.

CHYMIOLOGI, an appellation given to such naturalists as have employed their time in investigating the properties of plants from their taste and smell.

CHYMOSIS, in medicine, the act of making or preparing chyme. The word comes from Gr. χυμός; from χυμος, fume; χυμη, "I melt." Chymos, according to HOCART, is the foundation of the concoctions made in the body; being a repeated preparation of the most impure and gross parts of the chyle, which being rejected by the ladeals, is imbied by the mederas, and thence carried to the liver, to be there elaborated, purified, and foemolized aferile. It is of this, according to Rogers, that the animal spirits are formed.

CHYMOSIS is also a distillation of the eye-lids, arising from an inflammation; also an inflammation of the tunica cornea in the eye.

CHYTLE, in antiquity, a liquor made of wine and oil, and sometimes used in divination.

CHYTRI, among the Athenians, a festival in honour of Bacchus and Mercury, kept on the 13th of the month Anthesterion.

CHYTRIUM (anc. geog.) a place in Jonia, in which formerly stood Clazomenae; the Clazomenians through fear of the Persians, removing from the continent to an adjacent island (Paunias). Alexander reduced the island, by a mole or causeway, to a peninsula.

CHYTRUS (anc. geog.), an inland town of Cyprus, to the north of Cition: famous for its excellent honey.

CIBALAE, or CIBALIS, (anc. geog.), a town of Pannonia Inferior, on an eminence, near the lake Hulka, to the north-west of Sirmium; the country of the emperor Gratian, where he was brought up to ropemaking; a place rendered famous for the surprisal and defeat of Licinius by Confantine.

CIBBER (Colley), a celebrated comedian, dramatic writer, and poet laureat to the king, was born at London in 1671. His father Cains Gabriel Cibber, was a native of Holstein, and a skilful statury, who executed the baso relieve on the pedestal of the monument, and the two admired figures of lunatices over the piers of the gate to Bethlehem Hospital in Moorfields. Colley, who derived his Christian name from the surname of his mother's family, was intended for the
the church, but betook himself to the flags, for which he conceived an early inclination; and he was some time before he acquired any degree of notice, or even a competent falery. His first essay in writing, was the comedy of Love's Left Shift, acted in 1695, which met with success; as did his own performance of the character of the fop in it. From that time, as he says himself, "My muse and my spouse were so equally prolific, that the one was seldom the mother of a child, but in the same year the other made the father of a play. I think we had a dozen of each fort between us; of both which kinds some died in their infancy, and near an equal number of each were alive when we quitted the theatre." The Careless Husband, acted in 1704, met with great applause, and is reckoned his best play; but none was of more importance to him than the New-venur, acted in 1718, and leveled against the Jacobites. This laid the foundation of the misunderstanding between him and Mr Pope, raised him to be the hero of the Dunciad, and made him poet laureat in 1730. He then quitted the stage, except a few occasional performances; and died in 1757. Cibber neither succeeded in acting nor in writing tragedy; and his odes were not thought to partake of the genius or spirit he showed in his comedies.

His son Theophilus, also a comic actor after him, was born during a great storm in 1703; and after passing a life of extravagance, diætes, and perplexity, perished in another storm in 1756, in the passage between Dublin and England. Theophilus married the sister of Thomas Angustine Arne, the famous musical composer, who became a celebrated tragic actor, and whose honour was sacrificed to her husband's extravagance.

CIBDELOPLACIA, in natural history; a genus of saps debased by a very large admixture of earth; they are opaque, formed of thin crusts, covering vegetables and other bodies, by way of inclusions.

Of this genus we have the following species: 1. A greyish-white one, with a rough surface. 2. A whitish brown one; both these are friable. 3. A hard, pale-brown kind, which is the oëcoca of the heaps. 4. The whitish grey kind, with a smooth surface; this is the unicorn's foot, and the ceratites of authors.

CIBDELOSTRACIA, in natural history, terræ saps, duplicate of all brightness and transparency, formed into thin plates, and usually found coating over the sides of fissures, and other cavities of foses, with congersies of them of great extent, and of plain or botryoidy surfaces.

Of these there are usually reckoned seven kinds: the first is the hard, brownish-white cibdelostracium, found in Germany; the second is the hard, whitish cibdelostracium, with thin crusts, and a smoother surface, found also in the Harts-forests in Germany; the third is the hard, pale-brown cibdelostracium, with numerous very thin crusts, found in helleboran caverns in many parts of England as well as Germany; the fourth is the white, light, and friable cibdelostracium, found also in Germany, but very rarely in any part of England; the fifth is the light, hard, pale-brown cibdelostracium, with a smooth surface, found in almost all parts of the world; the sixth is the whitish, friable crustaceous cibdelostracium, with a rough surface, frequent in Germany and England; and the seventh is the brownish-white friable cibdelostracium, with a dusty surface, found in several parts of Ireland, as well as Germany.

CIBORIA, in antiquity, the large hulse of Egyptian beans, which are said to have been so large as to serve for drinking cups; whence they had their name ciborium, signifying a cup, in the Egyptian language.

CIBORIUM, in ecclesiastical writers, the covering for the altar. This covering is supported by four high columns, and forms a kind of tent for the eucharist, in the Romish churches. Some authors call it turris gellatoria and others pyxis; but the pyxis is properly the box in which the eucharist is preserved.

CIBUS FERIALIS, in antiquity, an entertainment peculiar to a funeral; for which purpose, beans, parly, lettuce, bread, eggs, lentils, and salts were in use.

CICADA, the Frog-hopper or Flea-locust; Plate in zoology, a genus of insects belonging to the order CXLIX. of hemiptera. The beak is injected; the antennæ are fetteous; the four wings are membranaceous and deflected; and the feet, in most of the species, are of the jumping kind. The species are fifty-one. The larvae of several of this genus evacuate great quantities of a frothy matter upon the branches and leaves of plants, in the midst of which they constantly refuse, probably for shelter against the search of other animals, to which it would become a prey. Nature has afforded this kind of defence to insects whose naked and soft bodies might otherwise very easily be injured; perhaps also the musculature of this foam may serve to screen it from the fultry beams of the sun. On removing the foam, you discover the larva concealed underneath; but it does not long remain uncovered. It soon emits fresh foam, that hides it from the eye of observation. It is in the midst of this foamy substance the larva goes through its metamorphosis into a chrysalis and perfect insect. Other larvæ, whose bodies are not so soft, run over plants without any manner of defence, and escape from insects that might hurt them, by the nimbleness of their running, but especially of their leaping.

The chrysalids, and all the larvae that produce them, differ little from each other, only that the former have the middiments of wings, a kind of knob at the place where the wings will afterwards be in the perfect insect. As to other respects, the chrysalids walk, leap, and run over plants and trees; as do the larva and the frog hopper, which they are to produce. At length they throw off their teguments of chrysalids, slip their last skin, and then the insect appears in its utmost state of perfection. The male alone is then endowed with the faculty of singing, which it exercises not with its throat, but with an organ situated under the abdomen. Behind the legs of the male are observed two valves, which, raised up, divulge several cavities, separated by various membranes. The middle contains a feally triangle. Two vigorous muscles give motion to another membrane, which alternately becomes conical and convex. The air agitated by this membrane, is modified within the other cavities; and by the help of this sonorous instrument, he amorously solicits his female. By pulling the muscles of a frog-hopper lately dead, it may be made to sing. This insect begins its song early in the morning, and continues it during the heat of the noon tide sun. Its lively and animated music is to the country
**Cicada**

Cicada. *Cicada pectinicornis*, or Locust of North America, ranks with the cricket and grass-hopper, as one genus of insects belonging to the order of hemiptera, and has most of the distinguishing characteristics of the grass-hopper, though its legs do not appear formed for leaping, as it is observed the insect seldom removes without raising its wings. The characters of the Cicada, or American locust, are these: The beak is inflected; the antennae are fuscous; the four wings are membranaceous, and delicately, and have much the appearance of the wings of some of the fly kind; the thorax is compressed and angulated, and the feet, in most of the species, are of the jumping kind. A gentleman who observed it in Pennsylvania in 1782, gives the following account.

"This remarkable insect, though but trivial attention has been given to its history, appears as an extraordinary phenomenon in the works of creation. Its periodical visits—its long absences—its number being from the earth, where they have, perhaps, undergone various transformations, whilst they have lain, entombed, for the space of 15, 16, or even 17 years, (for they are not always regular in their visits) certainly deserve some enquiry.

"We know not the progress of the American locust, through its several changes during its long confinement in the earth. I have no doubt but it often alters its appearance, and though these changes remain, as yet, amongst the arena of nature, yet some interesting observations may result from the pursuit of the enquiry, as far as their last appearance, which was in the year 1782, will admit of.

"Towards the latter end of May, under such trees as had been planted, previous to their former visit, the ground was perforated; so as, in some degree to resemble a honey-comb; and from these perforations, issued an army of these insects, which, if they had been ended with the voracionsness of the locusts of the east, must have spread devastation and terror throughout the country they fixed upon for a visit. But happily the cicada or locust, in this state, is not more injurious than the spurious summer grass-hopper.

"The appearance of the locust, when first escaping from its earthly manse, is a large amber-coloured grub-worm, about one inch and a half in length, and about an inch and half in circumference. The feet are somewhat flattened, as those of the grasshopper, and considerably shorter;—the insect seldom leaping, as has been observed,—in the outer covering, or grub-case, if the term may be admitted, near the back of the neck, begins an opening, which continues down the body, nearly half the length of the insect; through this opening the locust protrudes itself, and appears, at first, a white coloured moth, nearly resembling a filk-worm, in its moth state, though much larger. The wings in this tender state of the insect are wonderfully folded in close rolls near their base, so exquisitely compact, that it required several careful observations, to comprehend the possibility of the wings being formed with the insect, as it really appeared an almost instantaneous creation, when they were expanded, which was performed by the locust shaking itself with a considerable force.

"When the insect relieves itself from the outer covering or grub-worm case, the wings are of the hue of rich milk. In this state, the filaments, which add strength to them, are of the same white colour, and instead of the transparency which they afterwards obtain, they are now remarkably opaque; but as soon as the moisture dries from off the wings of the insect, these filaments become more firm, and have a dark brown colour which approaches a black, as the locust becomes stronger.

"The time when they issue from the ground, is about an hour or two after fun-set; soon after which they begin their exertions to free themselves from the grub-case, which the stronger ones effect in an hour or two. They remain on the branches of the trees, which they have attained, before this last metamorphosis until morning, when they are of an high amber colour; have acquired their strength, and are able to contend with some of their enemies. The weaker ones, and those who do not leave the earth till morning, do not so easily effect their transformation, and often prove a delicious prey to the larger and even the smaller birds.

"White in the grub-worm state, there is a film in the back of the skin, sufficiently large to admit the locust to pass therefrom, which, notwithstanding, is not done without great exertions. At the time of their leaving the grub-case, for it cannot be, with propriety, termed a chrysalis, life and motion is strong in the insect, even when it is about affuming its new form. And when we consider that every particular limb, every part of the body however delicately and tenderly formed,—and really some of them, at this time, are almost incomprehensibly thin and tender—is included in a separate case, and that these tender parts must be necessarily extricated from their sheaths, before the insect can enjoy uninterrupted freedom, we certainly feel our astonishment increase, in observing, that those so elegantly formed members escape uninjured from even the extremities of their covering. When this escape is effected, the insect leaves the place where its covering is, and rests at a very short distance from it, where it remains until the moisture is evaporated from its body. The wings, as well as the insects, when first protruded from the grub-case, are very moist and tender; though by degrees they dry, and become more firm and rigid. But should any accident prevent the cicada from a free expansion of its wings, for a considerable time after the grub-case is forsaken, the poor insect is doomed to remain either in a state of total or partial debility—all that should it be too weak as to be unable to expand its wings thoroughly, while the moisture and pliancy remain, as soon as they become dry and rigid, they are fixed in that particular or total want of expansion; and in this helpless state, the cicada is a certain prey even to the long-appalled indolent emmer.
 Cicada.

"The locust-grub, rising from the ground, is nearly the colour of the locust when it has attained its full perfection, though not altogether as dark; its strength is very great, nearly equaling that of the scarabaeous car
defly, without a leader, as is usual with the eastern locusts) were they to feed on plants the damage must certainly be observable: and as they live in the moth state twelve or thirteen days, it is probable they have a portion of the dew of heaven for their sustenance. Then they dry up as the silkworm moth,—the male becoming superannuated two or three days before the female.

"Having pursued the locust thro' its several moth states, the numerous offspring it has deposited in the slender twigs of trees, have filled some claim to an investigation.—The eggs are of a cylindrical form, rounded at the ends, and are of such a consistence, that they require a hard pressure between the fingers to crush them. The substance within, as in most other small eggs, is a white, transparent, and viscous fluid. In about the space of fourteen days, from the time of their first being left by the parent, the egg produces a whitish insect, somewhat larger than the silk-worm, when fresh hatched, which leaves the branch where the nest was, and, dropping on the ground, either enters into the hole through which the old locust filled, or turns the earth aside afresh, and entombs itself there, to undergo the metamorphosis of its ancestors.

"In digging wells, cellars, &c, in America, insects of very different appearances have been discovered: some twenty feet deep, which have been supposed to be of this species—others have been discovered nearer the surface, of which no doubt remains but that they are the grub of the locust—and early in the spring, previous to their assuming the moth state, the plough
thare often furnishes the blackbird, which follows the ploughman, with a rich repast of them; for which, by his clamours and flutterings, he endeavours to express his obligations. Varieties of this genus appear annually, they are in general much larger than the cicada septendecim, and of a greyish colour: the dark brown or amber colour which the others have, appearing in these mottled with a dirty white."

CICATRICULA, among natural historians, denotes a small whitish speck in the yolk of an egg, supposed to be the first rudiments of the future chick.

CICATRIX, in surgery, a little seam or elevation of callous flesh rising on the skin, and remaining there after the healing of a wound or ulcer. It is commonly called a fear.

CICATRIZANTS, in pharmacy, medicines which assist nature to form a cicatrix: Such are Armenian be, powder of turfy, &c.

Cicatrizants are otherwise called scabretries, sputules, incurvatarum, agglutinans, &c.

CICCA, in botany, a genus of the terrandria order, belonging to the monoeia class of plants. The male calyx is teraphyllous; there is no corolla: the female calyx tripphyllous; no corolla; four stiles; the capsule quadrilocules, or four berried.

CICELY,
CICELY, in botany, the English name of a species of chlorophyllum. See CHLOREPHYLLUM.

Cicer, or Chick- pea, in botany: A genus of the dervandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the Papilionaceae, or 32d order. The calyx is quinqupartite, as long as the corolla, with its four uppermost segments incumbent on the vexillum: the legumen is rhomboidal, turgid, and dispermous. There is but one species, which produces pea-shaped like the common ones, but much smaller. They are much cultivated in Spain, where they are natives, being one of the ingredients in their oils; as also in France; but are rarely known in Britain.

END OF THE FOURTH VOLUME.

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